SEVENTH ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY.

1883.

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1883.

THE STATE BOARD OF HEALTH.

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REPORT OF THE SECRETARY OF THE BOARD.

To His Excellency George C. Ludlow,

GOVERNOR—The State Board of Health of New Jersey begs leave to present to your Excellency its seventh report. The duty assigned to us in the constituting act was "to take cognizance of the interests of health and life among the citizens of this State; to make sanitary investigations and inquiries in respect to the people; the causes of disease, and especially of epidemics; the sources of mortality, and the effects of localities, employments, conditions and circumstances on the public health, and to gather such information in respect to these matters as it might deem proper for diffusion among the people." Since that time various other laws have been placed upon the statutes of the State, which have assigned to us other important duties. In the fulfilment of these obligations we find ourselves charged with responsibilities that relate to high social and industrial interests of the citizens, and that most directly concern the welfare of our whole population.

While there is a general consent to the fact that health is a great blessing, and that the preservation of life is, as a rule, the essential duty of a good government, there is not an adequate appreciation of the value of wellness as a source of strength and prosperity to a State. Industry, capital and security depend upon it as a resource. To foster it is to foster the dearest interests of a people. As science, observation and statistics are constantly showing how many deaths are avoidable and how many diseases are preventible, there is no direction in which intelligent judgment and reasonable expenditure yields better results. It cannot be concealed that premature death and burdens of sickness are constantly resulting from insanitary conditions which never should have occurred. The common consent that nuisances injurious to health must be abated, is an argument that such as could have been avoided should never had occurred. The liberal outlay made to stop an

epidemic after it has attained headway, suggests that a truer economy would have been to avoid its causes or deal with it in the first household. With regard to our own country and our own State, it is not unsafe to re-affirm that the same is true as was some time since asserted by Mr. Simon in reference to England:

"It is the common conviction of those who have most studied the subject, that the deaths which occur are by fully a third part more numerous than they would be if *existing* knowledge of the chief causes of disease were reasonably well applied throughout the country. This annual excess has the terrible further meaning that, as a rule, each death represents a number of other cases in which preventible disease, not fatal, has had far-reaching ill effects on the continued life, or added the many embarrassments which occur from more fatal attacks of sickness.

"Death accounts also, whose figures, arithmetically, make but little show, may, for administrative purposes, have immense meaning. One or two deaths in some village may, in hundreds of instances, correspond to long-continued local conditions of scandalous filth and unwholesomeness; one or two deaths by scarlatina or small-pox, almost unnoted in regard of some considerable town, may represent the beginning of what, three months later, will be a terrible epidemic, agitating the community with distress and fear, and adding prodigiously to the whole year's death rate of the place. In proportion as a disease is present the time of preventing it is past; but, for practical purposes, it is indeed all-important to remember that sanitary administration has its hope of success in preventing, not in arresting, great epidemics; and that if warnings are not taken from the smaller excesses of disease, *catastrophes*, not further warnings, may be next to come. It seems almost unnecessary to add, that a method of procedure which waits for death as its ground of action, may peculiarly dispense with cumulative proofs; and that, as no one preventible death can be remedied in regard of him who has suffered it, so the record of it may the more emphatically claim to be read as a protest on behalf of others."

No one can make even a cursory or superficial study of the contrasts between the death rates and sickness rates of city and country, or parts even of the same city, without learning that these are often but the forcible declaration that either the persons or the places are not conforming to the known laws of healthful existence. Sanitary art, made up as it is of medical and mechanical knowledge, and having ascertained how it is possible to make ground and houses best adapted for human dwelling-places, and how men, women and children should live so as to be true to the demands of sound humanity, no longer

admits that it does not know how to improve the social conditions of a people. The last annual report of the Registrar-General of England (44th, Abstracts of 1881) says: "There is nothing in the series of annual reports issued by this office that comes out more distinctly and unmistakably than the wonderful effects which the sanitary operations of the last decade have had in saving life. The death rate for this year, in England, was 18.9 per 1,000 living. The death rate in the urban population, consisting of some fifteen and a half million persons, was 20.3; while that of the rural population, comprising some ten and a half million of persons, was 16.8. Comparing the years for 1862–71 with those of 1872–81, the deaths in the latter were so much less in proportion that 392,749 persons who, under the old regime, would have died, were, as a matter of fact, still living at the close of 1881. Add to these saved lives the avoidance of at least four times as many attacks of non-fatal illness, and we have the total profits as yet received from sanitary expenditure." These facts are valuable to us for comparison, since they extend over twenty years, and are furnished by skilled observers, and accepted by the best authorities. They relate to a nation in which the teeming population, and the great obstacles constantly presenting, make such an attainment the best assurance of greater possibilities. "There can be no real doubt," says the report, "that the saving effected in life was the direct product of the money and labor expended in sanitary improvement."

The deaths for the State of New Jersey, for the year reaching from July 1st, 1882, to July 1st, 1883, were 23,310; which is a considerable decrease from the previous year, while the marriages and the births have increased. Fuller particulars will be found in the report of the Medical Superintendent of Vital Statistics. A review of the past year, and of the period to which these vital returns relate, together with abundant other testimony afforded to this Board, assure us that both the public and the local health authorities are realizing the great significance of health and care, and the value of those improvements which secure good water, proper disposal for decomposable substances, good houses, cleanly habits, and chances for employment deprived of all avoidable insanitary conditions. Several cities and townships have entirely modified their health administration, and others are so agitating the need as to be sure, eventually, to bring about desired results. The summary of reports from local Boards is well worthy of study as a guide. The relation of the State Board to local Boards has proved of signal advantage to both. Information and guidances are secured,

and that unity and coöperation which gives a system of health administration more and more tending toward efficiency and completeness.

LEGISLATION AND PUBLIC HEALTH.

Sanitary art is so new in its practical application to the wants of communities that it cannot be expected that the courts should abound in precedents, which, in law, so much guide decisions. It is an encouraging starting-point that common law is very considerate of the rights of the individual to be protected from nuisances. It does not always claim that these must be shown to be injurious to public health; but even if they cause decided, frequent discomfort to the public in general, or to ordinary persons of the immediate vicinage, the law calls for their abatement. If the nuisance is not one attended with smoke or odors, but is one which is shown to cause sickness, it is easily abated under the law of nuisances. So long as there are differences of opinion among medical men or sanitarians as to the relations of certain causes to disease, so long will courts and juries have to gather facts and opinions, and be governed by the weight of testimony. As there is often defect in testimony, or in evidence, it cannot be expected that every case will be decided according to the views of Boards of Health. So pronounced, however, is the common law in its declarations as to nuisances, and so evident is its possibilities of relief, as in the mill-dam case at Bound Brook, that the mode of indictment, grand jury complaint and jury trial is never to be lost sight of in that class of cases in which there is no occasion for haste. As, however, there are many cases where delay is dangerous, and as the assumption of danger to health, if real, is always a peril to somebody and to life itself, law is wise in providing methods of more speedy relief. One of these methods, which has been found very useful, is that by Court of Chancery. So far as we know, the claims to summary proceeding in cases where the public health is concerned have been fully recognized by this court.

In a case in Elizabeth, where a factory, in dealing with irritating acids and the sludge from petroleum refineries, was strongly complained of, Chancery granted an expert commission, with power to control, to experiment and to report, as to whether it would be possible to conduct the business and yet secure comfort to the residents of the vicinity. As the general law which gives this power does not reach

all cases, the Legislature, in 1883, passed a law, of which the following are sections (Sections 10, 11, 12, Ch. CV.):

"10. *And be it enacted*, That any such Board of Health, instead of proceeding in a summary way to abate a nuisance or such source of foulness, may file a bill in the Court of Chancery, in the name of the State, on the relation of such Board of Health, for an injunction to prohibit the continuance of such nuisance or source of foulness, and such action shall proceed in the Court of Chancery according to the rules and practice in such cases on the relation of individuals, and cases of emergency shall have precedence of other litigation pending at the time in the Court of Chancery, and may be heard upon final hearing on such notice as the chancellor shall direct.

"11. *And be it enacted*, That in all cases in which it shall be ascertained by the Court of Chancery in such suits that a nuisance or source of foulness existed at the time of finding such bill, substantially as set forth in the same, the court shall have power to abate the same, by injunction or otherwise, according to the practice of the court, and may charge the costs of such suit upon the property whereon such nuisance or source of foulness is found, and enforce the same by sale of the said property on writ of *fieri facias*, or so much thereof as shall be necessary for that purpose, or the said court may order the person or corporation which caused said nuisance or source of foulness, or allowed the same to continue, to pay such costs, and enforce obedience to such order.

"12. *And be it enacted*, That in case no nuisance or other source of foulness, hazardous to the public health shall be found to exist, costs shall not be awarded as of course against the Board of Health which caused such suit to be brought, but only in case it shall appear to the chancellor that no probable cause existed for bringing such suit."

Under this law, a case from the Board of Health of Washington borough, in Warren county, and another from Bridgewater township, in Somerset county, and another from the city of Trenton, have been before the Court of Chancery. These related to cesspools and the pollution of streams, and showed the value of this method of procedure.

The third course of procedure recognized in our law is that which is intended to authorize Boards of Health to view and pronounce upon nuisances. The first sections relating thereto are to be found in Ch. CLV. of the laws of 1880, being Sections 7 and 8 of the law. This law intends to recognize sanitary administration as at times or in some of its methods being of the character of a police power, viewing the Board or its inspector as dealing with a sanitary police measure justifying and requiring summary proceeding. Such a principle has been fully recognized in English courts and in some of our own States.

References can be found in articles in our third and fifth reports, by E. S. Atwater, counselor-at-law, and also in an article by him in the New Jersey Law Journal, May, 1883, entitled "The Police Power and Boards of Health." Two points have seemed to be disputed in this State in decisions made before the mode of procedure, as now designated in legislative enactments, were made. The one is that judgment cannot be pronounced in a case until the person concerned has been summoned to appear, and so have notice and opportunity to be heard. The answer now made to this is that there are cases where the immediate interests of health may not permit of this, and that the sections of the law, as at present framed, provide against oppression. The danger of invasion of the rights of all the citizens are, in such cases, greater than the danger of invasion of the rights of the individual, who is provided also with prompt methods of appeal. On this point this Board has been instructed that the action had is not of the nature of a trial, but a viewing and a pronouncing under the necessities or proprieties of the case, the time for hearing being as soon after as may be, and the Board having to rest the ground of their action on its ability to prove the fact of the nuisance and peril to public health. While it is believed such a view in a case of appeal, where this is the main question at issue, would be sustained, there are others who think it better to serve notice and call the person concerned to a hearing, and then to proceed, not as by trial, to pronounce whether or not the thing complained of needs summary abatement under this law.

Another method by which a Board may "examine the matter in a summary way," is to go before a police justice, and summon the party to appear. In a case tried in this way in an action of the Board of Health of Paterson, the defendant asked a jury, but the justice decided that under the law it was a summary proceeding which did not entitle to a jury at this stage. Such is the spirit and intent of a law intended for a sanitary police measure. The claim for such procedure in peril to public health is as defensible as in numberless cases that come before a police justice, or a justice of the peace acting as such. It was hoped that this case would go up by appeal, but it has not. On appeal it is fully recognized by Boards of Health that their defense must be the fact of nuisance, and that their modes of inspection and of abatement of nuisance have been such as the law and the necessities of the case justify, and that the costs have not been exorbitant.

It is clear that where inspection is forbidden or resisted, or where attempted removal by the Board of the nuisance is forbidden or resisted, there must be resort to a warrant or other proper method of going upon private premises. Two efficient city Boards have been unable to sustain their cases because of irregularity in these respects. This only shows that full legal advice is required in such cases, and that the forms of law must be observed. As public opinion is generally with Boards in the abatement of nuisances, the great objects of a Board are generally accomplished without that factious opposition which is sure, occasionally, to be met. Yet even this is found, as a rule, to lead to such inquiry as to aid a Board in its work. The powers now conferred on Boards of Health, in this State, are adequate to most emergencies, and, in general, such as will be sustained by the courts, unless they are exercised in a way that cannot be defended. For the time being, the Board must judge of the fact of nuisance. This does not, and probably ought not, prevent their being called upon afterward to rest their right of abatement on their ability to show to a court or jury that the thing complained of was actually a nuisance, although some decisions in other States have recognized the judgment and decision of a Board to be that of experts, and thus final as to the fact. The State Board of Health has, in connection with most of the health laws of this State, availed itself of the opinions of excellent legal and legislative authorities, and believes that the rights of local Boards are as likely to be maintained before the courts as those of any other constituency.

The recent decision (November, 1883,) of the Supreme Court of New Jersey on the milk adulteration act, and the opinion of the court, as delivered by Justice Reed, has important bearing on other laws of the State relative to public health, and confirms these views.

WATER-SUPPLY.

The question of water-supply is so important that it very properly attracts constant attention in this State. The fact that nearly one-half the population of the State is so located, in Hudson, Essex and Union counties, as not to be able to be supplied by wells, necessitates the most careful consideration of the sources of public supply. Intermediate or adjacent rivers are so available for manufacturing and sewerage purposes, that the lines of safety must be closely and accurately drawn. A special commission was, two years since, authorized by the State, in order to determine the best permanent

sources of supply. Owing to inadequacy of appropriation, no survey was made the first year, but under special provisions of the last Legislature, the commission has been steadily at work for the present year, and will no doubt aid in determining the best sources of supply.

It is gratifying to know that in various localities, Boards of Health have directed attention to the need of special inquiry into the value of well waters, the feasibility of cisterns, and to more public sources of supply. Scarcely a town of any prominence, not already supplied, but that has considered the subject. Princeton has secured its supply from a ridge of gravel which was fully tested by competent engineers, both as to quality and capacity, before choice was made. The well is about 25 feet in diameter and 20 feet deep, and is estimated to furnish 150,000 gallons per day. The stand-pipe, 60 feet high, is placed on a trestle 60 feet high. While the question of source of water-supply must always be a relative one, there are many localities where it is best to rely upon gravel beds or nature's store-house in the ground, instead of upon streams surrounded by alluvial soils and carrying an excess of decomposable matters. Skilled aid is always to be sought in making the choice. We know of an instance in this State where a well-intentioned Board has probably made a great error, and entailed much loss upon the city. The Atlantic City water-supply and stand-pipe mark an advance in its history. Ocean Grove has completed its driven well, which goes to a depth of 422 feet, and gives a present supply of 50 gallons per minute. The water is chemically very pure, and at present promises to afford abundant supply. If this proves as constant as expected, no doubt other similar wells can be placed at various localities. Gloucester City has water-works of recent construction. Several other cities are examining into methods of supply or adopting needed improvements.

There is need of some care in placing the water-supply of cities in the hands of companies, since when these are once established it is found difficult to correct any defects as to the quality of supply. Generally, cities should have control of so important an interest. The cleansing of reservoirs and the examination of pipes is too often neglected. A recent cleaning of the Camden reservoir showed an unexpectedly large deposit, and resulted in great improvement of the water-supply. Where water is periodically bad, companies or the people should not accept speculative views as to causes, but avail themselves of those facilities for knowing which science and art so readily afford. We find in too many cities which have a water-supply, that

some of the people rely on wells of doubtful purity. Where this is the case, city authorities should have wells examined, and not allow their use if found to be contaminated. It is very frequently the case that wells are not properly protected at the surface of the ground. It is much the best to have the stone or brick laid in cement for at least three feet from the surface, and then have a stone or arched covering. No water should be allowed to drip back into the well, and the stone itself should be so compacted round about as that no washings of any kind can enter. As the well is the natural drain for the soil for many yards around, the adjacent soil should never receive slops or soiled liquids of any kind, or compost, more than such as can quickly be disposed of by the air and the vegetation. We recently saw a well surrounded by a thick layer of compost; the idea of the owner being either to protect it from cold or to make the ground very rich in the house yard. As a rule a sterile soil around the well is best. Recent investigations are attaching more importance to wells as related to malaria. It is now claimed more than ever before, that in malarial districts the water is often a source of malaria, when the air would not alone cause the manifestation of the disease. The need of a pure water everywhere is such that too much cannot be said in its behalf. I had occasion to examine a well this year, within twenty feet of which one person was dead of typhoid fever and another very sick; the privy was less than two feet from the well, but because it was a driven well of eighteen feet and the vault was only five, the inmates of the house had apprehended no danger. The rinsing of utensils at the well is entirely a too common practice. Water, in numberless instances, has been proven to be the conveyancer of disease, and, where suspected, should always be boiled if intended for drinking purposes.

SEWERAGE.

Questions as to sewerage have pressed themselves upon the attention of the cities and larger towns of the State as never before. No longer is any health resort able to certify to its health attractions unless it can show just how it disposes of its liquid refuse, garbage, etc. That, as a rule, it must not be stored or ponded upon the premises, under ground and out of sight, is now generally conceded. Most of the growing inland cities of the State have come to the same conclusion. The sad effects from the gases of a Passaic cesspool has recently afforded us evidence of what an accumulation of foul gases and organic matter

can do. Where, from temporary necessity, vaults are used, the imperative necessity of frequent and skilled cleansing is admitted. The cesspool, built so as to leak out its liquid unseen into the ground surrounding dwellings, is no longer defended to any large extent. Such leakage can only be justified under special and regulated conditions of soil, locality, emptying and cleansing. Where tight cesspools are used, the quantity of spoiled liquid that accumulates renders its removal quite expensive. Water-carriage, or the conveyance of the fouled liquids and macerated solids by means of sewers, is more generally advocated. Hence, many of our cities are either considering or executing plans of sewers. Atlantic City has consummated a contract to remove, by sewer pipes and water-carriage, all sewage, miles beyond the city limits. Ocean Grove discharges into the ocean by a continuous flow, carrying the sewage out in its fresh state, and to such a distance as renders, it is said, any return impossible. Asbury Park receives it in well-constructed sea-side cesspools, and then discharges at frequent intervals out into the sea. Other of our resorts depend upon the daily dry removal of all closet material. A few still cling to series of cesspools, into which, could the guests look about midsummer, or have report upon the plan, the rooms would be cleared as a matter of wise precaution. When a place essays to bring itself into prominence as a resort for health, it must not regard it as intrusive for all or any one to inquire into its modes of household disposal, and of assumed cleanliness. Happily, with only here and there an exception, our State health resorts have responded to the call, and are, we believe, in advance of those of other States; because, as a rule, they have been more closely watched. Besides, a public sentiment has been created that demands attention to these matters. The great danger now is that work will be imperfectly or hastily done. The readiness with which the average householder, and especially the average plumber, considers himself fully competent to devise and execute some scheme of sewage disposal, heating or ventilation, is only surpassed by the deliberate wisdom with which some council committees sit in judgment and express opinions on purely expert and technical questions of sewer construction and sewage removal. On questions of financial expediency, and some other incidental questions, they are the only real judges; but are rarely competent to decide as to plans of construction or disposal. There is no longer any excuse for errors as to method or for financial extravagance. The principles of dealing with household liquids and refuse are now well understood,

and the methods well devised. The chief trouble in execution is to secure competent oversight and faithful administration.

MALARIA.

During the past year malaria has been much less prevalent in the State than for the last three years. While it can not be said that the essential cause is always known, yet the occasion of its occurrence and the conditions under which it mostly prevails are understood. That it may be produced at a distance, and in certain heavy conditions of atmosphere be wafted to places which otherwise would not have it, is undoubtedly true. But the rule of its occurrence still is that heat, moisture and vegetable decay are the factors in its production. Decomposition and putrefaction of different forms of vegetable matter occur under somewhat different conditions of heat and of moisture. The heat itself varies in degree, and the humidity of the atmosphere affects both persons and places, variously, accordingly as various laws are brought into operation. But the safety from this, as from many other diseases, is in the choice of a locality free from what we know to be the concomitants of this affection, and in such care of personal health as will enable us to resist this and other miasma. Our attention has this year especially been called to local defects of drainage in and near Eatontown, in Monmouth county; Blackwoodtown, in Camden county, and Hope, in Warren county. In each the unusual occurrence of malaria, or to a greater degree than formerly, seems to be attributable to accumulations which have been going on for years, and which at last reach that maximum which in a favoring season is sure to result in malaria. It is a significant fact, that we never yet have found a physician of long experience in any such locality who has not been able to satisfy himself of the relation of local conditions. In the vicinity of Eatontown, some important clearing of the stream has already been done, and, in other cases, investigations are being made with good prospect of abatement.

We need also to draw the attention of citizens to the fact that places which are by nature free from the usual occasions of malaria, may become affected as a result of changes made by construction. We believe, for instance, that there is no strip of land in the United States more free from malaria, than the sea-shore of New Jersey and the land adjacent thereto. Yet here and there we can pick out local-

ities where there are sporadic cases. Nor is it very difficult, as a rule, to trace causes.

Some stream is entirely altered in its course or made to contribute to an artificial lake or pond in an objectionable way. These streams, which are nature's drain pipes, may sometimes, between high hills or in the upper part of their courses, be interrupted by dams or made into ponds. But very rarely is this safe to be done near their outflow. Many such amateur improvements are the devices of those who know little of sanitary engineering, and too often compliment themselves on what pleases the eye at the expense of health. We warn against all such artificial lakes and ponds, unless those really capable have shown how they can be secured without heightening the water level in the surrounding soil, or causing more or less stagnation.

It is to be remembered, too, that in all excavations of soil and building of towns changes of soil and of level are made, and that the sun is shut out so as to cause more moisture of the ground. Whenever we have to deal with a locality naturally healthy, we have great advantages, but must consider the possible effects of every change being made, and by compensatory adjustments retain the local healthfulness. Attention needs to be drawn to the frequent covering up of wet places without any attempt at under-drainage. Many a pond is thus vacated, only that its water may increase the general height of stagnant and subsoil water in the land that is soon to be cut up into lots and offered for building purposes. Salt meadow or marsh is frequently thus covered without even the cutting of lines through its tough sod. "Although a large quantity of salt prevents putrefaction, a small quantity favors it." Dr. Letheby and others have noted the amount of putrid organic vapor from such marshes. When near the sea this is quickly diffused and does not concentrate. But if the mud and grass of these salt tracts is covered over, the organic matter undergoes decomposition under circumstances most favorable for the befouling of ground, of cellars and of streets without any compensatory methods of diffusion or disposal. We can point to places suffering from malaria from this very cause. Let all marshes be drained before the in-filling.

It is not surprising that in some of our cities we are finding an undoubted increase of malarial influences. Besides that addition of animal matter which causes its own class of decay, we are to remember that in cities much vegetable matter finds its way to the soil, and that many a street becomes enriched beyond the usual fertilizing of a field.

The use of vegetables and of grasses for food involves the burying in of much organic material, and the growth of low forms of vegetation is constantly and rapidly going on in city soil. Heat and moisture are increased by the locality of buildings, and the air and often the water have to receive particles of vegetable as well as animal growth or decomposition. Under and around houses such a temperature is often sustained in winter as prevents frost and cold, so that with summer conditions it is not surprising that we have summer diseases, and that malaria shows itself in the winter. However much inquirers in localities may indulge hypotheses as to the foreign origin of malaria, and however true it may be that occasionally it is wafted down from some outlying spot, the chief fact is that local conditions of the place and some favoring condition of the person prove the occasion of the actual attack. At a recent meeting of the National Public Health Association, papers and discussions on the subject revealed greater unanimity on this point than on any other as to malaria. The belief that water becomes the vehicle of malaria was also fortified by many significant facts. One great want of this State as to the health of its people is that no town should be started, no house should be built, on ground that has not been so thoroughly drained as that the water level as a rule does not maintain itself higher than ten feet below a surface through which the ground air can permeate it. A sweet, dry soil is the beginning of an assurance that healthy beings can be kept upon its surface.

SMALL-POX.

Although small-pox has been less prevalent this year, we have had sufficient to emphasize the importance of vaccination. Situated between two large cities, with many large cities of our own, and with almost the whole State a highway for travel, our only protection from oft-recurring epidemics is in the systematic vaccination of all children that attend the public schools. The introduction of bovine lymph has removed the only possible criticism that could be made upon the operation, and the reality of the protection is each year more fully illustrated. Even where there are failures, the facts in evidence show the reasons of the failure and so substantiate the law. Our last report in a thorough manner put on record all needed particulars, and (Circulars 18 and 20, fourth report, 1880, page 301, and fifth report, 1881, page 178,) give all necessary details as to procedure in

case of an outbreak. In an outbreak that occurred this year, the refusal of a parent to have a child at home vaccinated, not only resulted in its death but in the spread of the disease. While in scarlet fever and measles we have no mode of protection such as that provided against small-pox, experience shows that by isolation of those attacked, by oiling so as to prevent the scarf skin from being blown about during convalescence, by a thorough airing, washing or burning of all articles in the house, and by an enforced cleanliness of persons and surroundings, we can prevent these diseases from growing into epidemics. The contagion, while it is persistent, and will dwell long in unaired localities or uncleansed and unaired garments, is not transmissible through the open air for long distances. Well-understood methods of management at the start would often prevent the necessity of school dismissal, which may cause a scattering of the disease or an interruption of study.

While these diseases are not believed to have a local origin, they are rendered malignant by foulness, and so every effort at ventilation, cleanliness and disinfection should be secured.

Diphtheria and typhoid fever, on the other hand, seem to originate from household vegetable decay and dampness, from impure water and from other local conditions; and so, both for prevention and for relief, require the most assiduous cleanliness. For further particulars as to these and other diseases, reference may be had to the summary of local reports and to the record of the medical superintendent of vital statistics.

CHOLERA.

During the past summer, the facts as to cholera in Egypt were such as to lead many of the European governments to the adoption of precautionary measures. Past experience has shown its tendency to advance, and the disease has not been mitigated in its severity. The rapid transatlantic transportation now, makes it very certain that the disease occurring in Germany, England or France, will be more rapidly transmitted to us. While there has been some modification of quarantine methods, there has been no alteration of views as to the necessity of at once isolating individual cases, or as to the need of the most thorough sanitary precautions as to cleanliness, in order to prevent it from attaining the proportions of an epidemic. Hudson county and some other portions of the State are especially exposed, and are not able to avail themselves of as ready or complete sanitary

provisions as are in operation in New York. In case of any threatened or actual outbreak, this Board will be prepared with all necessary instructions, but on the prevision and preparation of local authorities must chiefly rest the duty of active and timely relief. Especial attention early in the spring should be given to thorough cleansing, and sanitary police of all cities and each local Board should know just what it would do in case of a sudden outbreak. Cholera and other hospitals are now quickly improvised at small expense; models of which can be had at this office or from other sources. It is this readiness beforehand to meet possible emergencies, and which the first day does just what ought to be done, that avoids those sad consequences which a delay of a few hours sometimes secures. Our power to prevent epidemics is almost absolute, if we meet them at the threshold, or have hold of the checks and apply them in time.

DISINFECTION AND DISINFECTANTS.

While our chief reliance is upon ventilation and cleanliness, the value of thorough disinfection is fully established and sustained.

Circular VIII. (4th Report, 1880, p. 260,) gives all necessary particulars as to their use. Since the issue of that circular, commercial sulphuric acid, in the proportion of a pint to eight gallons of water, has been accredited as valuable to be sprinkled about for the destruction of low forms of vegetative life associated with diseases.

Fumigation with roll sulphur cracked fine and set on fire, so as to have its fumes enter every part of the house while unoccupied, is very valuable. Privy and cesspool vaults may well be cleansed by letting down a tin tomato can with lighted sulphur in it, and then closing the cover or seat, so as to have the gas permeate the whole vault.

One ounce of nitrate of lead dissolved in a pint of hot water, and a pint of salt dissolved in two pailsful of cold water, and the two mixed, gives a valuable chloride of lead disinfectant. Sulphate of iron (copperas or green vitriol), two pounds to a gallon of water, is also greatly to be valued as a disinfectant.

Corrosive sublimate, in the proportion of one part to 500 of water, has great value as a preservative and disinfectant. The poisonous character of some of these disinfecting solutions, if taken into the stomach, must be borne in mind.

Besides the use of other disinfectants in the sick-room, the vapor of tar or the fumes from a vessel of boiling water containing tar, placed

upon the stove, are often found serviceable. The use of whitewash, and its value as a cleanser and disinfectant, is never to be lost sight of.

The recipe for the whitewash known as the Treasury or White House whitewash is as follows:

"Slake one-half bushel of unslaked lime with boiling water, keeping it covered during the process. Strain it, and add a peck of salt dissolved in warm water; three pounds of ground rice put in boiling water and boiled to a thin paste, and one-half pound of powdered Spanish whiting, and one pound of clear glue dissolved in warm water. Mix these well together, and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible, with painter's or whitewash brushes."

The glue should be soaked in about three quarts of warm water over night, and then the Spanish whiting added to it. When there is old whitewash on the walls which is flaky or makes them uneven, it should be scraped off, and the walls have a thorough washing with a solution of sulphate of zinc (white vitriol), two ounces to a gallon of water, and be allowed to dry before applying the whitewash.

HEATING AND VENTILATION.

These are so related to each other, and are so important to health, as to require the attention of all. Probably more disease arises from impure air in houses and schools and public buildings than from all other causes combined. The larger proportion of diseases are those which first affect some portion of the breathing apparatus. In order to secure greater heat, air is confined, and so ventilation impeded. Many of the present heating devices heat the foul air in the room or depend upon a room supply. As a rule, it is much better to introduce into a room pure air which has come from without and been heated on its way to the room occupied.

Persons will bear change of air, even if a little cooler than the air of the room, much more than is supposed, if only it is introduced without draught. Mosquito wires are thus of value, during the fall, as impeding draughts of air, and yet allowing the air to pass in. The placing of a small strip under the base of the lower sash, so as to make an entrance place for air between it and the upper sash, and yet have no direct draught, is of much service. All occupied rooms

should, each day, if possible, be flushed with air when the inmates are out. This is especially important to school rooms, factories, public halls, bed-rooms, etc. It is a mistake to suppose that every corner of a room gets good ventilation by the opening of a single window when there is but little stir in the air. Experiments show that air clings to surfaces; that the sides and corners of rooms often have air much fouler than that found in the center. The distribution of heat in a room is a pretty good index of the distribution of air; and this is found to be quite variable. "If air is admitted at a high temperature, and allowed to escape through openings at or near the top of the room," it does not ventilate the room much. "Where heated fresh air is introduced, as where buildings are warmed by hot-air furnaces, or by steam coils placed in the basement, the air enters the room at a comparatively high temperature—too high, in fact, for either comfort or health. In all cases it should be possible, by the operation of a valve, to permit more or less cold air to mingle with the heated air, and this should be done in such a way that the temperature of the air admitted into the room can be regulated without at all diminishing its quantity."

School buildings and all factory buildings in the State should have expert examination to determine as to their fitness to conserve the health of those who are employed in them. All experience is constantly attesting that no device will supply the absence of that pure outer air of which oxygen is so large a constituent. Dr. R. Angus Smith, one of the inspectors and chemists under the Rivers Pollution Prevention Act of England, in closing a report of one hundred and eighteen pages, says: "This report may be said to be chiefly on the value of oxygen in destroying putrefaction, in oxidizing impurities of nearly all kinds, and, of course, in preserving water and air from the unwholesome agencies to which they are exposed."

MOISTURE OF AIR ARTIFICIALLY HEATED.

In the last report, the principles which determine the moisture of warmed air are plainly stated in an article by Prof. C. F. Brackett. It is there shown that the condition of humidity is a relative one, the adjustment of which depends upon the adaptation of heat and moisture to varying conditions of outer moisture, and of room heat and atmosphere.

Prof. Kedzie, in the first Michigan report, in speaking on this subject in reference to school rooms, says:

"In many cases the out-door air is heated to the requisite temperature and brought into the room without any addition of watery vapor. Many persons forget that the capacity of the air to hold watery vapor increases much faster than the temperature. For example, air at 32°, saturated with watery vapor, if heated to 60° without either loss or gain of watery vapor, would be excessively dry. If we represent the humidity of air saturated at 32° as 100, the same air heated to 60° would have a relative humidity of less than 15; or it would hold less than one-sixth of the water it was capable of holding in the form of vapor at the latter temperature. Lehman has shown that the exhalation of carbonic acid in respiration is very sensibly influenced by the amount of watery vapor present in the inspired air. This may explain why persons are so often afflicted with headache when breathing very dry air, and why relief is so soon experienced when the air is moistened by placing a dish of water to evaporate on the stove. Buckheim has also shown that the depth of the inspiration is decidedly influenced by the presence of watery vapor in the air. The influence of excessively dry air on the naturally moist mucus surfaces is injurious; the nostrils become dry and irritable, and a tendency to catarrh is established. Most persons have observed the relief obtained by breathing air saturated with moisture ('inhaling steam') when they have taken cold, or 'have a sore throat.' The influence of too dry air on the eye is also injurious, from the unnatural drying of the normal secretions for moistening the eye.

"The air in the school room should be three-fourths saturated with watery vapor. The best way to test the degree of moisture is to suspend two thermometers side by side, one in the usual condition, the other with the bulb covered with a thin piece of cotton cloth kept constantly moist by dipping a portion of the cotton in a suspended cup of pure water. The difference in temperature between the wet bulb and the dry bulb thermometer will indicate the relative dryness of the air. Thus, if the dry bulb marks 65°, and the wet bulb marks 60°, the air is exactly three-fourths saturated, and the difference between the wet and dry bulb thermometer should not exceed 5° in any school room."

"The capacity of air to contain moisture is greatly increased by the elevation of its temperature."

"One effect of heat upon air is to raise its point of saturation. One cubic foot of air, say at 32°, is capable of containing a certain quantity of moisture, and no more. But if we raise its temperature to 80°, which is near that of the human body, it is capable of containing five times as much, and, consequently, it absorbs moisture from everything that contains any. This heating of the air does not dry it in the sense

of extracting moisture from it; it only increases its capacity of containing water, thereby rendering it more absorbent or thirsty. Air suddenly heated is thus rendered unwholesomely dry, and this is an important point in regard to the subject of warming, requiring careful consideration. Whenever the fresh air is warmed before being admitted into a room, an evaporating pan, or some other means, must be provided to supply the air with the necessary degree of moisture."

The illustration of Prof. Brackett, is that, with an outside cold of 32 F., and an inside warmth of 62 F., from a vessel of one foot area, with water so placed on a stove as that it will be kept at a temperature of 122 F., we would secure an evaporation of somewhat less than a half a pound of water an hour.

In advocating the use of water warmed in this way, we are not to be entirely governed by abstract questions relating to moisture or relative humidity. Mr. Robert Briggs, in his excellent paper on the Relation of Moisture in Air to Health and Comfort, while doubting our ability to determine the regulation of artificial water-pans by our knowledge of the physical laws as to the relation of moisture to air, says:

"It must be admitted, however, that some small degree of hydration is a necessity for comfort, and with comfort for a demand, some reason may be found to establish the healthfulness of the small supply. It is certain, from all experience, that from 5 to 10 per cent. of moisture can be added to air after it is heated, certainly with much relief, especially to the eyes, with apparently little harm, although such addition may make the occupant of a heated room a little delicate as to out-door exposure. Moisture may, to some small extent, be abstracted by the means of heating, especially when the heating is by stoves or hot-air furnaces; at all events, the presence of a sheet or surface of water, over which the heated air is allowed to pass, is now a recognized means of supplying a small quantity of aqueous vapor to air of ventilation. But the quantity supplied in this way is very small in comparison with what is needed for complete 'hydration,' or even for what can be denominated 'hydration' at all, in the sense of a summer condition."

"It is very difficult to find any hypothesis which will account for this requirement of a small supply of vapor with heated air, when we admit, or can demonstrate, that the sufficient quantity to the senses is so far below what is needed for hydration, and so independent from the moisture condition of the air; for nearly the same small quantity of vaporization seems desirable in air heated from any temperature. The explanation of the offensiveness of heated air-currents has been sought with much diligence, and, at times, causes have been assigned with much positiveness."

After noticing the fallacy of the ozone and electrical changes of condition as grounds for this need, he says:

"Altogether, the whole resolves itself to the reiteration of the bare fact, that it is comfortable to evaporate a small quantity of water in heated rooms, and that it can be done without marked injury to the occupants or to visitors. The quantity itself seems to be almost constant for all temperatures or hygromations of the air, and to be a slight addition only to the moisture in the normal air out of doors at any time."

Dr. Billings, in his letters to a young architect, on ventilation and heating, speaks thus:

"In living rooms, heated by a hot-air furnace, or by indirect radiation by steam, the use of a large coarse moist sponge in front of the register will often be a source of great comfort. Vessels of porous clay, through which water percolates rapidly, are used for the same purpose.

"This brings us to the question of attempting to regulate the moisture of the air in connection with apparatus for heating and ventilation. The precise influence which either the absolute or the relative amount of moisture in air has upon health is uncertain, for habit enables man to undergo great variations in this respect without marked ill-effect."

"The effects produced in air by artificial heat, and which, by some, are supposed to be connected with moisture, are important, and merit more study than they have yet received.

"Dr. Ure describes the effects of the use of highly-heated cockle stoves to be tension or fullness of the head, flushings of the countenance, frequent confusion of ideas, coldness of the extremities, and feeble pulse. Hood confirms this, and states (p. 326) that he examined a school heated in the same manner, and found it to be so pernicious to the health of the children that they occasionally dropped off their seat in fainting fits. He goes on to say that 'these pernicious effects, although generally in a somewhat less degree, always result from the use of intensely heated metallic surfaces. They are, however, much modified by tempering the air by the evaporation of water. In Russia and Sweden, the Apennines, and other places where close stoves are used, an earthen vessel of water is always placed on the stove for this purpose, and greatly mitigates the oppressive effects which would otherwise be experienced."

He then asks the question—"If it is not the dryness of the air which causes the disagreeable sensations, whose frequency in furnace and steam-heated rooms no one can deny, what is it?" and adds, as follows:

"My answer is, that it is no single cause, but a combination of a number of causes. The first and most important is the want of sufficient fresh air to insure satisfactory ventilation. The amount of air required for this purpose, if admitted after passing through the heating chamber of an ordinary furnace, would soon make the room insufferably hot, for on a cold day its temperature from the common forms of apparatus will average 180° F. To prevent this, the register is usually partially or entirely closed as soon as the room becomes unpleasantly warm, and the fresh air is thus shut off as well as the heat.

"The second cause is the contamination of the fresh heated air by gases from the furnace, and especially by carbonic oxide. This will be found to be the chief trouble in those cases where a dull, persistent headache, with the feeling as if an iron band were bound around the head is produced, or in such cases as those mentioned by Ure and Hood.

"From hot-air furnaces these gases pass mainly at the joints, and the more joints a furnace has the worse it is in this respect.

"A very common cause of impurity in air heated either directly by furnaces, or indirectly by steam or hot water, when the furnace is in the cellar, is leakage from the cellar into the cold-air flues or chambers. Brick piers, enclosing coils or radiators, are quite pervious to air, and the pipes or box flues used to bring fresh air to the heating surfaces leak very decidedly in the majority of cases.

"A very common method used by servants for diminishing heat is to open the furnace door, and at the same time to obstruct the draft below. This gives rise to large volumes of carbonic oxide, some of which will almost assuredly escape into the cellar, and it requires the presence of but a very little percentage of this gas to produce bad results.

"The last cause of discomfort which I need mention here, is overheating in rooms which are occupied by a number of persons."

It is now generally conceded that the benefit or comfort derived from the evaporation of water on a stove is not to be accounted for merely by its direct effect upon the humidity. Dry air, in the open, is often very healthy and invigorating. On the other hand, where the degrees of moisture approaches closely to saturation, and the temperature is pretty high, the air becomes sultry and oppressive as interfering with evaporation from the person, etc.; where there is overmoisture, it tends to attract to itself organic particles. Thus, even the hand held closely, for a time, against the walls of a sick room or hospital will show odor from the effects of the moisture. A continuous moisture in illy-ventilated or sick rooms tends to promote or develop disease. "Our dwellings, although the water-troughs of our hot-air

furnaces do supply limited quantities of vapor with admitted comfort, do not, as a rule, have over 30 to 40 per cent. of humidity in the air within them."

The most probable view of the benefit of this slight added evaporation is that the moisture or vapor thus given to the air attracts to itself dust and organic particles which are thus, as it were, retired from the in-breathed air, and so settle as to be removed or changed by ventilation, sweeping, dusting and general cleanliness. The benefit is not so directly in diminishing the dryness of the air as in furnishing such small degree of extra moisture as will get, in company with floating organic material of any kind, volatile gases, and cause these to be somewhat settled or disposed of by vapor. "Organic matter appears, mainly, to be in connection with the vapor in the air, and not to exist as a separate gas diffused in the dry air when the vapor is removed by natural causes." Thus, while there is still a field of inquiry, it can be said to be the opinion of authorities, as well as the experience of individuals, that water kept at a temperature above 125° on a stove or in a water-holder in the register, or a sponge, adds to our sense of comfort when occupying artificially-heated rooms. The water-holder of the furnace is not so direct in its effect on the air coming into the room, as is that on stoves or in water-holders in registers, unless the air is heated where the holder is, and is then introduced into the room as by the indirect method. As the water-holders are arranged on many stoves, the water never becomes warm enough to be of any service. It is often well to fill the water-holder with water already quite hot.

SCHOOL HYGIENE.

To all who have studied the welfare of population as related to physical care, it is evident that the most important reforms, both as to personal and public health, must begin in a proper training and instruction of the children of the State. Personal habits fully formed are always hard to change, and hence success in prevention requires early discipline. Also, where nuisances or conditions unfriendly to health have come to be tolerated, it is the more difficult to convince people of their evils and so to secure relief. That there are great defects in physical child-training and care is no longer a matter of general observation. In examinations of homes, and of the conditions to which children are subjected in school-houses and factories, and of classified particulars as to the results of imperfect methods, illustrations of wrong seating, imperfect light, bad air, have so multiplied that no longer can school boards or factory owners brush aside the facts in evidence.

Insanitary conditions are recording their results upon our population. By enforced inheritance, or by personal and acquired disabilities, many are made to worry through life with a burden of ill health or reduced vigor, and so evil comes not less to the State than to the individual. While there is a tacit consent to this fact, and a respectful patronage of such views, as yet there is no adequate training and instruction in the practical administration of hygiene. Instead of the floating knowledge which most teachers are presumed to possess as to proper hygienic conditions, both for the child and his surroundings, there should be such definite information as will enable the teacher to exemplify, to teach and to carry out a proper bodily discipline and education. We are glad to say that the State Superintendent and some of the city superintendents of schools appreciate such views, and would be glad to see definite provision for such instruction. It would include not only a proper assortment of calisthenics, gymnastics and athletics, but instruction in all those details which direct the child as to personal care and habits, and make him intelligent as to the management of a machine of which he must be the chief superintendent through life. All the members of the Board have been earnest in their endeavors in this direction. A circular issued this year has been largely called for in the State, and, where teachers and superintendents have shown an interest, has had extended distribution. We had hoped that, ere this, the Normal School would have had some definite provision for fitting its pupils to teach the principles and practice of hygiene. If many of its graduates are employed as teachers in the State, this would be the most ready method of reaching the various district schools. Independent of this, the city and county superintendents can do much in the important relations they bear to the public schools. To-day the school system of the State admits of greater improvement in this direction than in any other. We are not sure but that, in a social aspect, the care of the health is as important as care of intellectual education. We are sure that it is just as sensible to leave the childhood of the mind without instruction as it is to leave the childhood of the body. Unskilled instinct will do about as much for the one as for the other. Care of the growing child, as to health as well as to mental drill, belong to the economies of the State. It has a right to be recognized in the fund which the State provides to

secure the welfare of its people. For, whatever gratuity the State confers on its children, it confers in order that they may grow up with such bodies, minds and characters as shall give strength, prosperity and stability to the State. This Board, therefore, begs leave to call the attention of your Excellency, and of the Legislature of the State, to child-care—the preservation of its life and health, in home, in school, in factory—as a great civic duty and a great civic policy. The outcome of its neglect is not only sickness and death, but diminished industrial and productive abililty, a burden manifesting itself in various forms of thriftlessness, finding its outcome in generally increased taxation, and in that special form of heavy expenditure and loss which pauperism, insanity and crime entail.

SANITARY EXAMINATIONS.

The feasibility of sanitary and institutional examinations has been well illustrated during the year. The Board, by its visits and correspondence, is able to give guiding information, to correct many errors, and to outline plans which local authorities can investigate and execute. Not only has this resulted in great improvements at most of our summer resorts, but Boards of Health throughout the State come to be inquisitive as to what needs to be done and intelligent as to methods, even where conditions of inability or inexpediency postpone what will eventually be accomplished. As a distinguished lawyer of this State has expressed it, "the occasional failures which come to notice are but the indices of innumerable successes that have been made in various parts of the State, and have resulted in a more general and intelligent attention to the conditions promotive of good health." It has often been the duty of the Board to be very explicit in its disapproval of local conditions, and it is an index of popular sentiment that so generally there has been effective response to the suggestions made. Not only in State institutions, but in county institutions, we have found the officers ready to consider defects and to remedy as fast as circumstances would allow. While many institutions are models of care and of discipline, others have been found that needed thorough change of method. The habit of personal and close examination on the part of committees or directors, is not the rule, and even where it has been attempted, some evils are overlooked, which are readily admitted when pointed out by those of greater skill or experience in this particular direction. While special inquiry into

personal conditions will now probably fall under the care of a Council of Charities and Correction, this Board will still coöperate in careful sanitary oversight and insight.

INDUSTRIAL TRADES AND FACTORY OPERATIVES.

The attention now being drawn to industrial trades in factories, to factory labor in this country, and to the health of operatives, in the interests both of their health and of prosperity for the State, is very important. In coöperation with this work, the Board issued an industrial circular of "Health Counsels for Working People." We have also examined into the various laws regulating factory labor in England. While there may be some difference of opinion as to the practical methods of carrying on factory inspection and regulating the health interests of workmen, we must feel that such matters cannot be wholly left to the judgment or inclination of employes.

EFFLUVIUM OR ODOR NUISANCES.

Complaints not infrequently reach us as to the establishment of factories or other works which, either by organic putrescible matter directly infused into the air or through disagreeable smoke, cause great unpleasantness or sickness to the people of the vicinity. The laws of New York have become very stringent as to such evils, and too often location is changed to our own shores. Some of these occupations might be conducted without harm if proper machinery for wetting or consuming the organic matter was employed and the stokers or other workmen were always diligent in service. Others are so vile, as like nitro-glycerine factories or powder magazines, needing to be located far from the haunts of travel or of trade.

It is always in the interests of cities and townships, when such a factory is being located, to inquire into its character, and for the City or Township Board of Health either to seek injunction or to notify parties that they will be held from allowing their factory to become a nuisance. Where there is already complaint both common law and special statutes provide modes of procedure. While all proper local industries should be encouraged, it is to the interests of each locality that its people be protected from trades and occupations injurious to the general health, or so annoying and distressing to the average inhabitant as to cause such discomfort and impurity and nauseousness of air

as is an infringement upon the inalienable rights of the citizen. From Bayonne, Woodbridge, Belleville, etc., serious complaints have reached this Board. Local authorities, under proper legal guidance, have, by the laws of this State, great control over such nuisances. While workmen in these and other industries may for a time seem unaffected or may even survive any perceivable injury, statistics as well as experience show that race vitality is deteriorated.

CONTAGIOUS DISEASES OF ANIMALS.

The laws relating to the contagious diseases of animals, as in operation in this State, require careful oversight and administration. These diseases are of great interest as comparative studies, and as affecting the meat and milk supply and the revenues of the State.

While contagious pleuro-pneumonia has occurred only in a few localities, it still claims large attention. The removal of some restrictive laws in New York State has exposed us to the contagion from that vicinity. There is need of some national legislation to regulate the inter-State traffic, so that it shall not be too restrictive, and yet secure a registry of dealers and some inspection.

Our chief outbreaks have been in Hudson, Essex, Union and Hunterdon counties, and in these mostly confined to single neighborhoods. In accordance with a provision of the law since January, 1883, we have permitted inoculation of infected herds where the disease threatened to spread. Our experience with it has been satisfactory; but it is plain that it must be kept under strict State supervision; if not, it will be spread by those mingling with the disease, or its unskillful doing will lead to false security and disappointment. Some, in ignorance, have proceeded to inoculate before the facts were known to the Board; but this has never been from intentional disregard of the law on the part of owners. Here and there we have evidence of bad intent on the part of dealers. An occasional suit at law is necessary, and thus far the courts have fully sustained the law.

This is becoming more and more a milk-producing State. The amount invested in cattle is so large as to make it a great interest to protect herds from diseases which arise only from contagion. All details as to the execution of this law will be found in the report which we are required to make to the Board of Agriculture.

A serious outbreak of glanders, in a car stable at Newark, required the slaughter of about forty horses. The Board was able to coöperate with the local authorities, and with the owner, in the eradication of the disease. Fortunately, no more contracted the disease; although it is one of the few diseases that is sometimes contracted by the exposure of torn or abraded surfaces thereto. A few horses beside these have been found affected in other parts of the State, and have been destroyed. There is need of more watchfulness against this disease. Often it does not incapacitate the animal from work, and so is apt to be spread. A special law makes it an offense to keep a horse thus diseased. The law, also, as to cruelty to animals, has been brought to bear against the use of horses which have contracted the disease. The proper transportation of animals is a matter that, not only in humane interests, but in those relating to food, should receive more attention.

Local Boards of Health have it in their power to do much to prevent the spread of these communicable animal diseases. The assessor, or other officer, should know where animals are kept, and if there are any losses. In cities, all keepers of cattle should be registered. It is a duty which local health authorities owe to the public to see that such sickness is not spread among herds, and that the people are not imposed upon by the sale of animals so affected as to be unfit for food. We are glad to say that, in the administration of this law, we have been much aided by the approval of the Board of Agriculture, and the good sentiment as to it that obtains among farmers aware of its provisions.

COMMENTS ON LAWS.

In the last Report, a full index of laws relating to public health was given for convenience of reference. (Sixth Report, 1882, pp. 255–260.) Of these, the laws which are oftenest referred to, as related to the present work and authority of local Boards, are as follows:

Chapter	LXXI.,	page 117,	Laws of	1879.	As to vital statistics.
"	CLV.,	" 206,	"	1880.	As to local Boards, etc.
"	CXXV.,	" 160,	"	1881.	" " "
"	CLV.,	" 217,	"	1882.	" " "
"	CV.,	" 119,	"	1883.	" " "

The chief acts of the Legislature of 1883 relating to public health were as follows:

Chapter	XVII., page 25.	As to sewers.
"	XXIV.	Allows cities to increase appropriations for public health.
"	LVII.	As to the employment of minors.

Chapter	XCVII.	Regulating the sale of petroleum and its products.
"	CIV.	As to pleuro-pneumonia.
"	CV.	As to local Boards of Health.
"	CVIII.	As to practice of medicine and surgery.
"	CXXXIX.	Adulteration of foods.
"	CLIV.	Burial of all small or other animals.
"	CLXXXV.	As to skimmed milk.
"	CLXXXVIII.	An act to authorize and enable small land owners to drain and improve their lands.
"	CCV.	Council of State Charities.
"	CCVIII., page 259.	As to sewers in cities of the first class.

A few other laws were also passed that had a collateral reference to matters affecting the public health. There is need that new laws introduced be compared with laws already in existence, and that there shall not be unnecessary multiplication of statutes. It will probably be necessary ere long for the Board to collect and codify the various laws relating to public health. They are, however, easily accessible now, and when needing any special explanation, the opinion of a lawyer who is fully conversant with all the laws passed is better than the ready interpretation of those of less experience. The many laws and sections of laws impose duties on the State Board, and these from time to time have had some addition or modification.

Two or three changes made last year in the law as to the contagious diseases of animals, have made it more facile of application. Some farmers claim that when inoculation is done in an infected herd, to prevent contagious pleuro-pneumonia from spreading, it should be done at the expense of the State.

The law more closely defining the powers of local Boards, Chapter CV., 1883, and giving summary proceeding before Court of Chancery, was a valuable addition to the health legislation of the State.

The drainage law, to authorize and enable small land owners to drain and improve their lands, is in the interests of health as much as of property.

The law as to petroleum and its compounds is now found very effective, and it is doubted whether any more legislation is needed as to it. In some cities, local authorities might aid in the collection of samples and frequency of examinations.

The law as to the adulteration of foods, drugs, etc., led the Board to appoint a Committee or Council of Analysts. Considerable preparatory work has been done with little expense. We do not deem it necessary to repeat many chemical analyses already made, and are

aiming so to adjust and administer the law as to reach adulterations injurious to health, and next such fraudulent admixtures as reduce needed food values. While we cannot report much activity in the application of the law, it has not been neglected, but given time for cautious preparation for future inquiry.

We have had many attestations of the value of the present general milk law of the State, and have not been made aware of any cases during the year where it is complained of as invading private rights. As our relation to this law is incidental, and as it was framed as a measure of protection of farmers, we refer for further information to them and to the Milk Inspector. He has proved himself faithful, honorable and efficient in his duties.

The law passed last year constituting a Council of Charities and Corrections is capable of being applied with much advantage to the State. In our sanitary inquiries and personal visitations, we shall be glad to coöperate with those who may be chosen to fulfill this trust.

The law as to medical registry was so far perfected last year as to secure an index list of all those who have complied with the law of 1880, and the supplements thereto since passed. Some, who had filed their diplomas under a former law, did not understand these more recent laws to necessitate a re-file or re-registry, although, taken as a whole, they evidently mean this. With a few exceptions they have been so understood.

Had the index reached back to the first New Jersey law, it would have been impossible to have secured a roll of names that would have given any correct list of present practitioners. As it is, the lists will be found quite complete, and any additions to be made will be supplied the next year.

It has been recognized by some of the States, that the coroner law, similar to our own, is defective in method in securing reliable results, and is very expensive. Consequently, some of the States, as Massachusetts and Connecticut, have made a radical change which has commended itself to the lawyers and physicians of these States, as well as to the general public. This matter has been brought to the attention of some competent persons in the State, and it is hoped that ere long some legislation will be secured more simple and effective for the ends designed.

A law, in some form, regulating the connection of houses with sewers and cesspools would greatly decrease the risks to the general

health which now occur from hidden and imperfect work. The influence of private dwellings on public hygiene cannot be disregarded. The principle of inspection of buildings, in order to insure safety, is now well-established in various cities. Because of its extra hazard, it is not invidious to select out the pipe-work of houses as demanding some special oversight. While a law, introduced last winter, did not fully commend itself to our judgment, we beg to express the view that some legislation as to it is desirable, so as to be applicable to such cities as, in the esteem of local authorities, may need it.

It can be said, in general, that the State has been wise and liberal in providing laws conservative of the public health. While it insists that no private property shall be entered upon without permission of the householder, except by due process of law, it does mean that nuisances, hazardous to health, shall not be legalized, and that they shall be reached by proper process as speedily as a due regard to individual rights will permit. Increasing intelligence, as to health matters, on the part of the people, increasing demands for cleanliness by those who seek homes in boarding places or health resorts, and a clearer and fuller knowledge of their powers and their proper exercise by Boards of Health, will much aid in diminishing the frequency and extent of preventable diseases. While the time will never come, that there will not be those who quarrel with just and equitable laws, because of their own misconceptions, yet, in such a line, even contention and occasional triumphs on the part of offenders, as a rule, result in a greater regard for the necessities of relative duties, and of consent to the ordinances which a proper regard for the health of the people requires.

CIRCULARS, LIBRARY, ETC.

Circulars which have been issued or re-issued by the Board this year will appear in the Report. Former circulars can be had by their numbers as they appear in the Sixth Report, except that No. 37, as there given, should be No. 38.

The library of the Board, both by exchanges and purchases, is increasing in value and importance. It is accessible, as heretofore, and is of much service to individuals and to local Boards. The catalogue is contained in the fifth report, and the list of additions will appear next year.

A paper on "Cemeteries and Interments in Cities," which was deferred from last year, will be found in this report. An extended

contribution, both to the literature and experience of the past as to interments, by Stephen Wickes, M. D., is to be found in the transactions of the New Jersey State Medical Society for 1883. It is hoped that these two papers will lead to greater caution in the location and management of cemeteries. The choice of locality should be regulated by local health authorities.

The various papers contained in this report have been prepared with reference to general needs, and so as not to repeat the information contained in former reports.

It is the constant effort of the Board to furnish such information as will be of permanent value to the households and the people of the State, and such statistical and other facts as will aid in the prevention of disease.

EXPOSURE AND DISEASES OF OPERATIVES.

This year the Board has made a preliminary inquiry into the chief exposure and diseases of a few classes of operatives. It is hoped that we shall be able to follow these up with observations by those who live or practice much among special classes of tradesmen.

The influence of the inhalation of dust, in many occupations, is such as to have given a special name (pneumokoniosis) to diseases of the lungs caused by dust. Dr. Birch-Hirschfeld, in Vol. II. of Dr. Hermann Ealenberg's Handbook, thus speaks of it:

"Formerly the question was considered only in reference to the merely mechanical action of dust or it poisonous properties, as in the case of arsenic, &c., but the researches of Koch, and especially his discovery of the tubercle bacillus, have given a new feature to the question.

"The greater frequency of tuberculosis among persons working in ill-ventilated and dusty rooms is well known, but there seems now good grounds for believing that however much these conditions may favor the development of tubercle, and though dust *per se* may lead to various pulmonary disorders, actual tubercle originates in direct infection from the inhalation of the bacilli present in the atmosphere of such workshops. And this view is supported by the greater frequency of tubercle among persons working together in numbers than among those equally exposed to dust, but following their occupations alone or at home.

"The diseases immediately brought about by the mechanical action of dust are quite distinct from tuberculosis, and are chiefly, more or less, chronic bronchial catarrhs, leading to bronchiectasis, emphysema, chronic catarrhal pneumonia, and consequent ulceration and destruc-

tion of lung tissue, interstitial pneumonia or cirrhosis of the lung, in fact, all forms of non-tubercular phthisis.

"Acute pneumonia, too, seems, from the observations of Hirt, to be much more frequent among persons employed in dusty trades, and more so when the dust is of a mineral than of an organic kind. Indeed, the greater irritation produced by the former, apart from any chemical action or toxic property, is well known. The majority of the particles, it is true, do not reach the ultimate divisions of the bronchi, and are carried back by the cilia, so much so, that after a short absence from such exposure the whole are removed, and the effects must be mostly reflex, or conducted to the vesicles from the actual seat of irritation, but a portion does certainly remain. Inorganic and other particles are found in the expectorated cells, and *post mortem* in the cells and lymphatic vessels and glands. Merkel found in the lungs of needle grinders, as much as .8 per cent., and Zenker 1.45 per cent. of iron, while the ash of the lungs of workers on French mill-stones examined by Giesseler contained thirty-four per cent. of silica and ten per cent. of alumina. To these conditions the names of anthracosis, siderosis and chalicosis have been given. The inorganic particles are deposited in the upper lobes and around the root of the lung more than elsewhere.

"Cotton dust tends to a form of pneumonia; and Zenker found among cigar-makers marked atrophy of the lungs, together with deposition of brown organic particles, though whether any connection subsisted between the two conditions cannot be proved."

HEALTH IN THE HOME AND ITS SURROUNDINGS.

BY EZRA M. HUNT, M.D.

Whatever may be the extent and perfection of public health administration, as conducted by civil authorities, it will yet remain that the health of the people largely depends upon the sanitary condition of the house and immediate premises of the occupants and the sanitary care of the household. It will, therefore, be the design of this paper to furnish a plain outline by which the ordinary householder may know how so to regulate a house and its immediate surroundings as to make it promotive of the health of the occupants.

DRAINAGE.

In choosing or building a house the first essential is the securement of proper arrangements for the keeping of the *ground* under and about it in a condition favorable to health. This always means that there should not be such dampness of the ground as is caused by water stagnated in it or by a high water level.

There are some prominent reasons why a lot of ground that is to be occupied by buildings needs underdrainage.

There is no such purifier of ground as air. No ground is so solid as that there is not either air or water in the interspaces between the earth-particles. That this amount is very considerable you may easily test by filling a glass with dirt and seeing how much water you can pour in it. If the dirt is dry the amount of water that you thus pour in shows how much air was in the glass between the particles of dirt, for the water only takes the place of the air. If the ground is thus kept full of water it expels all the air except the little that mingles with the water itself. Now, we know that not air and water, but *cir-*

culating air and *circulating* water are the two great agents for keeping the ground in a condition favorable to health. We secure both of these by securing a low water level in the ground, so that air can circulate down to it, and so that the water coming from the clouds can also circulate in the soil and not find it already full of stagnant water. To accomplish this, deep underdrainage is often necessary. As the ground differs very much in natural degrees in different places, and as the soils and underlying strata differ very much, according to the geological structure and artificial additions, the depth at which it is necessary to lay tile in order to secure circulation in the upper ground and a low level of the ground water is very different. The farmer is not slow to find this out about his fields, and the builder who finds out whether he is building on clay, or gravel, or sand, or alternate layers of these or in a muck bed, is not slow to find out if he will. We knew a man who dug out a pond on a hill and built a house over it without any drainage except enough to carry off the standing water from the pond. It was a fine-looking house, but became notorious for chills and fever. We know an eminent engineer who claims that in most cities there is need of drainage to the depth of fifteen feet. This view is based on the fact that most cities are built near streams of water, where the natural water level is not very low; that as buildings shut out sunlight and air, evaporation goes on slower, and storm-water and the absence of prolific vegetation add to the ground moisture. This is all true. Many cities are now suffering from ground saturated with water more than from any other cause. This shuts out the air which would otherwise circulate and oxidize filthy matter and take care of it. It is wonderful what an amount of compost or organic matter the ground will take care of if only it can be allowed to have air in it and the water that comes from above circulating through it. But, if you shut these out, stop cropping the ground, and then by building on its surface increase dampness, you interrupt nature in one of its chief arrangements for health. Drains, therefore, ten to fifteen feet below the surface, are not extravagant for some parts of cities, but much will depend on the character of the soil. At any rate, no house should be built, either in city or country, until the builder has arranged to make the usual level of ground-water below the cellar, and many feet below the surface of the ground. Where the general water level about the house is high, it will often be necessary to have all the drain-pipes, under or around the building, converge to one general drain-pipe outside, which shall carry the water off to a lower level to a soil which is more

absorbent or a stream that will convey it away. It is also to be remembered that the level of dampness in the soil is above the level of ground-water, varying according to the character of the soil. For all soils are responsive to capillary attraction, by which the ground just above the level of complete saturation, is kept wet by the adjacent water. As drain-tiles are meant to take in water from the ground, they are not cemented as for sewers. Their size, the nearness of successive rows, the direction of outfall, etc., are all relative questions. Even when they are not filled with water they serve as air-tubes, and thus aid in the airing of the ground. We have seen one public alms-house in the State in which they were made to have openings on the surface on purpose to secure better soil-airing.

Many houses already built could be made much dryer and healthier by deep drainage about them. Others, where the ground is clayey or hard, could be helped by a substitution here and there of gravel and sand through the natural soil. All details cannot be here stated, but the householder who will keep prominently in mind the fact that only ground in which the water level is such as to allow the circulation of air beneath and around the building, is fit for occupancy, will find many things to guide him. If it is a place hard thus to dry, he will not pour the water from the roofs on this ground, or shade it with heavy foilage, so as to keep out sun and air, or otherwise embarrass a circulation in the ground, as important to its healthfulness as is pure air to his own lungs. In general, roof-water should not fall about the house, but be carried off. Sometimes, because we have not the means, or because our neighbor's lot is not thus kept breathing, we have to resort to various devices in order to secure dryness. The walls of the cellar are made so as to get air from the outside, as when an area is built about them, or they are built mostly above ground, or what is called a damp course is put in the wall. This is made by building a foundation of concrete or cement, and then putting one course or more of an impervious layer of slate, or cement, or asphalt, between the courses of brick or layers of stone work; also a double course of slates in cement is laid along the wall just above the ground line, or vitrified stone-ware perforated with holes, is sometimes used. If this is not done, in very damp ground the stone or brick often carry up the water by capillary attraction, so as to make the walls of rooms damp. The bed of concrete, or cement floors, used in basements, are an aid and are for the cellar and rooms above, what the damp course is for the walls. Stone and brick vary much in their degree of

porosity, and for foundations the best should be secured. Where we cannot wholly remove dampness, it is often best thus to cut it off, although we are to remember that we cannot wholly shut out ground air, and had better be radical enough to attempt to have it pure. The importance to be attached to the location of dwellings on *ground of circulation*, instead of on water-logged soil, has never been sufficiently estimated, since the vapors arising therefrom are too often laden with organic or specific disease particles, for which moisture as the carrier and the heat found in the dwelling furnish the disease-breeding conditions. This is all the more significant since now many diseases seem so intimately associated with low forms of vegetable or fungoid life. Ground thus becomes foul and is deprived of its self-cleansing powers, and its air is as prolific of disease as is the foul air of the sewer. Fungoid soils or localities are not good for building ground. Avoid a mouldy home.

HOUSE CONSTRUCTION.

The idea of a perfect building material is but an extension and modified application of the idea of a perfect ground structure on which to build. While there is more need of compactness in order that it may resist or accommodate itself to forces above ground, the idea of porosity or perviousness must be preserved. It must be material which admits of the circulation of air through it, yet in such a sieve-like way as not to cause draught. Brick, because it is a form of compact but aerated ground, and porous stone, because it is another form of earth structure, are valuable for this purpose. Some stone is so compact as too much to exclude air, and thus becomes too damp for building material. So walls may be painted and successively papered to an extent which makes them too impervious. The art of healthy house building is so to combine materials as to secure this properly distributed circulation of air, and if possible secure it at proper temperature, to govern the admission of light, as adapted to human beings, and thus follow out the natural laws which govern man in his relation to his inclosed condition, and the adjustments which within certain limits are allowable. But it is wonderful how wise it is for us in all artificial constructions to study closely the laws of natural philosophy, and not only conform thereto, but in deviations make our deviations on the basis of the law. It is of great import that now scientific tests unite with practical experience to enable us to decide many questions bearing on the welfare of life. We can accurately test the

quality of stone or brick, the angularity and quality of sand, the excellence of lime or cement, and whether the mortar is properly tempered. So brick, or blocks of terra-cotta, can be had of definite degrees of porosity, and even the various woods are closely tested, as well as the effects of varnish, oils and various paints. The right combination of materials to form a proper dwelling-house, as well as the right preparation of foundations, are well understood, but often greatly neglected.

HEATING AND VENTILATION OF HOUSES.

In the proper construction of a house so as to have a dry cellar and surroundings and dry walls, we take the first step toward proper heating and ventilation. Thus the circulation of the air is properly maintained in the inclosure and the dampness does not abstract the heat which is provided. In a house thus built the problem is merely that of bringing up the temperature of the air in the building without subjecting it to too rapid cooling from its surroundings. The demand for ventilation arises from the fact that rapid circulation of air is impeded by the inclosure, and that our own breathing and the lights and fires, use up oxygen and supply carbonic gas, while organic or decayable particles are also more or less furnished to the air. Air which has six parts by volume of this gas to 10,000 parts of air has reached the extreme limit for breathing purposes, not only because of the carbonic acid it contains, but because in human habitations this is denotive also of an amount of organic matter exhaled from the lungs which ought not to be again inbreathed. The expired air has five per cent. more of carbonic acid than the inspired, and has lost slightly more than that of oxygen. It also brings out with it a varying amount of gaseous and animal matter, quite decomposable. In order to dilute this or to drive it out, air must get in generally at a rapidity of not more than two and a half feet per second, since faster than this a draught is created which, except in warm weather, would be too much for most persons.

If the room is too small or too near air-tight, or has too many people in it, or one person in it for too long a time, or has other sources of air contamination besides the person, its air will become foul faster than it is possible to bring in fresh air without a draught. One lamp or gas-jet, or two candles in a room burn out oxygen and introduce carbonic acid gas as fast as a person, and most of our larger gas-jets or lamps are equivalent in this regard to three persons.

The foul air produced by lights has no organic matter, but it diminishes our supply of oxygen and so lowers vitality and often produces headache and weariness and ultimate ill health. The introduction of the electric light, which does not thus consume oxygen, will be of great service. Gas stoves with no chimney consume oxygen and produce carbonic acid gas rapidly. Iron stoves raised to a high heat not only do this, but when nearly red hot the gases inside the furnace are readily diffused through the iron into the room, and especially carbon oxide, which is much more injurious than carbon dioxide or carbonic acid gas.

The common fire-place helps much to ventilate a room, since it draws to it the air of the room, which causes fresh air to come in from without; while it thus heats the air of the room, it secures a supply. It is, however, very expensive if we seek to heat the whole room, since there is so much waste of heat.

Where a furnace is used, situated outside of a room, if it has a proper fresh air box, it supplies fresh heated air to the room. If this is brought in without dust or too much dryness, it is a good kind of heated air.

Where hot-air pipes are used they do not introduce fresh air into the room, but simply heat the air of the room, pure or foul as it may be, unless, instead of direct heat, these pipes are so arranged in coils somewhere as to allow fresh air to be introduced and flow over them and then flow into the room and so supply fresh air heated by pipes of hot air. For this method of indirect heating the pipes need to be kept very warm.

Hot-water pipes or steam-pipes are on the same principle, the choice depending mostly on cost or on some questions as to the degree of heat to be maintained in the pipes and the effect as to moisture, etc.

We cannot here discuss so broad a subject as heating and ventilation, but only desire to call attention to the principles on which it rests. By properly sustained animal heat resulting from food, exercise, etc., and by clothing, we are to accomplish most, and then supplement by these more artificial appliances. Pure air needs to be heated less than foul air, for it gives more heat-producing power to the system.

"In our best houses the question of ventilation hardly arises, unless under exceptional circumstances," but in crowded rooms or very close quarters, there is often need of artificial arrangement. Additional remarks on this subject, with special reference to school rooms, will be found in the Secretary's Report.

HOUSE-PIPES.

The modern house has come to be largely an inclosure of pipes—so much so that the proposition has been made to first draw the pipe plan of a house, and then construct the house in reference thereto. We have already noticed the under pipes which have to do with drainage. We have, also, alluded to some pipes which may be needed in connection with heating and ventilation.

The other series of pipes which have most to do with dwelling-houses are gas-pipes, water-pipes, and pipes for the conveyance of sewage. Although gas-pipes can only be harmful by reason of leakage of gas so as to contaminate the air, or so as to cause fire in case light comes in contact therewith, it is very important that there be no leakage. The pipes need to be of good metal, carefully joined, and the gas-jets, such as will fully prevent any escape. This occurs more frequently than is supposed. It is often well to try occasionally the jets when they are believed to be entirely turned off, and, also, to have the examiner of the gas-meter see that there is no escape. The gas-meter itself sometimes has leakage in or about it, and this adds to expense as well as fouls the air. It is best to have all tubing in a house placed so as to be as accessible as possible.

WATER-PIPES.

The water-pipes of a house are of still more importance. Where water comes to a house by pressure, whether by natural gravity, or, after having been raised by engine-power to a reservoir or stand-pipe, the pipes are kept full, and there is but little danger of contamination. Even lead pipes are not so susceptible to action when constantly kept full of water. Where intermediate cisterns or standing water, in any form, is kept, it is to be remembered that it is an absorbent of gases, and that water may be fouled by impure gases or by organic particles passing over it. Even where the water-supply is constant, cisterns for the water-closet supply are sometimes advised on the ground that thus the water is kept more distinct from the general supply, and with some forms of closets the amount of supply is more easily regulated. But if provided, such cisterns should not be left long without use, and should not be so large or so located as to allow the water to become stale or to absorb noxious matters. As most water is not chemically pure, there is often more settling and quicker

spoiling than one would suppose. There are many waters which are used for drinking-water, which, if kept a few days in a long glass tube half full and corked, will, on opening, emit much odor from the change in the suspended or dissolved ingredients they contain. All standing water needs to be aired, and is better off where a draught can reach it than in some pent-up corner, in cellar or closet or attic. The agitation of water also helps to air and freshen it. It sometimes happens in cisterns, over water-closets, that the pipe leading up thereto is empty, the valve being at the bottom of the cistern, and so it is filled with foul air from the closet. This is not completely washed or driven out by the water, but, at the raising of the valve, some of it gets through to the water, and may even bubble up in the cistern. The valve, therefore, should be close to the closet. If this cistern has an overflow-pipe, it must not run into the general soil-pipe, for if it does, when there is no overflowing water, it serves as a conduit for foul air. Even if there is a trap, the water in it becomes tainted or evaporated by long standing. It can be conducted to a water-leader or some other point.

Where the supply of water to a house is intermittent, so that the pipes are not always full, or, as is the case where a pump draws the water into the house, especial care must be taken. If the pipe is of lead, small particles may become dissolved, and even the lining with tin does not seem to remedy this. Lead thus introduced in the system is a great risk to health. When water-pipes are empty of water, they are occupied by air. Therefore, we must see to it that the air which gets access is not foul air. We have known a faucet thus to open directly over the sink connected with a soil-pipe, so that if the faucet was turned when the water-supply was not on, the tube would be filled with foul air. This mode of water-supply is not now common, but, as defective pumps are often located directly over sinks, it is well to bear these possibilities in mind.

SEWAGE-PIPES.

The most prominent and riskful kind of house-pipes are those which have to do with the delivery of the various liquid and floating materials from kitchen, laundry, wash-basins, bath-tubs and water-closets. These are the pipes intended to carry soiled liquids, the main or upright one being generally called the soil-pipe.

It may be said first of all, as a rule: Do not give them an undue

quantity to carry. There is such a thing as an unreasonable production of material, and a useless addition of water thereto. There is much of dust and dry dirt that should never find its way into the pipes, but into the fire. There is much stuff that properly goes with the garbage for punctual delivery and does not belong to the soil-pipe. Laundry and kitchen slop fluids can often be largely disposed of upon the lawn or around vines without inconvenience. Water, with all its value, may be wastefully used, so as to cause unnecessary dampness about a building, and so as to too greatly increase the amount of delivery through pipes. Where the dependence has to be on delivery into an outside cesspool, or for soil filtration, this is a matter of great importance. Many households use double the quantity of water used by others and make it dirtier without any corresponding increase in cleanliness. All introduction of rain or roof-water into the pipes is an undue increase of quantity, unless needed for flushing purposes, which is not generally the case.

GREASE TRAPS.

It often happens that entirely too much grease gets into the pipes. It is in some respects the most unmanageable of all the outgoes from the household. It does not dissolve in water. It does not submit to oxidation, as does most organic matter. Besides its mechanical clinging to the sides of pipes, it resolves into fatty acids, which are as pernicious as the grease itself. The same is true of soaps, which after their use not only lose their cleansing qualities, but become sources of pollution. This class of products is much more easily handled by ground admixture and by chemicals than by suspension in water, or even in air. So often does the grease clog up pipes as used even in small households, that it is necessary occasionally to thoroughly scald out the house-pipe and make free use of soda, potash, or other alkali. More than any other one ingredient, it is the cause of that peculiar odor so characteristic of sewers and generally known as a sewer-gas smell. Where there is much grease, it should be removed by mechanical or chemical means before going into the pipes.

For this purpose it is usual to have what is called a grease tank or grease separator, made variously of brick, stone or vitrified earthenware. The design in these is to give the grease time for cooling and so to construct an intermediate trough or sink between the house and the delivery pipe as that the grease may rise on the top, to be occa-

sionally skimmed off, while the outflow takes place from nearer the bottom.

There are many special forms, such as that of Doulton, Carson, and the Tucker grease separator or cooler. The most feasible chemical method is probably that by the use of carbon bisulphide. (See Spon's Ency. Arts and Man., Vol. II., page 1455.)

It is some advantage to have the urine flow into the soil-pipe above the dish-wash, as it aids to clear the pipes of grease.

Thus having diminished the quantity and improved the quality of the sewage within reasonable bounds (most important where there are no sewers and not unimportant sometimes with these), the principal fact as to the removal is that it ought to be made *while the material is fresh.* This means that all particles of matter that are to be added to the house sewage, should be added before there has been decomposition or decay, and that soiled waters, such as laundry-water, slop-water, etc., should immediately after use find their way to the pipes and out of them.

The rule is that, in a health-preserving or disease-breeding sense, no such liquid or offaling is objectionable until from twelve to eighteen hours after its production or voidance. Hence, all arguments as to the insanitary effects of its handling, or of its conveyance to rivers, are futile, if only you insure prompt delivery. To call it *filth*, in a disease sense, at the start, and to argue against its conveyance because it has odor, or because, by detention, it becomes pestiferous, is no more reasonable than to judge tomatoes unwholesome because decayed tomatoes are sickening. This point is important to be made, because so many arguments as to river pollution, or as to the evils of other transportation and delivery of sewage, are based upon the assumption that fresh sewage is unsafe. It is only unsafe to those who store it, or who do not succeed in getting rid of it before it becomes stale. The one center problem to solve in house-drainage is, how to get clear of fresh sewage through pure, clean pipes.

All matter that is to be carried by the house sewer system, having thus been introduced into it, in quantity, quality and method, as is best, the next question is as to the construction and relations of the pipes which are to carry it. Were it not for frequent errors, it would go without the saying that these pipes must be of such make and joining as will most completely conduct all that goes into them out from the house. This means that there must not be such roughness of surface, such smallness of calibre, such sharp points or quick turns, or angles,

as would either leak foul air, catch particles, or interrupt swiftness of flow; that they must be of such metal, and of such uniform thickness, as to allow no leakage of any gas, and that they must have proper fall.

Experiments now tell us just what these proportions are, and proper skill can construct and join tubes precisely in accord with these requirements. The next principle is to adapt the size and shape to the stream to be carried, so that, by this proportion between quantity and calibre, the current shall aid the fall to give such flow as shall be sufficiently rapid and self-cleansing. We must provide enough calibre of pipe to prevent clogging, yet not so much or so confined a space or chamber in the unfilled part of the pipe as shall be a receptacle for foul or stagnant air. It is to accomplish this that now smaller pipes are advocated than formerly, and that they are often made of the shape of the small end of an egg at the bottom so that the stream is made deeper and more compact, and thus a greater current is secured. The perfect pipe would need to be so smooth as to have no obstruction and the least amount of friction of surface, and to flow just full all the time, light and air having free access to the surface of the flowing sewage. But as, for many reasons, this is not always feasible, we must make the nearest approach we can by adjusting the shape of the pipe to the varying current, by making the whole pipe no larger than is really necessary. Next we must so construct the pipes as to admit currents of air, and give air-flow and flushing at such points as will not let out any of the flowing liquid, but as will let in good air and let out any possible foul air, at places convenient and not hazardous. And one great value of such a system is that there is very little, if any, hurtful air to let out.

The idea is, first, to have all material passing through to be the fresh soiled water before it is disease-breeding; second, to utilize the water, not only as a carrier to take it out of the way, but so as, by its own air, its own running action and its ability to suck up air along its surfaces, to secure oxidation or change of organic matter, whether in suspension or solution; and third, so to allow the free play of air through the pipes, as that it may both furnish this supply and do its own direct work in this same process of oxidization and healthy decomposition. When sewage is managed and conduits arranged on these principles, with the exception of the often unavoidable absence of light, we get the benefit of those chief principles upon which the safe conveyance of sewage must depend. As the soiled liquid runs along the pipe, the shape, size and velocity of the stream aid as a flush, while, at the same time, the

movement helps to appropriate the air that is available, to secure oxidation and other changes of the floating particles. If, by a flush-tank or other means, the liquid is made to flow in gushes instead of a small stream or in driblets, there is more flush and more suction of air.

Besides the presence of pure air, it is desirable that it be so introduced as that it may circulate. Indeed, without this it cannot maintain an average of comparative purity. It is better still if some rapidity of circulation can be secured, and, at times, the air be made to flow rapidly through the pipes. Very often, with a view to this, an opening is made by extending the soil-pipe to the roof, open at the top. But, *as it takes an opening somewhere below, as well as above, to make a current*, it must be remembered that this one opening, while better than none, is not enough. Again, the opening or openings are often made too small, and, although serving as *vents*, or to prevent pressure of gas and syphonage, they do not serve as real ventilators, or air and wind circulators. Hence, it is now a rule in the best constructed systems of house-sewage delivery, to have the main soil-pipe of the house run out open through the roof; and, *also*, just as it leaves the building to join the cesspool or sewer, to have another opening or outer stand-pipe connecting with it, and nearly as large in its diameter, which shall let in or out the air, and thus secure free circulation through the house soil-pipe system. With the main soil-pipe thus running through the house, *having an opening at each end for air, and no intervening trap*, we have facility for the entrance and exit of outside air. The temperature of the air outside and inside is generally different, and somewhat different at different points of the pipe in the building, and thus circulation is maintained. There are some physical laws as to the motion of air in pipes, as to the influence of heat, of friction, of currents and counter-currents, that may still admit of more accurate adjustment. But as a fact of actual test, it is found that soil-pipes thus constructed, as a rule, secure for themselves a circulation that purifies the air of the flowing sewage. The pipe that ends above the roof should be high enough not to be covered by snow, should have in it a wire ball to prevent leaves getting in, and, if having a hood at all, should have it so high as not to interfere with free circulation. As to the opening in the soil-pipe, at its lower end, where the soil-pipe emerges from the building, most prefer to carry a pipe or leader from it up to the roof, although many claim that house-pipes thus aired and cared for cannot produce spoiled air, and so may be allowed to end near the ground. Where the house is very large,

and the pipe system has many connections, it is best to have more than one roof opening. It will be perceived that such a system excludes all traps from the main inside soil-pipe, as these would interfere with the circulation of air.

TRAPS.

But if we are thus to leave the soil-pipe or main house-sewer without any traps, where, within the building, will you have traps? Now and then a good authority says, "nowhere." Such say that a well-managed system of this kind will be kept so pure that there can be no foul air to come into the house or to be produced in it, and that additional free circulation is had through the connecting pipes by having no traps under wash-basins, closets, sinks, bath-tubs, etc. Most authorities, however, say that, for fear of some such air, it is best to have the usual water-seal or trap under the basins, closets, etc., quite near to them and before their own short pipes join the main soil-pipe; also, *to have, just beyond the bottom outside opening of the main soil-pipe*, a trap beween it and the cesspool or sewer, so as to have a good guard against any foul air from these. A perfect system of sewer or cesspool will also have ventilation of its own for itself and its pipes. Thus, just as the house has its soil-pipe ventilated by two openings, with a cut-off trap between it and the sewer or cesspool, the sewer or cesspool should have its opening with the same trap serving as a cut-off from the house system. Thus the attempt is to keep each pure and so far independent of the other as that the condition of the one shall not contaminate the other. But as you may not be able to control the outside system, have, at least, the inside system well ventilated and separated by the exit trap. If the reader will get clearly in mind the principles of house arrangement thus laid down and explained, he will be able to estimate what methods should be adopted. Many connect the water-leaders of the roof with the house system, and use these as aids to the ventilation. This does no harm, unless it is unwise to let so much water go into the cesspool or sewer, or unless the rush of water may sometimes be so great through them as to syphon; *i. e.*, discharge the water from traps, and thus render the house, for the time, open to sewer air, if there is any; also, where roof-leaders connect directly with a sewer, while they help to ventilate it, if any side-leaders enter from piazzas or lower points, these may make open conduits for foul air too near

windows. But in such a system there ought to be no foul air. We thus hope to have made plain the most that relates to the general system of house delivery of liquid sewage.

It is often asked under what circumstances a trap may have the water forced out of it and cease to be a trap. In other words, *how is the risk of syphonage to be avoided?* When the pressure of air is removed from a trap so that the water is forced out of it, it is said to be syphoned. The water being removed, the trap is unsealed. This may happen under two sets of circumstances: First—Water flowing into the same pipe from fixtures above it, by the momentum of the stream and the air draft it makes in connection with the column below the trap, may remove the air pressure, and unless some water follows it more slowly, leave the trap empty. In this case, the weight of the column of water so removes pressure as to take the water from the seal, the air draft aiding in the effect. Where the distance is short or the trap is so as not to receive the full weight of water, it is not likely to occur. Second—These side traps of connecting pipes may be syphoned by the full and rapid flow of water through the main or soil-pipe with which they are connected. The air between the soil-pipe and the side trap is thus sucked out, and, as a consequence, the water in the trap follows it. A dash of water through a soil-pipe is not likely to syphon such traps unless they are very near, the pipes and the traps small and the soil-pipe is running full.

It must be admitted that practically there are found to be many variations of effect according to the whirl or direction of the water, the fall, the temperature of pipes, etc., so that there is much difference of opinion as to the liability of syphonage. This is one of the reasons why more dependence should be placed on flushing with water and air, and having pipes in all respects right, and the air pure, than on the trap alone. It is usual now in the best arranged systems to provide against the possibility of syphonage, by having a small vent-pipe pass from the "crown" or top of the trap nearest the outlet up or out to the air. Thus either air is let in so as to prevent syphonage, or if the water is carried out of the trap by the force of a descending stream in the pipe, enough water runs up the vent to fall back into the trap and continue the seal after the stream has rushed by. As to the size of this vent, "it is not safe to trust to a vent-pipe of less size than that of the trap it is to serve, until we get above two inches diameter, except it be of only a few feet in length" before reaching the outer air or joining a larger vent.

While we believe the risk of syphoning traps where the soil-pipe is ventilated on the roof and at its exit from the house, is often magnified, those who construct house sewage systems should fully understand the possibilities and the modes of protection. If the traps are near the basins or closets and are shaped and set so as to have from one and a half to two inches actual seal, and the soil-pipe is so ample as never to flow entirely full, syphonage is not likely to occur. Where, as from a bath-tub, there has been a full, sudden rush of water, it is well to allow a half-cupful to run down just as the flow is ceasing. It is claimed that some traps, like the Bower or Cordell, are not as easily syphoned as the *S* trap, which in general is in approved use. Some now claim that it is better to have the trap so near the basin that one can look down into it and see whether the water is in it.

In houses already constructed it is often not feasible to introduce a vent system of pipes for all traps. In these the round or bottle-trap (unpatented) can be safely used, except that it is to be remembered that by its shape it gives too much room for the settling of filthy particles, and should be accessible for cleansing.

There is but little danger of syphoning the trap of the outlet-pipe as it goes toward the cesspool or sewer, if it is of good size and has the outside ventilating-pipe before referred to. While questions as to the possible syphonage of traps must generally be submitted to authorities, with all the actual facts of size, locality, etc., given, these directions will aid those who wish to know when to seek for special advice. We claim that notwithstanding the number of defective house systems, it is now possible to build healthy houses with all the modern improvements. But it is to be remembered that this is skilled work, that there is sometimes need of cleansing of such apparatus, as well as house-cleaning in other particulars, and that an annual inspection of all plumbing work is desirable. Because it is thus possible, it is not, however, best to have pipes ending in each room, but to locate the bath-room, basins, etc, in one well-aired, accessible room, well located for light and ventilation.

DISINFECTION.

We have already, in former reports, said so much on this subject (see Third Report, pages 68–83; Fourth Report, pages 260–265,) that but little needs to be added here. Where any odor is perceived from a closet or other appliance, sulphate of iron, (that is, copperas or green

vitriol,) dissolved in water in the proportion of two pounds to a gallon, is most available to be thrown down the receptacle just after the rush of water, and so that some of it may remain in the trap. Various other articles, named in former reports, may be used in the same way. Borax is a good material with which to scrub out all fixtures. All places that are accessible to soap and the scrub brush should receive the occasional use of the same, since even air and flushing does not always remove or neutralize each organic particle. All those water-closets known as plungers, or which have a handle to raise, should occasionally have the top unscrewed and the side chamber thoroughly cleansed.

HOW TO TEST THE HOUSE SYSTEM OF SEWERAGE.

Various methods have been devised, but the water test, the peppermint test and the smoke test are the most prominent.

The water test is founded on the very proper assumption, that if the outflow is stopped by a valve or other device, and the pipe filled with water, it will continue to stand at its first level unless there is a leakage somewhere. The difficulty in applying this test is that it is not always easy to plug up the outlet, and that the level of the water rising in connecting pipes is not always situated so as to be convenient of inspection. Yet there is no reason why, occasionally, or because of suspicion, the fixtures may not be so loosened or put aside as to expose all connecting pipes above their trap, and the outside pipe be plugged just before it comes to the outside ventilator and trap. Then the highest horizontal pipe being kept for observation, the whole pipe system, when filled, should preserve its level. This, if showing leakage, unfortunately does not show locality, unless each series of pipes is tried separately. Where the traps have vent-pipes these also complicate the trial. It is, therefore, chiefly applicable to some main or continuous pipe that needs testing. It is exceedingly desirable that, as far as possible, all house soil-pipes should be out of the wall and exposed, as thus any leakages can be detected.

The two commonest tests are those known as the *peppermint test* and the *smoke test.*

"The smell of peppermint is well known, but probably its excessive pungency when in the form of the oil, and when brought into contact with hot water, is not generally understood.

"If such an excessively pungent mixture as this be introduced into

the drainage system of a house, even the smallest leakage will become evident. Suppose the least possible defect to exist in any joint of any of the pipes, a strong smell of peppermint will be evident near the defect. The only difficulty is finding a place to introduce the peppermint. It will be quite evident that it is no use to pour it into any of the appliances in the house, as, were such done, this smell would so rapidly permeate the whole of the premises, by way of the staircase, passages, etc., that time would not be allowed to detect the leakages. Some means must be discovered of getting the peppermint in from the outside. This is not always possible, but generally it is. In the case illustrated there would be no difficulty. The rain-water pipe at the back admirably suits the purpose. One person gets out on the flat roof, near the top of the pipe, and provides himself with peppermint and four or five gallons of water, as near boiling as possible. Meantime, all doors and windows are closely shut, and persons are stationed about the house to observe if the smell expected becomes evident, and to locate, as far as possible, the point from which it issues. The man on the roof pours about half an ounce of the oil down the pipe, and follows it with the hot water. He need then retreat from the place a little, for the peppermint-laden steam which will come from the pipe is blinding in its pungency. As soon as possible he plugs up the top of the pipe with a towel, or some such thing, to prevent the occurrence of the vacuum which would otherwise be in the pipes, and which would tend to draw air from the house into the pipes instead of from the pipes into the house, at any leakage. It would probably not be a minute before the people in the house would perceive the smell at various places. The manipulator of the peppermint must remain perched on the roof until those inside have had time to make their observations, otherwise he will infallibly bring the smell with him."

The test described is an excellent one. It is searching and is simple in application, but it has one drawback. It is impossible by means of it exactly to localize a leakage. This drawback does not apply to the smoke test, as made by a smoke machine. This is nothing more nor less than a centrifugal pump attached to a vessel for generating smoke. The pump pumps smoke out by a pipe, which may be inserted in any pipe in direct communication with the drain, or in an aperture made for the purpose.

The test is in all respects similar to the peppermint one, excepting

that the leakage is not smelt, but seen, and, as we all know, seeing is believing.

After the test has been performed the drain may be opened. This may be done by breaking into a pipe in front, by breaking off a collar, or by punching a round hole in the pipe. In any case it will be possible to judge much of the condition of the drain by the manner in which water runs through the pipes. If we have discovered that there is sufficient total fall, we can now see whether or not it is uniform. We shall find in a few cases out of every hundred examined that there is a total stoppage, that no sewage whatever leaves the premises, and that consequently it must all be depositing under the basement.

If the drain, after all tests so far applied, and from what can be seen of it, appear to be in good condition, it may be further tested by filling, or attempting to fill, it with water. There is probably not an average of one drain in a hundred in old houses which would remain full of water for an hour. For the rest it is necessary to examine all appliances, to trace the pipes from them, and sometimes to test these pipes.

OUTSIDE DISPOSITION OF LIQUID REFUSE.

We have thus far considered the relations of buildings to the modes for the delivery of liquid household refuse up to the point of their leaving the house through conduits or soil-pipes, separated from the outside system by a good trap or water-seal, with a ventilating opening or pipe from this house sewer on the house side of the trap. Thus you have devices by which whatever may be the condition of outside sewers, cesspools or places of deposit, it is hoped that there will be no pipes leading the foul air into the house.

Yet it is to be borne in mind that the most radical and defensible method is to have no foul air kept or generated outside which can be brought into the house.

It is also to be remembered that independent of pipes, if the cesspool or the ground near the house is being contaminated, air direct from there finds its way into the house, mingling with the general air, and thus furnishes devitalized and devitalizing breathing material. Also, if there is a well or ground cistern on the premises, the water may be contaminated through this air, or through more direct contamination in the ground itself.

If all the liquid material is carried directly to a sewer by a ventilated

and smooth and fairly self-cleansing pipe, with proper fall, the problem is simplified so far as the individual house is concerned. It is insisted that all pipes under the building be of iron, and that those between the building and sewer be of the best vitrified pipe, so laid and so joined as to make them absolutely water-tight. If one can have full security that such pipes shall be of best quality and construction, and shall be properly laid, they are as durable as iron pipes, which, notwithstanding coating, become roughened and rusted, and are then less lasting than the best stoneware or vitrified fire-clay pipe.

Too often the iron pipe, where it comes out of the building and is joined to the vitrified or stoneware-pipe, *is not well joined.* It should not depend upon cement, but have caulking with tarred gasket, so as to fit the socket tightly. The plan adopted by Engineer Philbrick in laying the pipe for Princeton College, so well expresses the kind of work desirable for all outside soil or sewer-pipes, that we quote his outline:

"SPECIFICATIONS FOR LAYING STONE-WARE DRAINS.

"MATERIALS.—No pipes should be used which are not nearly cylindrical, a variation of over one-fourth of an inch in the different diameters of a 6-inch pipe being enough to condemn it.

"The pipe should not have bells or hubs attached, as is now generally done, but should be formed in simple cylinders, the joints being covered by loose rings or collars of the same material, without glazing, to be broken in three or more pieces when applied.

"The thickness should be uniform and not less than $\frac{5}{8}$ and $\frac{3}{4}$-inch for 5-inch and 6-inch pipe, respectively.

"The glazing should be '*salt glazing,*' and not '*slip*' or *clay* glazing, and should extend throughout the whole interior, but should be omitted on the collars and on the outside of pipes for $1\frac{1}{2}$ inches at either end of the pieces. If the ends are glazed outside, the cement used at the joints does not adhere well, and the joint may be leaky, even with good cement and put together with the best of care.

"The clay of which they are made should, of course, be of good quality and well burned. Less trouble, however, is found in practice with the kind of clay than with the results of careless moulding, such as oval, crooked pipes, with glazing applied all over the ends, for no better reason than because it costs some trouble to omit the glazing there, although it is a positive injury.

"The cement should be of any good brand, of fair hydraulic properties, fine and freshly ground, and carefully mixed with not over its own bulk of *clean, sharp* sand. In all places where the sand is not clean (it should not soil the hands when rubbed between them), it should be washed thoroughly in a bed not over six inches deep with

a copious flow of water, stirring the sand and water quickly with a hoe and allowing all the loam and clay to be carried off, till the water ceases to look muddy. The sand should be then dried and mixed thoroughly with the cement before applying any water. When wetting it for use, no more water should be used than is absolutely necessary to render the mortar plastic.

"It should be wetted only in small quantities for immediate use. All lots left over an interval of half an hour, or long enough to stiffen and begin to 'set,' should be thrown away and not 'tempered up' as is generally done for indiscriminate use. Cement when rewetted after a partial set, is sure to shrink and crack when it hardens, and is worthless for pipe laying.

"The ends of pipes and insides of collars should be wetted in warm weather before applying the mortar to these surfaces. If applied dry, the porous pipe absorbs the water so quickly from the mortar that it never hardens properly, and does not adhere to the pipe.

"WORKMANSHIP.—Pipe should be laid with such good alignment that the inspector can see through every section, like a gun-barrel, from one man-hole or lamp-hole to another, or from house to sewer. This can readily be done with very little extra cost, if pains be taken to pursue proper methods.

"Every piece of pipe should be bedded in cement mortar through its middle portion as well as at its ends, leaving no voids longer than the inside diameter of the pipe between these bearings. The lower half of the pipe should be carefully aligned with its neighbor, by applying a straight edge inside when bedding it, to avoid offsets at the joints, leaving slight inaccuracies in form to be developed at the top of the pipe, which is rarely wetted by the flow.

"Through every piece of pipe as laid should be passed a cord, made fast where starting, and extending through every section of pipe laid, by means of which a wiper or rubber disc between two smaller wooden ones, can be pulled through the whole section before leaving it for a night. Of course the mason is expected to see that every joint is clean as laid, but human nature is fallible and can't be trusted to remember this, the consequences of such neglect being often a total failure of the drain.

"Every section should be covered about three inches with fine earth, and tested by some two or three feet of water pressure, when the defects will be seen and may be remedied before filling the trench. The best masons will be astonished to see how many leaky joints they make unawares, and which may never be detected in any way but this.

"The back filling should be applied with care, packing the material around the pipes without moving them on their beds even a hair's-breadth. The trench may be puddled with water if it is at hand, taking care not to wash the cement when applying it.

"No good drain can be laid on a yielding foundation. No matter what the material may be, it will break and make leaks when settlement occurs, for though the drain itself is light, the material over it is heavy and crowds it down as it settles. All drains on newly-filled land should be treated as temporary works to be replaced when the settlement is finished.

"After many years of experimenting, I have arrived at the conclusion that all stone-ware pipes should be laid by none but first-class workmen, and even then the work should be tested by slight hydraulic pressure before it is buried deeply, so that defective joints can be readily seen and made good before filling up the trench."

There might be slight variations of preference among different constructors, but these are the guiding principles. And it needs to be borne in mind that ordinary masons or builders do not conform to these plans, but assume that the work is to be done much after the manner of ordinary brick-laying. Just as an architect is employed to superintend a building and see to the fulfillment of the specifications of a contract, it is desirable that some one who has made sanitary art a study, should superintend such work; all the more, because so much of it is to be buried out of sight, where defects cannot be seen, and are often discovered only because sickness and death have openly manifested them. All *pipes and all sewers that are intended to convey foul* liquids must be water-tight, or hermetically sealed, except at points of ingress and egress, where intentional openings are made for ventilation.

A house-pipe should enter a sewer as far above the general level of its flow as the fall will permit, and in the direction of the sewer-flow. In order to prevent a back flow in the pipes, they should also enter a cesspool not far from the top. If, as there should be, there is a trap in the course of the pipe leading from the house just near its exit, there should not be another trap as the pipe enters the sewer or cesspool, since this would make a space of confined and unventilated foul air between the traps.

Should *the sewer or cesspool* be ventilated? The principle that we have advocated for all house soil-pipes applies exactly to all sewers and cesspools and their pipes. The sewer should have its ventilators generally not over 300 feet apart, and regulated as to size, frequency and locality by various considerations. Sometimes they may, especially at the beginning and the end, be carried up by the sides of trees or houses. Details cannot be fully given without knowing all particulars, but with these the principles of ventilation are generally easily carried out.

Where a cesspool is used, the ventilation is more directly under the control of the owner. From the first frost of fall to the last frost of spring, almost any ventilation that does not admit increase of liquid by rains, etc., will suffice.

A system of ventilation which is all-sufficient is made by having four pipes of not less than four-inch calibre running on a curve out near the top of the cesspool to a little above the ground, where each may have either a wire ball or movable cover. These serve to pass the upper air through the empty part of the cesspool, and so secure the dilution or change of any gas that may arise. These may enter the cesspool at varying and convenient points below the top, but all of them a little higher than the pipe by which the liquids from the house enter. The cesspool should not be so covered over with soil as not to admit of examination as to the height of its contents.

Where two or more successive cesspools are built, the one to receive the overflow of the other, the connecting tube is sometimes so arranged as to help the ventilation of both by having ventilating holes along its course. Because of imperfections it is generally safe to have all ventilators end by a tube up into the air.

Under what circumstances may cesspools be used? The reply of some of the very best authorities is, never. Such assert the principle that it is never wise to store filth, and therefore it should never be done. To this a reply is, that, with all the proper conditions given and specified, it is possible and feasible to store these liquids safely for a time. The answer to this again is, that the practical difficulty of securing the carrying out of such conditions is such that, in ninety-nine cases out of a hundred, absolute safety is not secured. This is too true, but does not vacate the propriety of stating what these conditions are. In order to arrive at these, we must state how cesspools are to be built, if at all, what are the risks, and what the best protection from these. The first question that arises is, shall the cesspool be so built as to allow part of its liquids to leak out at the bottom and sides, so as to leave only the undissolved matters, and so as not to need frequent emptying; or, shall it be built tight, like a cistern, and to be cleaned out as it becomes full?

If a spot can be found at least 100 feet away from your own or your neighbor's well and from the house, if the water level of the ground is low, so that it has much air in it and can receive the liquid slop as it leaks out of the cesspool, and if the soil is a gravel and

sand or a light, clayey loam, admitting of good percolation or soakage and cultivation, it is possible to have such a cesspool.

It should be made of even surface, should not go down deeper than the usual water level, and should be large enough never to be filled within a foot of the top. It should be well covered, so as to protect it from solar heat, yet by a stone cover should admit of inspection, and should be cleansed in early spring of all its contents. Three or four pipes of tile, coming out from about eight inches below the surface and opening on the surface, will ventilate it better than only one. Some, during the summer, would hang a wire netting of powdered charcoal just under the cover, but this is not generally necessary. Where there is need of a curb or lining, bricks loosely laid are best, and the cover should be an arch or stone. Occasionally such cesspools are well kept, and with no reason to suspect evil consequences therefrom. It is only because of nearness to water-supply or house, of neglects and of close vicinage, as in cities, that they are to be condemned. It is because the necessary accumulation of these in cities vacates the conditions of dry, well-aired soil, admitting of percolation and proper disposal, that they are ill adapted for city use. It is because they are so often made in a silly way, and so often neglected in the country, that they too often become disease-breeding nuisances.

It should be a rule not to make them very deep. Ground within four or five feet of the surface deals with refuse far better than earth deeper down. The air more readily reaches it, the growing vegetation appropriates it, and so it comes more within the reach of the conservative processes of nature. If tile-pipes a few inches from the surface run out in every direction, so much the better. The only exception to preference for superficial cesspools is where, by going deeper, you penetrate a clay bed, and strike a gravel or sand bed which is more porous and so removes it, unless, at the same time, you strike the water level.

While cautioning against the use of such cesspools, we desire that when used they shall be of the best kind and properly kept and cleansed.

Because of the possibility of a filth soakage which might contaminate the ground, or the water, or the air, where cesspools must be used, it is more usual to advocate those built after the manner of a cistern, thoroughly and smoothly cemented on the bottom and sides, and so provided as tight receptacles, to be emptied when full. The rules given as to the connecting pipes and ventilation, are the same in

regard to these as to the uncemented cesspools. But as no demand is to be made on the soil or ground, the locality, depth, etc., may be to suit the owner.

These tight cesspools always need to be watched, so that they shall not be allowed to overflow. It is better also, if possible, that they be not emptied by small and continuous pumping which agitates the mass, but by some form of odorless excavating apparatus, which quickly removes contents and admits of more thorough cleansing and disinfection. Some of the foulest arrangements to be met are closed cesspools, often made of planks driven down, which, from day to day, are being emptied by common pumps of their decomposed and putrescent liquids. Where cesspools are used, they should be made sufficiently large only to require emptying in the early spring and fall. Such cesspools should have at least two stand pipes for ventilation, of unequal heights, and of not less than four inches diameter.

Non-ventilated cesspools have given name to two forms of disease in Paris: the one a form of asphyxia, caused by sulphuretted hydrogen; and the other an inflammation of the eyes, caused by the ammonia in the foul air.

Where there are no public sewers, and owners of property are unwilling to have cesspools, two other forms of disposal have been successfully tried, each depending on soil disposal. One process of preparation is as follows: The small plot of land adjacent to the house is first thoroughly underdrained, so as to secure for it the lowest possible water level and the quick subsidence of all rains from its surface. This is done by close, deep laying of drain tiles in the usual form. These should generally be laid a little time before others now to be described, since thus the ground is allowed to become fully settled. Surface-water is kept off of it as much as possible. Next, another series or system of tiles is laid in a way quite similar, but of less size, nearer to the surface, and for a different purpose. The design of this system of pipes is that they shall be as near the surface as frost and surface-flowing or spading will allow, so that the liquid slops can flow through them and soak into the drained soil, and be appropriated by well-cultivated grains, grasses and croppage upon the surface. It is surprising, if these two ideas are well carried out, how much of the liquid and its organic particles can be thus disposed of. But there is one other condition: This slop must not come dribbling along the pipes just where it will, but must be received into a little tight cistern, called a "flush tank," so arranged as that it will, when about full,

each day, send out its contents with a gush through these pipes, and thus leave them a part of the time dry or vacant for the circulation of the air. It is easily arranged that this tank shall, at a certain height of the liquid, discharge itself, and also that it may discharge one day into a certain portion of the pipes and another day into another portion. It is found that thus a far greater quantity will be appropriated and nuisance from it prevented. Even the more solid matters, except such very coarse portions as are detained by a cleansing wire, become macerated, and afterward dried out and taken up from the small pipes by the growing plants. In Orange, in Princeton, and many other places, this plan can be found in successful operation. Most of the pipes do not need to be over two inches in calibre, and should not be more than from eight to twelve inches beneath the surface. While the persons putting down and overseeing such a system must understand not only its construction, but the necessary relative conditions as to soil and high culture, and closeness of plant or putting down, it is a feasible and satisfactory plan when well devised and superintended.

The next plan is that of modified *surface irrigation*. It, like the former, is based upon the idea of "intermittent filtration of soiled liquids" through the ground. By its structure, its air, its croppage, and its *alternation* of supply, the earth or soil can appropriate much floating or liquid material.

In this method, there should be under-drainage as before, but instead of the second series of pipes, reliance is had upon surface methods. Series of superficial trenches or furrows are made lengthwise, which run up to a long furrow parallel with the rear of the house and made to receive the liquid outflow. This can, if preferred, be made of galvanized iron, with movable outlets opposite each furrow, so that the contents can sometimes flow out some of these furrows, and sometimes at others. If so it should be cleansed occasionally with some one of the liquid disinfectants named in our circular. As the liquid is not intended to overflow, these furrows can be kept covered with boards if preferred. Here the liquid slop of each day is received into this long gutter, as in the former instance it was into the "flush tank." But now it is allowed to flow out by surface instead of sub-soil methods. When this is well managed, a small piece of ground with heavy grass, or with Indian corn cultivated as for fodder, or with vegetables, will dispose of very much soiled liquid. It is not found offensive, as is apt to be imagined, and is at least applicable to many country houses. The furrows can be changed from

year to year, and if the ground is thoroughly worked and aided with lime or other inorganic fertilizers, it thus disposes of the refuse. Without indicating preferences, which must often be relative, and must depend on the facilities and on the exactness of administration, we thus plainly indicate the most common and available means for dealing with the soiled liquid sewage of the household.

MODES AND PLACES OF INTERMENT.

BY DAVID WARMAN, M.D., TRENTON.

The disposal of the dead is none the less a sanitary question than the care of the living. Disease and pestilence are recognized evils. Whatever contributes to produce them must, if possible, be removed. We know that pestilential influences arise from various causes, and we provide against them. Much has been written upon the subject of contamination of the air from sewer gases and pollution of the soil and water by cesspools, and kindred topics, but a comparatively limited amount of attention has been given to the interment of the dead. It seems, therefore, imperative that a knowledge of the modes of burial, and the dangers that may arise from the improper disposal of the remains of our beloved dead, should become more extended. The experience of the past shows the importance of the careful consideration of this subject. The welfare of the living must not be lost sight of, while all proper respect is shown to the dead. The question of how and where the dead shall be disposed of, is one that is eminently sanitary. The dead should be so buried that the living may not suffer.

The disposal of the dead has varied at times, simply from fear of desecration of the grave. In the time of the resurrectionists, many bodies were buried in quicklime, and a resident of Dundee was so fearful lest the coffin of his child should be disturbed that he arranged an explosive apparatus, which was buried with the coffin. The methods in modern use are, as every one knows, first, intramural and extramural; second, cremation. The latter method is the burning of the dead.

This very ancient method of disposing of the dead has in modern times been, to a certain extent, revived. In England a society has been formed to introduce the practice, and in Germany cremation

has also made some progress. It has also been used to a limited extent in the United States. The serious and almost insuperable objection is the facility with which cremation would conceal certain crimes, such as poisoning, and render identity in other cases impossible. Cremation has not been accepted in this country, and there is nothing to deplore in the fact. It can doubtless be a useful mode of disposing of the dead in many cases, yet we do not think that either sanitation or sentiment demand it; and in many parts of the country it will be a long time before it can be made practicable or economical.

The other method, of intramural and extramural interment, or the enclosing of the dead in a grave, either within cities or beyond their confines, is generally adopted by all civilized races.

There are few countries where more excellent regulations relating to burial grounds and the interment of the dead exist, where the ceremony of burial is conducted with more propriety, and where greater respect is paid to the deceased, than in our own land, yet in some particulars improvement might and ought to be made.

The history and condition of burial grounds and the regulations for the interment of the dead, are intimately connected with the public health and should form a part of the sanitary regulations of every city and town. We can in this connection notice only some general matters which the subject suggests.

There are two principal objects which should be kept in mind, in these regulations: first, to pay proper respect to the dead, and, second, to protect the health of the living. To accomplish this there are several matters to be considered. The first important lesson for us to learn is, *that the dead and living were never intended to be brought in close proximity.*

That interment or enclosing the dead in a grave is a most ancient custom there cannot be a doubt. Amongst the ancient Jews, to have no burial was reckoned among the greatest of calamities. The exposure in any manner of their dead (even criminals) was looked upon as a pollution of their land. The Egyptians and Asiatics practiced interment from the beginning of time. Subsequently it became the custom to burn the bodies of the dead. By Homer's description of the funeral of Patroclus, it would appear that the Greeks used burning as early as the Trojan war. They also had recourse to interment, as seen by their historians, who give an account of the manner in which bodies were placed in the grave; Plutarch tells us they were laid with their faces toward the east or towards the

west; and Cicero informs us that, in early times, as those of Cecrops, interment was altogether made as by the Greeks; but we have ample testimony, in history, that it always took place without their cities, particularly among the Jews and Greeks, from whom the Romans derived the custom. We have several passages in the New Testament showing that the Jews buried their dead without the city. Servius, in giving an account of the unhappy death of his colleague, Marcellus, which happened in Greece, says that he could not, by any means, obtain leave of the Athenians to allow him a burial-place within the city.

The Romans observed the same custom from the first building of their city; it afterwards became a law, as settled by the Decemviri, "Neither burn, or bury within the city." They generally buried near the highways—in fields appropriated for the purpose. Their reasons seem to have been founded on sacred as well as civil considerations; among the former, that the passers-by might see the graves and be reminded of their own mortality—hence, as Varro tells us, the inscription upon the monuments, "Sta. Viator;" among the latter, "that the air might not be corrupted by the stench of putrefying bodies." The ancient Persians never buried in cities or towns. Their kings were interred on a high hill, on the east of Persipolis; generally, throughout Persia and the Levant, there were no burial-places except those without the city. The cemeteries of the Turks were always without the town, that the air might not be corrupted by the vapors arising from the graves; they, in like manner as the Romans, also bury by the sides of the highways, that travelers may be reminded to pray to God for the deceased. Eusebius informs us that when the Christians, by favor of Constantine, built churches in the cities, they had their burial-places outside. According to Gregory of Tours, it was not until the latter part of the sixth century (about A. D. 590) that funeral places and cemeteries within the towns were consecrated or tolerated. Hesperian informs us that the ancients greatly disapproved the innovation of burying in towns and churches; and, on that account, the councils of their bishops made several canons and decrees against intramural and church burial.

Whether the ancients burned or interred their dead, they never made choice of the place of divine worship, either to bury the dead or deposit the ashes. For centuries after Christianity was established, they never presumed to make God's temple the charnel of the dead.

On the contrary, when the ancient mode of burial without the city began to be neglected, burials in the churches were approved by authority.

The being buried in or near a church, we are told, originated with the first Christian Emperor, Constantine, who, although he did not desire to be buried within the church (a thing in his day unheard of), was resolved that his remains should be deposited as near as possible to it; they were accordingly interred in the porch of the great church at Constantinople. Subsequently the practice increased and persons of quality claimed a similar privilege. Their inferiors, although they claimed not the right of being buried within the porches, deemed it an honor to be buried as near thereto as possible; hence another reason assigned for large courts and yards around churches.

Intramural burials and church-yards, it would seem, originated in the idea that persons passing the graves of their dead relatives or friends, on their way to worship, might be reminded to offer up prayers for them.

> "The melancholy ghosts of dead renown,
> With penitential aspect as they passed,
> All point at earth and smile at human pride."

With reference to burying in churches, the custom did not arise earlier than the year 1076. In the reign of William the Conqueror, the Council held at Winchester, under Laufranc, Archbishop of Canterbury, by the ninth canon, opposed burial in churches. It soon after, however, became a custom, and vaults were built under the altars.

"It is horrid," said the Austrian Emperor, "that a place of worship, a temple of the Supreme Being, should be converted into a pest-house for living creatures."

The following extract is from a sermon preached by Bishop Lattimer, in 1552, which proves that even at that early period, when the population of London could scarcely have been one-sixth of what it is now, the nuisance of intramural interments was found to be dangerous to health, if near a church or the houses of the living. "The citizens of Nain," observed the Bishop, "hadd their buryinge-place withoute the citie, which no doubt is a laudable thinge, and I doe marvel that London being soe great a citie, hath not a burial-place without; for no doubt it is an unwholesome thinge to bury within the citie, especialle at such a time when there be great sicknesses and manie

die together. I think, verilie, that many taketh his death in St. Paul's church-yard, and this I speak of experience, for I myself, when I have been there some mornings to heare the sermons, have felt such an ill-favored and unwholesome savour, that I was the worse for it a while after, and I think no lesse but it is the occasion of great sicknesses and disease."

Well would it have been for the inhabitants of this vast metropolis, had Sir Christopher Wren's plan been carried out at the rebuilding of the city after the fire of 1666. All grave-yards, according to his recommendation, were to have been removed without the town.

In the year 1786, the Legislature of Germany passed a law, which was punctually obeyed in the empire over which Joseph II. ruled, and which we would do well to imitate, instead of using the ground around and about our churches and chapels as store and pest-houses. This law prohibited the burying of dead bodies in or around any church or chapel whatever. Neither rank nor affluence could obtain permission to evade it, as in the enforcement of it no respect was paid to persons.

Dr. Adam Clarke, in his commentary on St. Luke, advises that "no burying-places should be tolerated within cities or towns; much less in or about churches or chapels. This custom is excessively injurious to the inhabitants, and especially to those who frequent public worship in such chapels and churches. God, decency and health, forbid this shocking abomination. * * * From long observation I can attest that churches and chapels situated in grave-yards, and those especially within whose walls the dead are interred, are perfectly unwholesome; and many by attending such places are shortening their passage to the house appointed for all living. What increases the iniquity of this abominable and deadly work, is that the burying-grounds attached to many churches and chapels are made a source of private gain. The whole of this preposterous conduct is as indecorous and unhealthy as it is profane. Every man should know that the gas that is disengaged from putrid flesh, and particularly from a human body, is not only unfriendly to, but destructive of, animal life. Superstition first introduced a practice which self-interest and covetousness continue to maintain."

As examples of evils arising from this custom, I quote the following cases:

The Rev. Dr. Reuder, in his tour through Germany, published in London in the year 1810, mentions the case of a very corpulent lady who died. Before her death she begged, as a particular favor, to be

buried in the parochial church. She died on Wednesday, and on the following Saturday was buried according to her desire. The day following the clergyman preached her funeral sermon. The succeeding Sunday, being the day for administering the holy sacrament, about 900 persons were present. The weather was very hot. Many during the service were obliged to go out for a time to avoid fainting, while some actually fainted away. A quarter of an hour after the ceremony, before they had quitted the church, more than sixty of them were taken ill. Several died in the most severe agonies; others of a more vigorous constitution survived by the help of medical assistance. A most violent consternation prevailed about the whole congregation and town. It was concluded that the wine had been poisoned, and so it was generally believed. The sacristan and several others belonging to the vestry were arrested and cast into prison. The persons accused underwent very great hardships. During the space of a week they were confined in a dungeon, and some of them put to the torture, but they persisted in asserting their innocence. On the Sunday following, the magistrate ordered that a chalice of wine, uncovered, should be placed for the space of an hour upon the altar, which time had scarcely elapsed when they beheld the wine filled with myriads of insects, and, by tracing them to their source, it was at length perceived by the rays of the sun that they issued from the grave of the lady who had been buried the preceding fortnight. The people not belonging to the vestry were dismissed, and four men employed to open the grave and the coffin. In doing this, two of them dropped down and expired upon the spot, and the other two were only saved by the utmost exertion of medical talent. It is beyond the power of words to express the horrid sight of the corpse when the coffin was opened. The whole was a mass of entire putrefaction, and it was clearly demonstrated that the numerous insects, both large and small, together with the effluvia which had issued from the body, had caused the pestilential infection which was for a while attributed to poison.

In the autumn of 1843, in Minchinhampton, England, a grave-yard was disturbed which had existed five hundred years. In rebuilding the church it was deemed expedient to lower the surface of the grave-yard to within a foot or two of those buried. The earth so removed, of a dark color, saturated, in fact, with the product of human putrefaction, was in a fatal hour devoted to the purposes of agriculture. About one thousand cart-loads were removed to a new piece of burying-ground to make the grass grow quickly, some as manure in

the neighboring fields, some on the rector's garden, and some in that of the patron. The seeds of disease were thus widely disseminated, and the result was such as any person of common sense might have expected. The diffusion of a morbid poison which soon followed was evinced by an outbreak in this once healthy locality. The family of the rector and the inhabitants of the streets adjoining the church-yard were the first attacked and were also the greatest sufferers. The rector lost his wife, a daughter and his gardener. The patron's gardener, who had been employed in the unseemly art of dressing flower-beds with human manure, also died. The children who attended the school took the fever as they passed the upturned surface of the grave-yard, went home and died, but did not communicate the disease to those who came near them. Seventeen deaths occurred, and upwards of two hundred children had measles, scarlet fever and various kindred eruptions.

In further illustration of this subject, we may cite the instance of the French physicians who were deputed expressly to Egypt by the French government, to investigate the nature of the plague. It is their opinion that the superficial mode of interment that prevails there materially contributes to it. At almost every village they found near the habitations of the Arabs mounds crumbling away and exhibiting the naked bones of those who had been buried in them. In the whole of Lower Egypt corpses are merely thrown on the surface of the earth. A hillock is raised over them, which is quickly demolished, or cracks in drying, while infectious vapors escape through the fissures or flies are admitted to the bodies. The sting of these insects will subsequently produce pestilential tumors of which many of the natives have been known to die.

Carcasses scattered over the field of battle have in all times caused mortal sickness.

We cannot afford space to relate all the accidents that occurred at the beginning of the French revolution. When, on account of the insalubrity of the church and neighborhood of the Cemetery of the Innocents, the government determined to have the remains of the bodies removed, M. Thouret, himself, who was director of the operations, narrowly escaped death from a putrid fever which he contracted in the performance of his duties. The bodies in the burial-ground of St. Eustace, in Paris, were moved in 1780, and of a number of children who were proceeding to the church to be questioned in their catechism, some fell down in a state of syncope, whilst other were subjected to other indis-

positions. Three workmen who had entered the vault died. These and numberless other instances that might be quoted, induced the French government to prohibit interments in or near the town; and it was once in contemplation to burn the dead bodies, according to the custom of ancient Rome.

Vicq. Dazyr says, in regard to these facts: "Were we to collect together all the observations of those who have gone before us, we should find proofs without number of what we advance; the small number of the learned and of persons capable of transmitting to posterity accounts of the deadly effects of interments in churches and in towns, or rather the sanctity with which we ourselves have been used to consider the custom of interring in temples, has been often the reason of attributing to other causes the epidemic diseases which have from time to time depopulated our cities."

Dodsley's Annual Register, July, 1773, gives the particulars of an accident which occurred in a church: "Of one hundred and twenty young persons, of both sexes, who were assembled to receive their first communion, all but six fell dangerously ill, together with the Curé, the grave-diggers and sixty-six other persons. The illness with which they were seized is described as a putrid fever, accompanied with hemorrhagic eruption and inflammation."

All the civilized nations of antiquity have condemned the custom of interment in cities or towns. Wherever he travels, the antiquarian finds in the environs of the great ancient cities *tumuli*, funereal temples, vaults, excavations in caverns, masses of masonry of the most astounding magnitude, such as the pyramids, wonders of the Old World, that appear to have survived the wreck of ages, to teach us an important lesson—a lesson, however, as yet unattended to in many parts of this country.

The examples of the evils arising from intramural interment have thus far been drawn largely from England and the Continent of Europe. The vaults of their churches and crowded church-yards warn us of the danger of this system of burial, that has been handed down to the present century, from the dark period of the middle ages. But it is not necessary to go back to antiquity, or search the pages of ancient history, to establish the fact that the dead and living should not be brought in close proximity, and that, wherever they are, it is always a cause of disease and death. We have had numerous instances in modern times, and in our own country, sufficient to warn us of the

great danger, and of the urgent necessity of making prompt provision to meet them.

The first settlers of the New World came with the traditions of their forefathers. They buried their dead in their midst, and their descendants do so still in very many places. When the population was scattered, and vast territory surrounded the then towns and villages, there was but a minimum of danger; from this fact the people have no doubt become blind to the evils they were fostering in a rapidly-growing country, with large and populous cities and towns building in every direction. Cemeteries extramural have been growing in popular favor in our own country for the last half century. This is an encouraging feature of the times, and illustrates a growing sanitary influence in sharp contrast with the old, offensive, health-polluting grave-yard system. We will cite a few examples of the evils of the old system. Dr. Ackerly thus describes the old grave-yard connected with Trinity Church, New York City, 1822: "During the revolutionary war this ground emitted pestilential vapors, the recollection of which is not obliterated from the memory of a number of living witnesses. In the hard winter of 1780–81 this city was in the possession of the enemy, and the ground was so frozen that the soldiers and others, who were buried there during that long and severe winter, were interred but a small distance beneath the surface. The consequence was, that in the ensuing warm season it became so offensive as to require the interposition of the military commandant, and the Hessian soldiers were employed in covering the ground with a fresh stratum of earth three or four feet thick." In 1814 a battalion of militia was stationed on a lot on Broadway, the rear of which was bounded on Potter's Field (now Washington Square), from which arose a most deadly effluvium. A number of the soldiers were attacked with diarrhœa and fever. They were removed at once. One of the sick died, the others rapidly recovered.

An article in the *Commercial Advertiser*, September 7th, 1822, furnishes further facts: "It will be remembered that the grave-yard being above the streets on the west, and encompassed by a massive stone wall, and the east side being on a level with Broadway, it results that this body of earth, the surface of which has no declivity to carry off the rain, thus becomes a great reservoir of contaminating fluids suspended above the adjacent streets. In proof of this, it is stated that in a house in Thames street springs of water pouring in from that ground occasioned the removal of the tenants, on account of their

exceeding fœtidness. The cellars of all the houses in the streets west of the church-yard were all more or less accessible to impure springs of water." These springs had their source in the grave-yard, which was twenty-five or more feet higher than the last street below it.

There were other grave-yards and vaults in proximity to that of Trinity: the South Reformed Church, having a space of 25,000 square feet in Garden street, which was narrow and confined, and Wall Street Church, covering, with the building, 20,000 square feet, nearly the whole of which was excavated for vaults, and an additional range constructed under the sidewalk. Between Pine and Cedar streets were the burying-grounds of the Associate Reformed and French Protestant Churches. The Middle Dutch Church Cemetery was a considerable place of interment and appropriated to vaults, as also St. Paul's Church and the North Dutch Church in Fulton street. St. Paul's was contiguous to Broadway. The monuments now standing in it bear testimony to its being the resting-place of large numbers of dead. Nearly opposite to it was the grave-yard of the Old Brick Church, which in 1823 was entirely filled. Dr. Pascalis, in commenting upon these, and other burial-places which he makes "of less account," says: "There is, as all know, at the slightest computation, ten acres, or 500,000 square feet of ground, in the church-yards appropriated to graves or vaults. * * * We will take the subject in another point of view, to ascertain whether the space thus employed may endanger the health of the inhabitants. On the authority of observation and experience, it takes more than ten years for the entire decay of the human frame in graves, and a much longer time than that in vaults. * * * The yearly bills of mortality at the City Inspector's office, for the last eleven years, amount to 33,945. We have, then, a total of 33,945 dead bodies dispersed and accumulated within an area of three miles during eleven years and a half, all still under the decomposing operation of nature, and diffusing in the warm season their volatile exhalations in the air we must respire." Dr. Barrow says of them: "They (the grave-yards) are saturated with materials hostile to human life."

In a work published prior to 1823, is the following warning: "Avoid as much as possible being near church-yards. The putrid emanations arising from church-yards are very dangerous, and parish churches, in which many corpses are interred, become impregnated with air so corrupted, especially in the spring, when the ground begins to grow warmer, that it is prudent to avoid this evil, as it may

be, and in some cases has been, one of the chief sources of putrid fevers which are so prevalent at that season." Another writer says: "In the summer of one of the years I have mentioned, the trustees of the church made some repairs to it, and built a porch to each of the eastern doors next to Liberty street. In digging for the foundation of the southeast porch, next to the sugar-house, they came upon the great grave in which had been buried those who died in this sugar-house while it was occupied as a prison during a period of the revolution. The grave was deep and spacious, and it became necessary, in order to get at the solid earth for the foundation of the porch, to disinter a great quantity of the remains of those who had been buried there. Several cart-loads were taken up and carted away. During this operation the air of the church-yard and its vicinity swarmed with myriads of little black flies, very troublesome. They filled our house, covering the sideboard, furniture, and every article on which they could alight. Even closing the doors did not entirely relieve us from the annoyance."

In depositing a corpse in one of the vaults of the Brick Church, Beekman street, the sexton cautioned the attendants "to stand on one side; you are not accustomed to such smells." Mr. De Groadt, the sexton of the Dutch Church above noted, frequently remarked that, in descending into the vaults, "candles lose their lustre; and that the air is so sour and pungent that it stung his nose." The journal says: "This being the case with all the vaults where dead bodies are deposited and subject to be opened at all seasons, this method of disposing of the remains of our friends is, at the least, an unpleasant, and certainly a dangerous one."

The Board of Health in the city of New York, in 1806, appointed a committee to report on measures necessary to secure the public health. The following extract from the report, which was drawn by Dr. Edward Miller, says: "Interment of dead bodies within the city ought to be prohibited. A vast mass of decaying animal matter, produced by the superstition of interring dead bodies near the churches, and which has been accumulating for a long time, is now deposited in many of the most populous parts of the city. It is impossible that such a quantity of animal remains, even if placed at the greatest depth of interment commonly practiced, should continue to be inoffensive and safe. It is difficult, if not impracticable, to determine to what distance around the matter extricated during the progress of putrefaction may spread; and by pervading the ground and tainting the waters,

and, perhaps, emitting noxious exhalations into the atmosphere, do great mischief. But if it should be decided still to persist in the practice of interments in the city, it ought to be judged necessary to order the envelopment of the bodies in some species of calcareous earth, either quicklime or chalk. * * * This growing evil must be corrected at some period, for it is increasing and extending, by daily aggregation, to a mass already very large, and the sooner it is arrested the less violence will be done to the feelings and habits of our fellow-citizens." This report being sent to the Legislature with a memorial upon the subject, resulted in the passage of a law authorizing the corporation of the city of New York to prohibit interments within its limits. The law was afterwards incorporated into the general statutes of the State. It was not till 1823 that the common council of New York passed a prohibitory ordinance upon the subject, and, when passed, it was some years before it became operative.

Dr. Elisha Harris says: "Trinity church-yard has been the center of a very fatal prevalence of cholera, whenever the disease has occurred as an endemic near or within a quarter of a mile of it. Trinity Place, west of it; Rector street, on its border; the streets west of Rector, and the occupants of the neighboring offices and commercial houses, have suffered severely at each visitation of the pest, from 1832 to 1854." Dr. John W. Rauch, in an excellent monograph on interments in populous cities, and their influence upon health and epidemics, says: "During the prevalence of the cholera at Burlington, Iowa, in July, 1850, a number of dead were interred in the city cemetery. No deaths occurred in its neighborhood until about twenty had been buried there. After this, until the epidemic ceased, cases occurred, and always in the direction from the cemetery in which the wind blew." Dr. Bryant, "On Yellow Fever at Norfolk and Portsmouth," in 1856, after giving a history of the epidemic and its terribly fatal results, and offering some suggestions upon a future correct hygiene, says: "The last, and at the same time one of the most important of these suggestions, relates to the remains of the dead. They can scarcely be said to rest beneath the sod. * * * When the summer's sun shall pour its rays down upon this decaying mass, can it be otherwise than that their noxious gases will commingle with the purer air, and sooner or later aid in reproducing other harvests of disease and death? * * * The remedy here indicated is the disinterment of the dead, and their removal to a distance of not less than eight miles from either city. It is the total forbidding of intramural or even near-

by suburban cemeteries." Dr. Buck, in his work on hygiene, says: "It is impossible to say how long the *materies morbi* may continue to live under ground. If organic matter can be boiled and frozen without losing vitality, and seeds 3,000 years old will sprout when planted, it would be hardihood to assert that the poison of cholera, yellow fever or small-pox, whatever it is, may not for years lie dormant, but not dead, in the moisture and temperature of the grave."

But we will now cite some cases in our own State which reveal a condition of things horrible almost beyond belief. The Weehawken Cemetery, in Hudson county, has required legal proceedings on the part of the authorities there. A communication is on file at the office of the State Board of Health, accompanied by affidavits, which gives a series of facts such as show it even now to be a great public peril. From the statements, we learn that the grave-yard is owned by a private corporation. It has been used for interments for sixteen or seventeen years. The cemetery contains but seven acres, and from ten to twelve thousand bodies have been crowded into its narrow limits, and, from the evidence adduced, the land is totally unfit for burial purposes. Jacob Haushe, who resides on the north side of the cemetery, testified to a most revolting state of things. He says, that a very bad smell pervades the whole neighborhood, the fœtid odors arising from the corpses of the dead. Haushe describes the smell as that of "rotten carrion," extremely offensive. We visited the cemetery, and the smell was even worse. The ground was cracked open and the cracks emitted a stench that poisoned the atmosphere. The cracks were afterwards closed up, but subsequently the carrion oozed out from the ground, smelling most offensively. The receiving vault in the grave-yard also emitted very noisome odors. Visitors at Haushe's house have complained of the smell, not only while passing the cemetery, but while sitting in the house. This condition of things, the witness testified, has continued for a long time. Other witnesses testified that the odors arising from the graves are "like those of decayed human flesh—a peculiar smell, and very offensive." Many of the families resident in the vicinity of the cemetery testified that much sickness in their families was produced thereby. It seems impossible that such things can exist in a civilized community, but they are well attested by reputable people, long-time residents of the neighborhood.

From the apathy evinced in many parts of this country in the disposal of the dead, it would seem that nothing short of one of those

terrible epidemic inflictions which the Almighty has allowed to be the penalty of the breach of His laws, will bring the people to a sense of the evils and perils of such abominations. There can be no doubt that, under any circumstances, in densely populated neighborhoods where cemeteries have been in use for a long time, the practice of burying within the precincts of towns is, unless guarded by the strictest regulations, most productive of injury to the health of the inhabitants.

The following statement explains itself:

"DR. WARMAN—In compliance with your request, I make the following report concerning the Mercer Cemetery, Trenton, New Jersey: On a Monday, September, 1861, eleven men were set to work to prepare the ground for the building of the present passenger depot of the Pennsylvania Railroad, and also the road-bed for the necessary tracks. The ground was a swamp, covered over with a dense growth of willows, alders, magnolias, &c., situated in the valley of the Assanpink creek. On the following Monday morning, seven of the men were dead, and the other four confined to their beds, dangerously ill. These subsequently recovered their health, but each was attacked with a skin disease of the face that has hitherto resisted all treatment. One of the men is dead; the other three are still living.

"*Geological Formations*—The substratum of the plateau upon which the cemetery, depot, and railroad tracks are located, is gneiss; dip of strata, forty feet; trend, northeast and southwest. This is covered with gravel and coarse sand for twenty or thirty feet, and then a superstratum of four or five feet of loam.

"The stream has cut a valley some twenty-five feet deep, at right-angles with the trend of the gneiss. The cemetery is located upon the west side of the creek, on the top of the plateau, some twenty-five feet above the swamp, and here the ground-water from the plateau finds its outfall into the above-named swamp. After the ground was cleared of bushes and the filling-in of the quagmire was commenced, the stench from the disturbed mud was almost unendurable, and the men could only work during a few hours in the middle of the day.

"Owing to the existence of the war at that time, labor was very uncertain, and, hence, the history of the men cannot be traced. But this much is certain, that many persons were employed and left on account of sickness, and that a virulent fever attacked many of the persons who lived near by. The physicians called the disease typhoid fever. Whatever its proper name it was very fatal, and the more so the nearer the swamp and cemetery.

"The cemetery is located about two hundred and fifty feet from the valley west, and was first used in 1842. The soil in which the bodies are buried is coarse sand and gravel, hence most favorable for rapid decomposition. A low state of vitality has characterized the employes of the railroad serving about the depot, and many have had to leave on account of broken health."

The above communication was handed me by Dr. J. I. B. Ribble, of the city of Trenton, whose attention was called to the above-stated facts from having treated two of the sufferers for the peculiar skin affections alluded to. There can be no question but that the emanations from the decomposing bodies and the digging up of the saturated soil was the cause of the virulent fevers that prevailed at the time in the neighborhood.

This brings us now to the consideration of the methods of disposal of bodies as buried, most favorable to natural decay. There are two modes of interment practiced in this State—one in graves and the other in tombs. We much prefer the former. As has been noticed, dangerous gases often escape from tombs when insecurely closed, or when often opened for new deposits. Besides these evils there is no security that deposits in tombs will ever return undisturbed to the earth. They are there exposed to removal and desecration, which sometimes takes place (as in the case of A. T. Stewart).

Very properly, we think, tombs are not allowed in many parts of our country. Graves alone are used. Mount Auburn Cemetery, near Boston, is a notable example of this. "Earth to earth," seems to be the generally adopted plan of burial at the present time, among all civilized nations. Much has been said lately of a return to the practice of interring the dead without the medium of a coffin. Why should we not go to our graves in our habits as we lived? as in the case of the soldier described by Wolfe:

> "No useless coffin enclosed his breast,
> Nor in sheet nor in shroud we wound him;
> But he lay like a soldier taking his rest,
> With his martial cloak around him."

It is not at all unlikely that this method will be chosen by many as a settlement of the sanitary questions that have sprung into notice since cremation has been once more broached.

In the Norman dynasty it was the custom to bury in the bare ground. Also in the time of Edward II. and Edward III., even persons of distinction preferred to have their bodies committed to the bare earth. It was the common custom in the time of Queen Elizabeth to bury only in winding sheets. Interment in the bare earth was the common method among the Jews and other nations as well. It is supposed that the dead bodies of the pilgrims at Plymouth, so many of whom died during the first winter, were thus laid. In Dr.

Samuel A. Green's *Early Records*, are the items of a town clerk's funeral expenses. They are: "A winding sheet, 18*s.*; coffin, 10*s.*; grave digging, 7*s.* 6*d.*"

Mr. Seymour Hayden, of London, would abolish coffins altogether, and substitute wicker-work filled with flowers. The proposal is new and has been recommended with great force, and we have no doubt but that, if introduced here, would meet with popular favor. The question is, will the abolition of coffins improve matters? We fear the result might be something like the following extract: "In the course of walking round the city we had occasion to pass through one of the cemeteries, but the horrible effluvia from the graves obliged us to alter our course. The Turks do not make use of coffins. Having dressed the dead, they place over the body a few thin pieces of wood, and then cover it with earth. Heavy rain has often the effect of opening passages down to the putrefying mass, occasioning that pernicious and terrible smell which we experienced, and to which in some degree might be attributed the frequency of pestilential diseases in Turkey." The interment of a body in a mere shroud is no new idea. There can be no doubt that in ancient times the practice was almost universal among those who buried their dead. It is hoped that by dispensing with the coffin the body will sooner return to the elements, about which there can be no question; provided, that the earth in which it is interred be a suitable one. But that is not always the case, for under certain circumstances of humidity in the soil, the muscular fibres of the body, for instance, are converted into adipocere. Soils which keep out the atmospheric air are nearly always favorable to the generation of this substance.

This kind of earth, it need hardly be stated, is unsuitable for sepultural purposes. The ground chosen may not only be too damp and clayey, and impervious to air and moisture, but it may be of too open a character. Were we to bury in light, gravelly soil of this class without coffins, it is not unlikely that the foul gases would rise faster than they ought. We do not know why coffins were originally resorted to; but it is just possible that our forefathers discovered that, in certain soils, the earlier and fouler stages of decomposition proceeded at too rapid a pace for the comfort of the living. The depurative character of the soil was not equal to the demand made upon it. This is not an altogether theoretical statement, for an eminent foreigner has noticed that this is the case in grave-yards which he had visited. A coffin may therefore be a desirable thing under some circumstances.

It is a fit question to consider, also, whether it would be safe to carry a person who perished (for instance) with small-pox, without protection by means of a coffin. Mischief would be less likely to result, after such a lapse of time as was found necessary to destroy the coffin. Here is where the advantages of cremation appear, for with the body is burned up all disease germs. The thing to consider is, How many persons die with contagious diseases, the germs of which not even the earth can destroy? It is not so much a question of coffin or no coffin. When the Minchinhampton church-yard was disturbed, and the black earth carted away to the gardens round about, the population was simply decimated, and the same would have occurred, one would imagine, even if the coffin-earth had been absent.

The sanitary requirements for a cemetery indicated under the foregoing remarks, may, therefore, be summed up under the four following headings:

1. Suitable soil.
2. A suitable position with respect to population and sources of water supply.
3. Sufficient space.
4. Proper regulations and management.

Very much depends upon the soil of a cemetery. Dr. Parsons, in the eleventh annual report to the Local Government Board of England, says: "The soil should be of an open, porous nature, with numerous close interstices, through which air and moisture may pass in a finely divided state, freely in every direction. In such a soil decay proceeds rapidly, and the products of decomposition are absorbed or oxidized. The soil should be easily worked, yet not so loose as to render the work of excavation dangerous, through the liability to falls of earth. It should be free from water, or hard rock, to a depth of at least eight feet. If not naturally free from water, it should be drained, if practicable, to that depth; to this end it is necessary that the site should be sufficiently elevated above the drainage level of the locality, either naturally or where necessary by filling it up to the required level with suitable earth. Loam or sand, with a sufficient quantity of vegetable mould, are the best soils; clay and loose stones the worst. A dense clay is laborious to work and difficult to drain; by excluding moisture and air it retards decay, and it retains in a concentrated state the products of decomposition, sometimes to be discharged into graves opened into the vicinity, or sometimes to escape through cracks in the ground to the surface. A loose,

stony soil, on the other hand, allows the passage of effluvia." And with reference to the site to be chosen for a cemetery, he further says: "Nevertheless, in view of the evils which in former times have undoubtedly arisen from the practice of intramural sepulture, and also because the erection of houses near a cemetery interferes with the free play of air around and over it: the place of burial should, therefore, be selected in a somewhat secluded and not in the most conspicuous part of the town, and should also be combined with such natural scenery as will tend to inspire those feelings of solemnity and decorum which properly belong to the 'city of the dead.' It should not be where it would ever be liable to be encroached upon for buildings, roads or any other purpose, but where the tenants may remain forever undisturbed in their quiet resting-place; and it should be large enough to meet the wants of the probable future growth of the town which it is designed to accommodate. Parts of such a cemetery might be assigned to a peculiar religious denomination, and, if desired, specially consecrated for its use. It should never be within a populous city or town." Such a site is now generally regarded as dangerous to the health of the living, though in this country we have not as yet experienced to a great extent the evils that have existed in London and other large cities in England. "It is highly desirable that interments should not be made up to the extreme edge of the cemetery, and it would be possible, without great waste of space, to reserve in all cases a strip of ground, free from interments, fifteen to thirty feet in width, around the whole cemetery in the interior of the boundary fence. This strip should afford room on the inside for a gravel or asphalt walk, to give access to all parts of the cemetery, and on the outside, next the fence, to a belt of shrubs or trees, the rootlets of which, penetrating the soil, would arrest and assimilate any decomposing matters percolating to the exterior of the cemetery. Obviously a cemetery should not be placed on elevated ground above houses, where the soakings from it may percolate to the sites and foundations of the dwellings below." Sites are, of course, unsuitable which are liable to be flooded or to land-slips, or which are in danger of being washed away or encroached upon by streams or the sea. Very steep sites are not desirable. The cemetery should be accessible by good roads from all parts of the district. The selection of a proper site for a cemetery, on sanitary and other grounds, is one of the greatest importance, and any one who has this duty to perform cannot do better than keep the following words of the well-known English sanitary engineer, Mr. Eas-

sie, before him. He says: "A well-chosen cemetery is one whose soil is dry, close and yet porous, permitting the rain and its accompanying air to reach a reasonable depth and so expedite decay. The formation is also well covered with vegetable mould, which assists in neutralizing any hurtful emanations and encourages the growth of shrubs. The subsoil is also of such a character as to need no underdraining and such as will prevent the water from lodging in any grave or vault. It will also stand exposed to the north or northeast winds, which are dry and do not hold the putrefactive gases in solution like the moist south or southwest winds. An improperly chosen grave-yard may be said to be one where the soil is dense and clayey and impervious to moisture. It will be insufficiently drained, necessitating the use of planks to walk upon in wet weather. It will be too close to the abodes of the living; too small to permit a proper planting; the graves may be covered with flat stones, which prevents the passage downwards of the air and rain; and surrounded, moreover, by high walls which exclude the fresh air. The grounds will be stony and insufficiently covered with vegetable soil. No natural outfall will exist, and the drainage water must be pumped up, the bare idea of which is horrible. It will be near, also, to a water-bearing strata or to a reservoir. Long before decomposition has taken place, owing to the smallness of the site, and the impossibility of obtaining more land, except at high building prices, the organic matter hidden out of sight will be far too large in proportion to the area."

The dangers to the public health to which places of burial may give rise, are of two kinds, viz.: the contamination, first, of air, by volatile particles or gases; and, second, of drinking-water, by suspended or soluble products of decomposition. Foul liquids from graves may enter and pollute a stream; or wells in the vicinity of a grave-yard may be injured by percolation from it; and, in either case, if the water be used for drinking, injury to health may result. The liability of wells to pollution obviously depends, partly upon their proximity to it, and partly upon the configuration and geological structure of the ground. Thus, an intervening and impervious bed of clay will prevent foul matters reaching a well; and filtration through a sufficient space of porous, aerated soil decomposes such matters into harmless, inorganic substances, which are fixed by the soil or taken up by plants. It is necessary, therefore, in order to obviate risk from this cause, that a cemetery should have a suitable soil and

be properly drained, and that it should be at a sufficient distance from subterraneous sources of water-supply; and in such a position with respect to them, that the percolation of foul matters from one to the other may be impossible.

The Massachusetts State Board of Health (report of 1875) notices the following examples of water-pollution which had been recently reported: "At a meeting at Milan, Dr. Polli, to prove that inhumation taints air and water, referred to certain researches of Prof. Selmi, of Mantua, and to chemical analyses of the waters of Milan, by Professors Parvesi and Rontondii. M. Ducamp discovered, in Paris, a well, the water of which was entirely derived from cemeteries. It had acquired a sulphur-like taste, so that the people bought it for mineral water." The following case is also furnished: "In the last remarkable report of the Faculty of Medicine of Saxe, Reinhard relates that nine large and several smaller victims of the cattle plague were interred at Dresden, at a depth of ten or twelve feet. It was found, the next year, that the water from a well situate one hundred feet from the pit in which they were buried, had a fœtid odor, and contained butyrate of lime. At a distance of twenty feet it had the disgusting taste of butyric acid; and each quart contained about thirty grains of this substance." The water from grave-yards contains ammonium and calcium nitrates, and nitrites, and sometimes fatty acids and much organic matter. Lefort found a well of water, at St. Didier, more than three hundred feet from a cemetery, to be highly contaminated with ammoniacal salts, and an organic matter left on evaporation. The water was clear at first, but had a vapid taste.

A recent report on the preservation of the anthrax germ in graves, furnishes the following fact: "In Livingston county, New York, on a sandy soil over a heavy clay soil, the graves were carefully fenced in by direction; but nearly a year after, during a rainy period, the liquid, oozing out on the river-bank between the clay and sand and opposite one of the fenced graves, was licked by six of the cattle, all of which promptly perished of anthrax. The grave was now fenced in down to the water, and no further deaths occurred."

In the selection of a cemetery site, the pollution of wells and of water-supply should receive especial attention. Thus, it is stated in a collection of reports concerning the cemeteries of the town of Versailles, that the water of the wells which lie below the church-yard of St. Louis could not be used on account of its stench. In consequence of various investigations, in France, a law was passed prohibiting the

opening of wells within 100 metres of any place of burial; but this distance is now said to be insufficient for deep wells, which have been found, on examination, to be polluted at a distance of from 150 to 200 metres. In some parts of Germany the opening of wells nearer than 300 feet has been prohibited.

In the report of the Board of Health of New Jersey, 1880, we find the following from a writer in the northern part of the State: "Another great nuisance in some parts of the county is the grave-yard; such a one as we have in the village of ———, in the shape of a burying-ground. It is in the center of the village, and on the elevated side of the street. The church is in the grave-yard. Private dwellings are situated on the lower or other side of the street. Each house has a well of water for family use. The water runs from the grave-yard into these wells. The old sexton of this church told me a number of times, that when graves were dug in certain parts of the yard, the wells would become soiled and muddled during the process of digging. 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 half mile of the village, for a cemetery; soil dry and pleasant. I urge strongly on the State Board of Health, that an act of the Legislature be passed preventing any more burials taking place in this grave-yard."

Another writer, from another county in New Jersey, remarks that burial-grounds are mostly connected with churches, and raises the question whether churches which are closely crowded upon by graves, and not occupied during the week, do not become receptacles of grave-yard air and thus risk the health of the Sabbath worshipers, especially in those churches heated by furnaces, which cause a current of air from without laden with noxious gases. Again, in the report of the Board for 1882, the same complaint comes from a writer in the southern part of the State. He says: "In the principal village of this township the well water is exceptionally bad, and of offensive smell. As the grave-yard, now well filled with the dead, is near the center of the village, and on a rise of ground, and all the wells, with offensive odor and bad taste, are east of the grave-yard and near by, (my own is about twenty paces,) I have long ceased to use my well for drinking

purposes, believing it to be contaminated with the decomposition of the dead bodies. I have noticed that all the families living east of the grave-yard have more or less sickness, and a great deal more than those living west of it, as the streams all run east to the bay shore. This may account for it. I had one death in my own family, and several others sick with typhoid fever. This happened several years ago. Since then we have stopped using well water, and have been free from any diseases traceable to bad water."

In the report of the British Local Government Board, before noticed, upon the relations of a cemetery to sources of water-supply, we read: "It is evident that the drainage of a cemetery should not be allowed to enter a stream from which water is drawn for domestic purposes. The degree to which the purity of neighboring wells is endangered by a cemetery, and the distance to which contamination may extend, obviously depend in each particular case upon the relative elevation of the respective sites, of cemetery and well, and upon the nature and dip of the intervening strata, so that it would seem impossible to lay down a general rule for all cases. Fissured rock might allow foul matters to traverse considerable distances, while the interposition of a bed of clay, or a water-tight vault, would shut them off, or the passage through an aerated stratum of finely divided earth would oxidize and destroy them on their way. A dangerous state of things is when the graves and wells are sunk together in a shallow, superficial water-bearing stratum of a loosely porous nature, resting on impervious clay."

CONTAMINATION BY AIR.

This may take place in several modes. The gases evolved from putrefying bodies may make their way to the surface through pores or fissures in the ground, or may pass into open graves dug in the neighborhood, or they may diffuse themselves laterally through the ground air, and be drawn up into the interior of houses or churches; or noxious emanations may be given off from putrid drainage water, whether bailed out of graves and thrown upon the surface, or draining into open channels or water-courses. Thus nuisance and danger to health may be occasioned not only to grave-diggers and persons attending funerals, but also to the inhabitants of houses in the neighborhood of the burying-ground. To obviate these risks it is necessary that the number of decomposing bodies in a given portion of ground should not at any time be so great that the gaseous products

cannot be oxidized into harmless substances in the interstices of the soil or taken up by vegetation, that a sufficient depth of earth intervene between corpses and the surface, and that the soil be of a suitable nature and properly drained, the drainage water being harmlessly disposed of. Furthermore, since the atmospheric contamination which has to be especially guarded against, is that of the air in the interior, and neighborhood of human habitations and frequented places such as churches, it is necessary that the place of burial should be in an open situation and at a sufficient distance from dwellings or churches, in order that any effluvia arising from it may be diluted by the winds so as not to find their way in an injurious state of concentration to places where they will be liable to be inhaled.

The geological structure of the earth, the character of the soil, its water-bearing strata, its slope, and its deep and effective drainage have much to do with its adaptability. Then, again, there is a great difference in the capacity of ground to get rid of the products of decay. Cases have been brought to our notice where school houses are located at or very near burial-grounds, or where basements of churches, located in and among graves, are used for school and meeting purposes, in many of which a furnace is located for heating purposes; the hot furnace acting as a great suction pump for the grave-yard air that may be laden with the products of decomposition. A hot furnace in such a place may do serious harm. The writer of this can give testimony in relation to a school house located in one corner of a country grave-yard, in which, during the months of August and September, a number of bodies had been placed that had died from epidemic dysentery. Soon after burial a heavy rain storm followed. The soil was a heavy clay. Large cracks formed in the soil over the graves, and a sickening odor escaped, so much so that the windows on the side adjacent to the grave-yard had to be closed, and the teachers and children were both affected for a time. Mr. Hutchinson, Surgeon, of Farrington street, London, says he was called to attend a girl aged fourteen, who was suffering with typhus fever of a highly malignant character. The girl was the daughter of a pew-opener in one of the large city churches situated in the center of a small burying-ground which had been used for interment for centuries, the ground of which was raised much above its natural level, and was saturated with the remains of the bodies of the dead. There were vaults beneath the church, in which it was still the custom, as it had long been, to bury the dead. The girl in question had recently returned from the country, where

she had been at school. She assisted her mother in shaking and cleansing the matting of the aisles and pews of the church, a few days before being seen by Mr. Hutchinson. The mother stated that this work had usually been done once in six weeks; that the dust and effluvia which arose always had a peculiar fœtid and offensive odor, very unlike the dust which collects in private houses; that it invariably made her (the mother) ill for at least a day afterwards, and that it used to make the grandmother of the present patient so unwell that she was compelled to hire a person to perform the duty. On the afternoon of the same day on which this young girl, now ill, had been engaged in her employment, she was seized with shivering, severe pain in the head, back and limbs, and other symptoms of commencing fever. On the following day all these symptoms were aggravated, and in two days afterwards malignant fever was fully developed.

Among others who obviously suffer from this cause are the families of clergymen, when, as occasionally happens, the parsonage is situated very close to a full church-yard. Dr. Stephen Wickes, of Orange, N. J., in an excellent treatise on sepulture, (Transactions New Jersey Medical Society, 1883,) says: "One clergyman's family I know of, whose dwelling house is so close to an extremely full church-yard, was annoyed by a very disagreeable smell from the graves, always perceptible in some of the sitting and sleeping rooms. The mother of this family states that she has never had a day's health since she has resided there, and that her children are always ailing. Their ill health is attributed both by the family and their medical friends to the emanations of the church-yard."

It is stated by Sir James Macgregor that on one occasion, in Spain, soon after 20,000 men had been put into the ground within the space of two or three months, the troops that remained exposed to the emanations of the soil, and that drank the water from the wells sunk in the neighborhood of the spot, were attacked by malignant fevers and by dysentery, and that the fevers constantly put on the dysenteric character.

The placing of a dead body in a grave, and covering it with a few feet of earth, does not prevent the gases generated by decomposition, together with the putrescent matters which they hold in suspension from permeating the surrounding soil, and escaping into the air above and the water beneath. '"I have examined, says Dr. Lyon Playfair (1881), various church-yards and burial-grounds, for the purpose of ascertaining whether the layer of earth above the bodies is sufficient

to absorb the putrid gases evolved. The slightest inspection shows that they are not thoroughly absorbed by the soil lying over the bodies. I know several church-yards from which most fœtid smells are evolved, and gases with similar odors are emitted from the sides of sewers passing in the vicinity of cemeteries, although they may not be more than thirty feet from them."

The first result of the smell from a grave-yard is generally headache. A military officer said that when his men occupied as a barrack a building which opened over a crowded burial-ground in Liverpool, the smell from the ground was at times exceedingly offensive, and that he and his men suffered from dysentery. A gentleman who had resided near that ground said that he was convinced that his own health and that of his children suffered from it, and that he had removed to avoid further injury.

The following testimony of a lady at Manchester is added as an example of how air may be contaminated *by sewers near grave-yards* and cemeteries: "You resided formerly in the house contiguous to the burying-ground of ——— chapel, did you not? Yes, I did, but was obliged to leave it. Why were you so obliged? When the wind was west the smell was dreadful; there is a main sewer runs through the burying-ground, and the smell of the dead bodies came through this sewer, up our drain, and until we got that trapped it was quite intolerable. Do you think the smell rose from the emanations of the sewer and not from the burying-ground? I am sure they came from the burying-ground; the smell coming from the drain was exactly the same as that which reached us when the wind was west, and blew upon us from the burying-ground; the smell was very peculiar; it exactly resembled the smell which clothes have when they are removed from a dead body; my servants would not remain in the house on account of it. Did you observe any effect upon your health when the smells were bad? Yes; I am liable to headaches; and these were always bad when the smells were so also; they were often accompanied by diarrhœa in this house; before I went there, and since I left, my headaches have been trifling. Were any other of the inmates of the house affected with illness? I had often to send for the surgeon to my servants, who were liable to sore throats. And your children, were they also affected? My youngest child was very delicate, and we thought he could not have survived; since he came here he has been quite strong and healthy."

In the course of an examination of the chairman and surveyor of

the Holborn and Finsbury Division of Sewers, on the general management of sewers in London, the following passage occurs: "You do not believe that the nuisance arises in all cases from the main sewers? Mr. Roe—Not always from the main sewers. Mr. Mills—Connected with this point, I would mention that where the sewers come in contact with the church-yards, the exudation is most offensive; have you noticed that in more than one case? Yes. In those cases have you had any opportunities of tracing in what manner the exudations from the grave-yard passed to the sewer? It must have been through the sides of the sewers. Then, if that be the case, the sewer itself must have given way? No; I apprehend, even if you use concrete, it is impossible but that the adjacent waters would find their way through the cement; it is the natural consequence; the wells of the houses adjacent to the sewers all get dry whenever the sewers are lowered. You are very certain that in the course of time exudations very often do, to a certain extent, pass through the brick-work? Yes; it is impossible to prevent it. Have you ever noticed whether there was putrid matter in all cases where the sewer passed through a burial-ground? The last church-yard I passed by, in the parish of St. Pancreas, when the sewer was constructing, I observed that the exudation from it into the sewer was peculiarly offensive, and was known to arise from the decomposition of bodies. At what distance was the sewer from the church-yard? Thirty feet."

That these emanations do act injuriously on the health of the people resident in the immediate neighborhood of the places from which they issue, appears to us, by the evidence that has been adduced, to be indubitably established.

SUFFICIENCY OF SPACE.

On sanitary grounds, it is requisite that each corpse shall be surrounded and covered by a mass of earth sufficient to deodorize and destroy the putrid emanations proceeding from it, and also that the total amount of space shall be so great that it may not be necessary to re-open any grave until the body previously interred therein shall be completely decomposed. With regard to the amount of land necessary for a cemetery, Dr. Parsons calculates that about a quarter of an acre of land for every thousand of the population of the community to whom the cemetery belongs, is the usually estimated minimum, but this is far too small a proportion even for a cemetery possessing every advantage, and he further states the desirability of

providing more than the bare minimum of space is obvious, and is generally recognized. It must be remembered that, as a rule, quite one-sixth of the total area of a cemetery is taken up by roads, paths and ornamental grass or beds of flowers and shrubs, the chapels, mortuaries, lodges, &c., and sufficient width should be allowed between each grave-space to permit every grave being reached without trampling on others. A standard of 110 burials per acre has sometimes been taken, but this appears to be rather a small one. It has been estimated by others that an acre of ground is capable of affording decent burial to not more than 136 bodies yearly, but in the thirty-seven burial-grounds of Liverpool, taking one with another, the number of burials to an acre is fully double that just stated. Were the calculation confined to the burial-grounds most in use, the proportion would be greatly augmented. Therefore, the whole subject of the locality of the cemetery should be regulated by authority, so that the graves of the multitudes of the dead should not be close to the habitations of the living, so that the air we breathe and the water we drink should not become contaminated with the product of decaying animal matter.

Therefore, since inhumation is the generally adopted method of disposing of the dead at the present time, and in view of all the evils that have been pointed out in the past and that may arise in the future, it is plainly apparent that *no cemetery should be located or managed without due authority from some sanitary board.*

In conclusion, I cannot do better than to quote from the admirable and exhaustive treatise on Sepulture, by Dr. Stephen Wickes, already alluded to. He says: "The country towns in the vicinity of our great cities have become suburban; small villages have become considerable cities. The population, as it increases, crowds upon the old and venerated burying-places, and they are enlarged to meet their increasing interments. The authorities of such towns are stimulated by their growth to add to their attractions by improvements in their drainage, by abating nuisances, and by conveniences of various sorts; but when, as has occurred in some towns, they are warned of the dangers of the grave-yards, and importuned to abate them, they let them alone, to receive their annually increasing dead, to exhale their noxious miasm, to pollute their water-supply, and to become nuisances of a daily increasing power for evil. The most of the governments of Europe have prohibited intramural interments absolutely. In our own country, the disposal of the dead has not been a subject of legis-

lation by State legislators, to whom it properly belongs. The regulation of burials has been left to municipal authority, liable to be governed in its action by local influences. * * * The legislatures of our States adopt laws of quarantine to protect the people from the importation and consequent spread of contagion. The State of New Jersey, perhaps others, provides by a general law against the infection of cattle. Our law-makers do not recognize as they should the fearful dangers of the inhumation of human bodies dead from malignant diseases, with its specific germs—germs which float in the air we breathe and the water we drink; germs which neither boiling or freezing can destroy; germs which, after being buried in the earth for centuries, when brought to the surface by excavations produce a pestilence, and which, like vegetable seed germs buried for ages in the earth, when brought to the surface bring forth fruit after its kind. * * * Inhumation commends itself to the traditional sentiments of the people, and an innovation upon these is not demanded. * * * Rural cemeteries, properly regulated, under wise control, guarded by good laws, and permanently extramural, afford all necessary protection to the public health."

SANITARY INQUIRIES AS TO HEALTH RESORTS AND OTHER LOCALITIES.

The examination of the various health resorts of the State was commenced about the 20th of April and continued at intervals during the year. Our object was to find the present condition, and, also, how far suggestions made in former visits had been carried out. It was gratifying to find that, with rare exceptions, great improvement was manifest, both in the diligence and intelligence of Boards of Health. At Cape May, the sewer system had been extended, and more attention given to the ventilation of the sewers, especially at the points of house connection.

It had been noticed the previous year that one large hotel was greatly needing a reconstruction of its sanitary arrangements. It was unfortunate that this was not reached more promptly, but the building has now been greatly improved in its sanitary condition. If only the management of the hotels and large boarding houses is made as good as that of matters outside of buildings we believe prevalent healthfulness will result. There must be a thorough system of house to house inspection by those competent and fearless, and a report to the Board of Health of any deficiency either in construction or administration.

CAPE MAY POINT.

This locality has recently come into notice as a winter as well as summer resort. An examination showed that it was dependent on driven wells, which differed somewhat in the quality of the water. The drainage is not so good as it should be, but it is hoped that ere this unnecessary pond holes have been drained and filled.

The provisions of the hotels as winter resorts were incomplete, and a thorough reconstruction as to sanitary arrangements in that occupied

for the winter was recommended. The owners have now taken hold of the problem fully and are applying the "Pullman" method to the drainage and sewerage of the entire city.

VINELAND.

This inland resort was found to have made many important improvements during the past year. A system of inspection is carried out, and a Board of Health with intelligent activity and full powers is diligent in its service. In a few cases of dilatory action on the part of occupants of property we had the opportunity of seeing the recognition of health authority, and feel sure that great progress is being made. The people respond to these improvements and thus help to aid in the appreciation of the locality as a place of winter and spring sojourn.

ATLANTIC CITY.

The great sanitary event of the year for this city has been the introduction of a water supply which seems entirely satisfactory, both as to quantity and quality. Already the reward has come in increasing confidence in the city as both a winter and summer resort. The Board of Health has been aroused to new vigor, and is doing a great work in the interests of the city. A Health Inspector has been appointed, who devotes himself to an investigation of the sanitary condition of the city. The removal of garbage is much better managed than formerly. The rules as to privy construction and cleansing are more diligently enforced. Better than all, the city itself, or enterprising citizens thereof, have come to realize that it was in vain to point to natural advantages, to sandy soil, or to former crude methods of slop-water disposal, as adequate to the care of the liquid refuse of so large and crowded a resort.

Hence a contract has been made by which all liquid material will be constantly carried out of the city by means of sewers to a distant point, where it will be mechanically and chemically treated and utilized. The system will be completed before spring, and thus enable all hotels and boarding houses to connect therewith. Visitors hereafter will not be content to sojourn where such provisions are not secured. The authorities will no doubt see to it that these sewers are properly flushed and ventilated. The city seeks the prompt removal of all decomposable materials without its transfer into any

adjacent waters. The spirit and enterprise which have been manifested and the inspection which has been instituted, deserve and will receive recognition.

All these growing cities need to assert and exercise, through their Boards of Health, the right to secure healthy domiciliary conditions. The change of sentiment on some leading sanitary topics was not less encouraging than the actual activity which was manifested.

The city has now contracted for a system of sewers which will entirely remove all liquid refuse at once, and thus by the coming summer complete a sewer delivery and clarification at a distance beyond the suburbs.

POINT PLEASANT.

The development at this point has been so rapid the last year as to make it necessary to inquire carefully into its general situation and constructive arrangements.

Its water-supply is from driven wells of varying value. While many of these are reliable, it is advised that cisterns above ground be used for potable water until a more general supply is secured.

The water level of the soil is near the surface, and there is much need of efficient drainage. In parts, this is being attended to. The construction, as well as the emptying of all closets, should be in charge of a skilled inspector. It is one of those places which must depend upon active and intelligent regulation and administration.

A water company was formed early in 1883, and before another summer a full supply is probable. The proper garbage, water-closet and sewage disposal will depend upon the exercise of proper sanitary police, which is sure to exist if only visitors, in a way that is not captious, see to it that some system is being carried out.

OCEAN BEACH.

This locality shows no improvement in its care of sanitary conditions. The ground water level is high, and no skilled attention is given to drainage. The water-supply is mostly from driven wells, which are generally surface wells. Privy vaults are of the crudest construction. Slop-water is disposed of in cesspools, often in close proximity to wells. This sanitary lawlessness has not been without its deleterious results. The locality is capable of being made one of

the very best along the coast, but until a different system of construction and administration obtains, it is the duty of those who have care of the public health to state the facts. A year since we made personal appeal to those interested, but no skilled system of sanitary construction or supervision has been put in execution so far as we have ascertained.

ASBURY PARK.

This city is an excellent example of what good administration can accomplish. The Board of Health has for two or three years past had efficient organization and intelligent oversight of health interests. The system of sewers is well managed although not fully complete in details. While the liquid portion is carried into the sea, this is so managed as to be, as we believe, devoid of evil of any kind. At the point and at the time chosen, it cannot, as we see, in any way affect the bathing, and secures a thorough riddance of all slop-water. Privy construction and removal are conducted under skilled oversight. The flushing of the sewers is very efficient and they are so ventilated as to secure currents of air through them. If the individual housekeeping of the hotels and other buildings is kept on a par with the sanitary administration of the city, there can be no reason why it should not remain one of the most healthy localities along the coast. There is in most of the city good underground drainage, and the driven wells are down at an average of twenty feet. The care exercised over the ground and its purity goes far to secure purity of water. Yet it is well also to have an eye to larger growth and to such water-supply as is wholly independent of the ground on which a close population is to be crowded. Well-constructed cisterns are not relied upon along the coast to the degree that is warranted. These are especially to be commended to those smaller towns in which there is no general water supply or where the height of subsoil water and the management of slop and privy systems is such as to be of doubtful propriety. Asbury Park has done, and is doing, very much to secure a thorough sanitary administration.

OCEAN GROVE.

The sanitary prospects for Ocean Grove have been greatly improved the last year. The new driven well is shown by chemical analysis to provide a pure and wholesome water, and indicates that at other points a similar supply is likely to be secured as may be needed.

The system of sewerage has been entirely remodeled. It is based on the principle of the immediate and constant removal of all soiled liquids. Thus it is intended to avoid all cesspool storage. The continuation of pipes far out into the sea is said entirely to have prevented any return of the diluted liquids to the shore. The flushing of the pipes is easily secured and plans of upper air ventilation are being applied. While the ultimate result of all such systems must depend upon thorough and efficient administration, we can be sure that the prompt removal of all sewage will thus be secured.

Another year we shall seek to find precisely how many houses are attached to this system.

The Board of Health has been re-organized and seems to appreciate that the sanitary care of a health resort includes, not only water-supply and sewerage, but various other details which relate to sanitary, police, and public and personal health-care. House to house inspection each spring, a vigorous oversight by a competent sanitary inspector, and a book of sanitary entry which shall show the work done each day, and the inspections made, and the defects and improvements found, is indispensable to the welfare of any health resort. A reference to the annual summary will present other facts.

LAKEWOOD.

For many years that portion of Ocean county in and about Bricksburg has had some reputation as a health resort, especially for those suffering from pulmonary disease. Dryness of soil, protection from heavy winds, the influence of fine forests, and freedom from malaria, have been the distinctive features claimed. Within two years the erection of a commodious and well-appointed hotel as a winter resort has given new prominence to this inland winter home. The beautiful lake, the large pines and the lake-drive afford some local attraction. But its real advantage is in the choice of a proper locality for buildings, their construction according to the most approved designs, and their special adaptation to the purposes of a winter resort. The sanitary arrangements of the building are quite unexceptionable; each room has its fire-place and its supply of pine wood. The open and inclosed balconies are so related to sunlight and to moderated warmth as to make them genial on many a cold day.

The water of the lake contains a little iron. The rest of the mineral matter in the residue is mainly carbonate of lime. The total

solid residue, 2.77 grains per gallon, is very small, and the water owes its color to the peaty matter like that of cedar lands. It is believed by many that such districts are especially exempt from all malarial and other influences detrimental to health. We have no doubt of the feasibility of claiming Lakewood, Vineland, Atlantic City and Cape May as winter resorts, that in many respects easily vie with some more southern localities. The comparative value of those inland and those on the sea is yet to be determined. We feel sure that such a place as Lakewood is friendly to that rest and recreation which many a tired worker needs to seek in winter or in early spring.

ELBERON.

Elberon is dependent for its water-supply upon the Long Branch source. This has been improved in calibre of pipe and machinery the past year, so that the complaints of the previous year, as to deficiency at some points adjacent to Long Branch, or of insufficient pressure, are not likely again to occur. The cottages at Elberon are mostly dependent upon cesspools for removal of liquid refuse, but these are thoroughly cleaned and managed, it is believed, as well as cesspools can be. There is need to impress the thorough disconnection of cesspools from houses by means of a trap and a ventilating pipe between this and the buildings. As these cottages are mostly tributary to the hotel, there is no cooking, and but little refuse in many of them. The arrangements of the hotel deserve notice, because of their novelty. The water-closet system ends in two successive cesspools, so constructed that the overflow of the one goes to another more superficial, and so constructed as to secure safe soakage at a distance from the buildings. It has a safety method of preventing overflow which is said not to occur. The cesspools are carefully cleaned each season.

The slops and liquid refuse pass through a well-constructed grease tank, so located as to cool the liquids, and the grease is retained and removed once a week. The liquids pass to a large well-cemented cesspool in an area of the building. This is connected to an engine by an iron pipe, so that each day the entire contents are pumped out about a mile below the hotel; thus the principle of removal of fresh sewage is well applied, and the premises delivered of it before it becomes disease-breeding. Great care seems to be taken as to the details of cleanliness. Except in two or three minor particulars as to which suggestions were made, the system seems to be very efficient.

The outfall at a distance may eventually become a nuisance to that neighborhood.

LONG BRANCH.

Long Branch has great natural advantages, both for drainage and sewerage, and its water-supply is believed to be satisfactory. No system of drainage or sewerage has been adopted, and the public sentiment expends itself too much in discussion and too little in action. The hotels exhibit some of the very best, and some of the very worst, methods for the disposal of water-closet material and liquid refuse. Those, in general, are the safest which handle the vault material separately and in a dry form, and dispose of the fouled liquids by some other method. One or two hotels, which were found exceptionally bad the former year, have made considerable improvements. In others various devices are to be found. It is distressing to see the fondness for originality displaying itself in all sorts of contrivances, in order to get rid of filth by covering it up or soaking it in the ground. Ever and anon crude overseers are found giving themselves great credit for devices which leave "but ruts and botches in the work." The most of these are, perhaps, a little better than nothing, but quite ridiculous alongside the skilled methods now practiced by good artisans.

One hotel has five successive cesspools of enormous proportions, and at the end a boarded and covered filter bed of the crudest construction. At one point, on account of smells, a charcoal-house is built over the cesspool to diminish the odor. The only relief was to find a common workman, who said he got up every morning before the boarders in order to smell, and that he had but one rule, and that was, somehow, to correct all smells. His inventive genius in this direction was far more protective than anything we saw, and was the only thing that made the apparatus tolerable.

In another hotel, the closets were located over a worse cesspool, and the mode of delivery was the same. In another, enormous and more elaborate brick vaults had no modes of ventilation, and nothing but the shortness of the season protects the inmates. We do not present this as a uniform experience, and find exceptions as excellent as they are rare. But we have to say, that visitors at such hotels, before taking rooms, should, at their own expense, have a sanitary expert of acknowledged skill and trustworthiness to make a sanitary inspection

in their behalf. We have already done something to correct grave errors and to interrupt the policy of concealment. But if patrons will thus seek common protection, they can insure what is their right and aid in this beneficent life-preserving work. It is the intention of the State, through this Board, to insure to the tens of thousands that resort hither for health, protection from gross sanitary neglects. Reference is here made thereto, not because such places here are any worse than those in other States, and not because Long Branch is not a salubrious and most desirable retreat, but because the self-satisfied carelessness or uninformed presumption of some wealthy owners of hotel property have made light of these defects, and they have been tardy in their correction. And we also feel that, in all these places, local Health Boards have a duty, of inspection and of general provision for the removal of all refuse and fouled liquids, which they must not overlook, as indispensable to growth, to prosperity, and to that greater length of season which all of these places have a right to seek and expect.

Some other localities have been looked at with less exactness, but a notice of these will suffice as tests of what is being attempted or done along the coast-line of New Jersey, and in some other resorts, to promote the health and welfare of residents or patrons.

This Board, in its first examination, was careful to point out defects, and, so far as is its duty, to advise or to indicate the need of expert oversight. In some cases there were ready responses. In other cases there was proper and respectful delay, until the propriety of the advice given could be tested. In a very few, there was an evident conviction that glowing statements and assertions of salubrity, and self-devised plans of adjustment would suffice. Influences of various kinds, however, have so made themselves felt as to convince most that a sanitary basis is a part of the basis of success.

It is now assured that this shore will continue to be a favorite summer resort of tens of thousands, and that not a few in winter will, somewhere in this State, seek protection from the colder climes of the North. It is also settled that they will be able to find spots where skilled and constant attention will be given to sanitary construction, appliances and administration. While perfection will never be attained, while occasionally some disease may be brought, or may originate from the neglects of a single cottage, it is certain that the rule of these cities and boroughs will be to defend health. Those that make light

of such a view and adopt the policy of boastfulness, without facts to support their claims, will receive their reward.

But our knowledge of the various Boards of Health, of the public spirit of citizens, and our determination, as a Board, not to censure without discrimination, not to conceal, and only to boast where there is ground of security, leads us to feel confident that no health resorts will surpass these in prevision, and provision for the interests of patrons as well as for the welfare and success of residents.

INQUIRIES INTO THE CONDITION OF CHARITABLE AND PENAL INSTITUTIONS.

The duties devolving on the State Board of Health in examining the sanitary condition of asylums, prisons and almshouses, made it necessary for us also to inquire into the personal and hygienic management of inmates, the methods of confinement, etc., since it is quite impossible to separate the sanitary management of individuals from that of their surroundings.

The two State asylums show a careful attention to all the details of sanitary arrangement, as well as in general the application of those principles of mental and moral hygiene which are indispensable in the treatment and care of alienism. We believe the most of those connected with these asylums are not content to accept what was long years ago regarded as the essential and established methods, but are realizing that advances made demand a corresponding change in methods of dealing with this class of patients. Indeed, the progress of sanitary science has especially developed attention to this as a department of State medicine and public hygiene. There has come to be a fuller recognition that in no class of cases is the direction of cure or of relief more to be sought in a fuller comprehension of the possibilities of good food, good air, regulated exercise, employment and amusement, and of the relation of perfected hygienic conditions to relief. Such knowledge and a closer diagnosis between the various forms of insanity will yet lead to such modifications of treatment and of management as will quite change State methods of dealing with this dependent class.

It is felt to be a great misfortune that in most cases these essentials of return to physical and mental health are so neglected that often the first regret of the State alienist is that the subject has not earlier come within the sphere of his jurisdiction and control. Morbid conditions, in part dependent on physical states, or such as could be relieved by a

regulated hygiene, too often by delay become so fastened on the victim as either to embarrass or prevent recovery. Besides the personal infliction, the ward becomes a perpetual charge to the State instead of the grateful recipient of its restorative agency.

This will never be overcome by mere advice as to early admission. Such advice rarely, if ever, reaches those concerned, and if it did would need the personal endorsement of the skilled visitant. It would be a great gain to this charity, and an ultimate saving to the State, if each one of these institutions was at liberty to send the physician in charge, or his assistant, to examine into cases earlier and either indicate as to the treatment or advise as to their early removal to the institution. Many a one would thus never need to come, and others would come at a time when the prospect for recovery would be far more hopeful.

In reference to the county asylums, it must be said of them, as a whole, that the principles upon which they are governed are radically defective. The whole system tends to put the management into unskilled hands and not to provide for inmates that kind of special expert oversight which such a disease or which such dependency demands. There is nothing inviting in frequent examinations of the insane. The freeholders, however well intentioned, cannot be expected to acquaint themselves with the exact kind of oversight which is due. We have known such men to express their deepest mortification and regret at what has been found to be occurring under their own administration.

The physicians chosen are, in some cases, selected only for political reasons, and are persons who have not made a special study of alienism. Many of them frankly say so, and say that with their uncertain tenure of office they cannot afford special preparation and expenditure. As a rule, there is no resident physician in such institutions, and more than once have we been told that the visiting physician has never seen the deranged persons unless some rare and acute attack of sickness occurs. As a consequence there are serious neglects so common as not to be regarded as neglects. The solitary confinement of the insane is the rule in a part of the county asylums of the State, and the individual study of the cases is an exception to the rule.

In some cases incompetency results from defective knowledge and the absence of experience, in others from a total want of comprehension of the problem on hand and the possibilities of amelioration which intelligent authorities recognize. We are glad to be able to say, notwithstanding this, that the larger county asylums of the State

have been fortunate in their choice of chief officers and matrons, and have faithful medical oversight.

This Board has no reason to complain, for many of its suggestions have been accepted, but it has reason to know that there are defects in the system which either need to be given up or to be under classified administration. While the idea of economy is valuable and has been reached in some of these county institutions, it has too often been at an expense of uncharity, which is a poor compensation for the saving made. So long as the State contributes to the support of these county asylums it should see to it that the care, both medical, hygienic and personal, is of the proper kind. Indeed, this would be due to such afflicted persons who had become a public charge, because of their relation to the population of the State, but is also to be urged on grounds of economy. While we are not in sympathy with any captious or sensational review of State, county, city or township institutions, we cannot but feel that the sanitary, and social, and general management of these institutions and of their inmates is an important concern of legislators. These have been accepted as wards, and while under public care we are not to lose sight of the fact that their welfare has important relations, not only to their personal condition, but to the limitation of disease, pauperism or crime. As to the insane, it is enough to say that some defects in management in local asylums were so flagrant as, upon the complaints of this Board, to lead to partial or complete change of method. In other cases the mistakes are too adherent to the system to admit of correction until the State, by its directing superintendence, secures methods that are satisfactory. Less uncertain tenure of office for those who are capable, more uncertain for those who are not, and a system by which more than one person shall determine the disposition to be made of each case in hand in accord with the highest known intelligence as to the management of various degrees of unsoundness, are greatly to be desired.

JAILS, PRISONS AND REFORMATORIES.

The same statement will, in a modified degree, apply to the penal institutions of the State. It is to be remembered that the two thousand or more that are each year to be found in the various State or county institutions are mostly under short sentences, and are, therefore, to be returned to the population of the State. Some of them are hopelessly beyond the reach of reformation and should be kept, not so

much as a punishment as for the protection of society. There is another class who should have such attention given to their physical, industrial and moral condition, as will diminish the probabilities of their repetition of crime or aid them in the work of reform. While there is limitation of the degree to which the State can accomplish these results, the limit is not so narrow as to be expressed by zero. Indeed, results in other States have shown the great economy of a wise administration of these great interests. These questions are now being studied by able jurists, and statesmen, and statisticians, not in the spirit of a promiscuous philanthropy but on exact social and political investigation. Up to this degree, at least, they cannot but command the attention of every State. How to deal with first sentences, with young criminals, with different classes of crimes; how to promote industry and yet not disturb the proper balance of labor; how to prevent such association of prisoners as shall contaminate and debase; how, in fine, to return the incarcerated to society with the best possibilities of harmless or of useful life, is a problem that no State thinks to ignore; yet, as to it, a State may be in a very inactive or detrimental attitude. In other proper and well-defined limits there should be in each State an oversight both of the physical and social future of the criminal classes. This applies not less to jails than to prisons and penitentiaries. The way that those of both sexes, or of young years, are thrown into the common jails, and the exposures in them both to physical and moral contamination, demand the judicious guardianship of the State. These subjects have received thoughtful attention from some of our legislators and citizens and need to be provided for by proper executive authority and oversight.

To some extent the same is true as to the various almshouse systems of the State, and as to all plans for the care of the indigent. Ill-health, insanitary conditions, pauperism and crime, have relations to each other, very apparent to those who trace, classify and analyze the facts in evidence. No one can visit such an almshouse as that of Hudson county, at Snake Hill, with its 800 inmates, without knowing that it means something more to the State than victuals and clothes and a retreat for the dependent poor. The same is true of other county or city poorhouses, of the numerous township poorhouses of the State, and of other plans of caring for the poor at their own homes or by "farming out."

Pauperism, unless interrupted by well-devised means of improvement, physical, social, educational and moral, does not, under present

systems, tend sufficiently to its own limitation, or to the amelioration of its conditions. These are susceptible of being wisely modified, within those limits which we recognize belong to the State in its care of the population.

Some well-regulated oversight of all these great interests that concern the deranged, the penal and the dependent classes, has seemed so desirable that now the Legislature has, in addition to the general sanitary oversight exercised by this Board, directed a Council of Charities, which will have more especial care of those questions which relate to the economic, social and ethical interests of the State as regards this portion of its constituency.

The State Board of Health has for the past year continued its inquiries into all these various institutions, so far as other and pressing duties would permit.

Our first attention was directed to inquiry or visitation of such institutions as were last year found defective, in order to find out whether suggestions made had been regarded.

In many cases it was very satisfactory to find that careful attention had been given to the suggestions made.

Some of these, while relating to details that do not need to be repeated here, secured valuable improvements in sanitary administration.

Suggestions made as to the Burlington county almshouse and asylum were in part carried out and the ventilation much improved. There is still need of a small hospital or reception building, and of some changes as to a few of the asylum inmates.

In Camden county a single case of typhus fever, which occurred and recovered without extension to others, has showed the wisdom of present isolation methods, and how wise it is to have almshouses arranged and kept with full attention to the details of sanitary and executive management.

The almshouse is now one of the best appointed in the State, and will, probably, after its costly lessons, be kept and maintained with a proper sanitary administration. An excellent and convenient separate hospital has been built.

The asylum is under the management of an efficient matron, and of a physician who, while attending to general practice, has recognized it as a duty to make a special study of alienism.

The size of the asylum, and the more definite provision of a term of office, and a compensation not likely to be disturbed by caprice or

party influence in a sphere into which such influence should not enter, will probably secure for the insane in this institution better provision than in most others.

The condition of the jail and the court house over it, as found in Camden county, has before been reported upon. It served as one of the influences which determined the need of different accommodations. While the Board has not felt called upon to give any judgment as to the expense of outlay, it feels assured that there is a common conviction that a new jail should be provided, and this is rapidly being completed.

In Cumberland county there have been some improvements since the last year. The trustees and the steward are carefully looking into the needs of both the almshouse and the asylum. There are eleven patients in or belonging to the latter. The attendants and nurses in such small asylums often stand in need of more special instruction as to their duties and the methods of skilled attention than they have received.

The jail in Cumberland county had but twelve inmates, and very few suggestions were needed.

In Gloucester county so little was found to suggest the last year, chiefly on account of the small number of inmates, that it was not deemed necessary to repeat the examination this year. All acute cases are at once sent to the asylum.

In the Hudson county institutions, at Snake Hill, some very important changes have been made. The report of the Board, made last year, led to a careful inquiry by the freeholders, and the entire water-closet system has been changed. By it, the sanitary condition is much improved.

There are still many improvements that could be made. These mostly relate to the application of improved methods of dealing with the deranged, the penal and the dependent classes. The system of county care and appointment does not secure or pay for the requisite skilled oversight and treatment. In the case of the paupers and of the large number of children there is no doubt good intent and faithfulness, but many defects, because there is not knowledge of the details now well recognized by authorities and applied in the best appointed institutions. 132 deaths among 750 inmates is a large death-rate, although, with a varying number of admissions, the average number might be stated at 1,000.

The Director-at-Large has an intelligent oversight of all construct-

ive needs, and is glad to superintend changes of which he had felt the need. A laundry, separate from the other buildings, would be a great improvement. A system of separate care of children is desirable.

The appointments of officers are many of them for too short a period. In the asylum, the appointment of ward-keepers should be in the hands of the physician or head steward and matron. While the asylum has many admirable features, it is open to criticism in the male department.

We feel confident that there is among those in charge an increasing inquiry as to methods and as to the way of promoting the best interests of these classes, and of the county and the State to which they belong.

The Passaic county almshouse has a part of it appropriated for asylum purposes. Both it and the almshouse are under one management. The building is well located, and kept in excellent order. All acute cases in the asylum part are sent to the State Asylum. Some questions of more accurate division between the pauper and deranged classes need to be considered. There were thirty-six inmates in the asylum division.

The jail of Passaic county has some of the advantages of newly-constructed buildings, and was, for the most part, in satisfactory sanitary condition. There was so much to complain of in the promiscuous mingling of small boys with those older in years and in crime that the Secretary of the Board called the attention of the proper court thereto.

In Salem county, the jail had only one inmate, and was, as usual, in good sanitary condition, except that objection, as before, was made to a form of closet in use, and to an inadequate and illy-arranged cess-pool method of delivery.

The condition of the almshouse and asylum, as to which previous complaint was made, had been slightly but inadequately improved. Although neither is very large, it continues to illustrate an imperfect system as to the care of paupers and some of the worst features of county insane asylums. The asylum was found to be a system of cell confinement in unskilled hands. The only relief to a sense of sadness mingled with disapproval, was to be found in the fact that the committee whom we met expressed their concurrence in the criticisms and assured the Board that there should be no delay in seeking and effecting important changes. The following communication shows how well they have fulfilled their trust:

"SALEM, N. J., December 6th, 1883.

"*E. M. Hunt, M. D.:*

"DEAR SIR—Your favor of late date to Jos. W. Cooper was handed to me for reply. I have not a copy of your suggestions at hand to answer in rotation, but would say that we have had a number of them carried out.

"The filthy water-closet in the insane department has been thoroughly repaired, and a ventilator carried from the closet and soil-pipe to the chimney. The soil-pipe leading from the building to the stream below has been taken out, and was found to be entirely closed up, nothing having passed through it for a number of years.

"All deposits from the closet have been running along the cellar wall, under it, and into the cellar. This pipe has all been taken out and a cesspool dug in the yard and properly walled and covered up.

"The cellar under the asylum has been thoroughly cleaned up, all filth and rubbish removed and the walls whitewashed. There is now nothing in the cellar but coal.

"The old man with a sore leg has been moved to the top of the building, where he has a good room, with plenty of light and air, much to the comfort of himself and the other inmates. The old colored man has been removed by death.

"Zinc has been put on the floors of a number of the cells. The old zinc was found to be in a very filthy condition. The old commodes have been replaced with new ones, and the slab bedsteads for insane persons on the floor, that you proposed, have been put in. We find they are just the thing needed. Straw beds are put in at night and taken out in the morning. Patients (some of whom had not been on a bed for years) all occupy them every night. Iron doors (grating), with locks on them, have been put in all the cells, so that, if necessary, they can be locked up and yet have a good circulation of air. Also one of the difficulties of keeping the female inmates more private is now overcome. There has been a woman in charge of the insane department for some time, and now everything is kept in much better condition.

"During the warm weather the patients were taken out into the yard (particularly the females) and allowed to stay most of the day. At first they did not want to go, but after awhile they looked for it. I think it was very beneficial to them.

"The pavement around the side door, that you spoke of, has been taken up and a good brick pavement put there.

"The insane department is not yet what we should like to have it, but we have done the best we could with the means at our disposal, so that there is now a very great change in its condition from last spring when you was there.

"The almshouse has also received a share of attention. The water-supply has been improved very much. The spring on the opposite side of the yard has been enlarged and a wind-pump erected that forces the water to the tanks on the fourth floor. The water-supply is now all that can be asked. The tanks and the room in which they stand have been cleaned, and the tanks have been partitioned off, so that they now stand in a room by themselves, well lighted and ventilated.

"A new range has been put in the kitchen; also a circulating boiler, holding 100 gallons, thus providing plenty of hot water for all purposes. The bath-rooms have both hot and cold water and plenty of it. The quality of the water is good and the quantity all that could be desired. During the dry days of August and September water was plenty. The old gutter from the kitchen to the stream below has been relaid with flat stones and bricks, so that the refuse is all carried off. The stream itself has been cleaned out.

"The out-houses are cleaned every month, and the hogs are not now allowed access to them. And the yards adjoining the houses have not been overlooked. There are other points about the institution that need attention, but the present Board did not feel authorized to lay out any more money just now. We have left them for the next Board.

"It is just here I would call your especial attention, and through you, the attention of the Governor and Legislature, to the manner of conducting the affairs of the almshouse in our county. We are under a special law, which regulates our system of electing almshouse trustees. They are elected for one year only, and when the Board of Freeholders changes, as it often does, they change the trustees of the almshouse, and then a Board of entirely new men comes in at one time, and it is a year before they learn the wants of the institution. Just when they find out what is needed, they have to give way to another new Board. They should be elected for three years, and part of them go out at a time, so that all should not be inexperienced.

"We find it difficult to carry out your suggestion of getting proper persons to take charge of the insane department, as people capable of doing that kind of business do not want to live in an institution like ours.

"I inclose you a copy of the law and regulations governing the almshouse.

"Yours respectfully, "CHAS. W. CASPER."

We have thus far noticed only those counties in which there are both jails, almshouses and asylums. It has been impossible to visit all the various township and city almshouses, but we have collected some facts as to the modes of dealing with the dependent classes in various localities and as to the causes of pauperism. It is very desirable that the State should more and more realize that it has a direct relationship to the preservation of the people not only from the taxation and expense which dependency causes, but from those greater evils which result from institutional defects. The work already done has been of great service, but much remains to be done.

SCHOOL HYGIENE.

BY JAMES GREEN, PRINCIPAL OF HIGH SCHOOL, LONG BRANCH.

It is not my purpose to attempt to deal solely with the abstract principles of hygiene. If I can but add numerical emphasis to the energetic plans already put in motion, and furnish a little encouragement by the assurance that here is one more who purposes henceforth to fight in this line, I shall feel that I have accomplished all I could expect.

Hygiene is that branch of science which treats of the principles and laws for the preservation of health.

School hygiene involves as much of these laws and principles as are contingent upon the child's attending school. This branch of hygiene is not bounded by the school premises but extends to the domicile of the child: in a certain sense it covers his school-day life. It therefore follows that, while school authorities can only be held entirely responsible for that over which they have absolute control, they are in part responsible for the child's home-life, responsible for so much of it as they may regulate by reaching out with their influence into the home-circle.

The laws of hygiene are not alone physiological, but they are also metaphysical in their nature. If we are materialists, we accept this statement at once. If we are realists, while we pause at the nature of the mysterious chord that unites mind and body, observation teaches us that their union is so complete that whatever depresses the one debilitates the other, and whatever exhilerates the one rejuvenates the other. It therefore appears that methods of teaching have as much to do with the health of the pupil as systems of ventilation, modes of carriage, diet, and physical exercise.

It behooves us, first, to glance at the evils to be guarded against or overcome in the school room; next, to consider the best means of accomplishing these ends.

It is difficult for the unskilled person to trace a large variety of ailments to a common place of either origin or development such as the school room, unless he is impressed with the idea that the body is, as a piece of machinery, one of the parts of which being out of order, the whole is deranged. So, upon any one school room evil, there may be a variety of consequents, through the child's peculiar weakness and special susceptibility.

The prominent evils of the school room may be divided into three classes, named from the diseases they promote, namely: 1. The pulmonary, including the stooped posture, impure air, drafts and sudden changes of temperature. 2. Intestinal, involving irregular meals, hasty eating and hurried stools. 3. Brain and nervous, including over-mental strain, monotonous, or cramped positions, want of sufficient physical exercise and improper light. Now, if we turn to the recent annual report of our Bureau of Vital Statistics, and to the Cyclopædia of the Practice of Medicine, we find the following: Total deaths from certain specified diseases in the State of New Jersey, for the year ending July 1st, 1881, 17,539. Of these, belonging to the pulmonary, are 5,197, or nearly one-third; to the intestinal, 3,943, or about one-quarter; to the brain and nervous, 3,144, or about one-fifth. Total amount belonging to these three classes, 12,284, out of the entire number, 17,539. Add to these figures the fact that, between the ages of six and twenty-one, near-sightedness is increased from 3.5 to 26.78 per cent. in this country, and far more in other countries; and still further add, that the schools have charge of the children at the period when they are most susceptible to these diseases, and we have evidence sufficiently startling to impress us that much must be done, and that right early.

I shall now pursue a course dangerously susceptible to criticism because characterized by specific applications of general principles; but in my judgment specific applications of general principles with criticism are preferable to the practice of some of our writers of using generalities so broad as to be susceptible of greater errors in their application than in their absence. I recently read in one of our leading magazines, three long articles urging the necessity of plenty of physical exercise and not cramming. Now, teachers may have many faults, but I never heard of their opposing physical exercise or favoring cramming. The question is, what is sufficient exercise, or what a proper apportionment of work? It is in answering this question that the mistakes are made.

I wish to prepare some material out of which to construct the main features of a model school room, and to mention in connection therewith some of the special qualifications of an appropriate teacher with a suitable curriculum, and then compare these with what some of us have. I propose that my model structure shall not be merely ideal, but practical, requiring rather increased intelligence than increased expenditure of money.

First, as to ventilation: Each person at each respiration displaces one cubic inch of oxygen by about the same amount of carbonic acid gas and vapor. To admit of this atmospheric change without detriment to health, each person must be supplied with forty cubic feet of air per minute. A room 20x30, with a ceiling twelve feet high, contains 7,200 cubic feet of air. Allowing twelve square feet of floor space per pupil, it will seat fifty pupils and grant each one hundred and forty-four cubic feet of air. Allowing each pupil to use forty cubic feet per minute, it will require 3.6 minutes to use the air of the room. To meet this demand 2,000 cubic feet of fresh air per minute must be admitted into the room. To do this without draft and consistent with maintaining a proper temperature the air should be first warmed and then filtered into the room through ten square feet of aperture, if possible divided into several different mouths, at or near the floor. An equal amount of equally guarded space should be allowed for the exit of impure air. The above figures are a medium between the maximum and minimum as laid down by the best authorities.

The light of the school room should receive careful attention. The following statistics are significant: 62 per cent. of those who graduate from the public schools of Germany are near-sighted; 26.5 per cent. of those who graduate from the public schools of America suffer a like affliction. Between the ages of six and twenty-one this near-sightedness is increased in Germany from 11 to 62 per cent., in America from 3.5 to 26.5 per cent., showing a greater ratio of increase in America than in Germany. Cohn found that of his pupils who studied out of school two hours, 17 per cent. were near-sighted; of those who studied four hours, 29 per cent.; of those who studied six hours, over 40 per cent. were thus afflicted. The eye is probably the most delicate instrument of the nervous system, and as such will most readily sympathize with any bodily deterioration. Of the various causes which aggravate near-sightedness, bad light is doubtless the most serious, and hence should receive most careful attention. The light should be admitted through

plain glass windows near the ceiling, on the left side, and equaling in their entire surface at least one-sixth of the floor space.

Let us next turn our attention to a curriculum. I fear this subject has not hitherto occupied as important a place among our questions of hygiene as the strong sympathy between mind and body, above referred to, would seem to demand. The astonishing fact that everywhere increased study is accompanied by increased physical debility seems to admit of an explanation in one of two ways; either in the increased work or in the manner of doing that work. While I am willing to concede that the hurly-burly, on-rushing, fevered haste in fortune-seeking, quantity-*versus*-quality standard, as tendencies of this new American age in which we live, greatly constrains us to an overestimation of the amount of work that should be done, yet I incline to the view that we are to find much greater evils in the how than in the how much.

I believe that the courses of study now ordinarily laid down by the more experienced of our high school teachers, are necessary for conformity to the requirements of our most approved definitions of education. These include such a development of the useful faculties of the child as will enable him to go on developing and adapting himself to his environment, and such as are also necessary to meet the actual and just demands of the day. Let us glance at their contents: spelling, reading, writing, grammar, geography, arithmetic, United States history, a brief outline of general history, book-keeping, algebra, geometry, botany, natural philosophy and a foreign language. These units, subjected to a little variation or substitution, as the special case or local circumstances may require, constitute about the usual course.

Now, when we consider the requirements of the average citizen, including as they do a knowledge of such first principles of engineering, drainage, hygiene and civil government as are necessary, through which of the above studies would you draw the pen? But can they be accomplished consistently with the child's time, allowing for sufficient recreation and physical exercise? I believe they can. Here are fourteen branches, the fundamental principles of which are to be acquired, on an average, between the ages of five and sixteen; that is, in eleven years. For some of them more time is allowed, for others less, as the needs may be. Let us glance at arithmetic, acknowledged as one of the most important as well as one of the most difficult. To this branch is given, counting from the lowest primary exercises, a

period each day for from seven to nine years; that is, from 1,400 to 1,800 days. Now, in Robinson's Practical Arithmetic there are about seventy-five different features; thus we have a new feature, on an average, from every eighteen to twenty-four days. Does this seem to be cramming, allowing a proportionately long time to each of the other thirteen branches? I think not, when we remember that our best authorities concede to us time for study and recitation, as follows: During the years from five to seven, two and one-half hours daily; from seven to ten, three and one-half hours; from ten to twelve, four hours, and from twelve to seventeen, five or six hours.

But may not the effects of cramming be produced in a way to which our best educated teachers are most tempted? Is it not best in coming before a pupil or class to impress a new principle, to leave everything else out and present the new principle in the simplest and most forcible manner, holding it before the mind until grasped, and then entirely relax the attention? Not a few prepare the way for the introduction of the new principle by the statement of many conditions or supplementary facts which tend so greatly to detract from distinctness, as not only to produce uncertainty, but also to overload the mental stomach. There is thus a two-fold evil, continuous application instead of relaxation. The mind is overstrained and the nervous system deteriorated, not by how much, but by how.

Again, it is too common to admit to the profession of teaching persons with no knowledge whatever of the natural laws of mental growth. The child is called upon to grapple at once with principles which are the result of the mature thought of our best minds, instead of gradually approaching those principles from the concrete, and thus being prepared for the abstract. The results of all this overloading and overstraining are stunted growth and debilitation. As the same food which, bolted, is a source of great disorder, becomes a source of great strength when properly masticated, at proper intervals and with proper intervening exercise, so with knowledge. As in handling each subject we should proceed from the concrete to the abstract, so in the order of our subjects we should regard the same principle. As the closest application should be followed by the greatest relaxation, our most severe recitations should be followed by the longest recreation, and by those branches requiring least close application. On each page of our tutorial dogmas should be written, "not too much," but in bolder characters should appear, "but how well."

But the teacher is not alone responsible for the cramming effect of

the studies, much is due to the pupils' discipline at home. One of our pupils, who, while subject to the irregularities of home life, considered himself to be working hard, wrote in his first letter after entering upon the course at Annapolis, that he had never before known what work was. He soon, however, under his newly-established systematic habits, became accustomed to the work, did it with ease, and took high honors. The parent and teacher should coöperate in the establishment of systematic habits on the part of the pupil. But look how we disregard the above suggestions in our practice. Our pupils, generally, are kept in school the same amount of time, and given the same number of exercises, without regard to age, physical condition or sex.

Having indicated the proper amount of time to be spent in study and recitation at the respective ages, also the proper mode of teaching, I shall conclude by the statement of a few of the principal conditions of my model school room, and their comparison to what we have.

My model building must be located on a healthy site, and set so that its corners indicate the cardinal points of the compass; must not be set on a closed foundation near the ground, thus converting it into a suction-pump for the ground air, but must have either an open foundation or a cellar; must have the light admitted on the left side through plain glass windows near the ceiling, equaling in surface one-sixth the floor space, and shielded from glare; for the exit of impure air must have sieves set in the wall near the ceiling, and corresponding with perforated bricks or weatherboards, with the perforations dipping down and out; must have the artificially admitted fresh air led through a tube opening above the ground, and, if the building is heated by steam, taken into a drum, surrounded by a coil of steam pipe, and warmed, and thence led into the room; if the building is heated by stoves, the air shall be first led into a sheet-iron drum surrounding the stove, and then filtered into the room. We must have a course of study arranged with reference to the age of the pupil, with pliable rules of absence for girls, and a teacher acquainted with the laws of hygiene and mental growth.

I will now institute a comparison, in four respects, with my model and a few of our leading schools from which I have received partial information:

SCHOOLS.	Time for recitation per day.	Length of recess period.	Cubic feet of air space per pupil.	Mode of ventilation.	Independent of urinals No. of pupils to each water-closet accom.
Model	proportion to age.	proportion to study.	144	sieves or air tubes.	20
Newark H. S.	3⅓ hours.	40 to 60 minutes.	130	windows.	ample.
Jersey City H. S.	4 hours.	40 minutes.	200	windows.	30
New Brunswick	2½ to 3 hours.	proportion to study.	130-500	doors, windo's & Boston sys.	20
Paterson	3⅔ hours.	15 to 30 minutes.	27-107	windows & Rutan system.	40
Long Branch	2½ to 3 hours.	20 to 40 minutes.	130-200	foul-air tubes & windows.	15-50
Hackensack	.....	.....	.....	Rutan.	ample.
Elizabeth	3 hours.	25 minutes.	160	transoms, tubes & windows.	25

The above figures indicate that, while the time devoted to recitation is generally proportioned to the advancement of the pupil, the time of confinement to the school room is uniform, and that modes of ventilation are sadly deficient; and be it observed, that these partial statistics are from our most advanced districts. Our State Superintendent's report says, that only 17 per cent. of the school buildings of the State are provided with some means of ventilation other than doors and windows.

My paper would be incomplete without some suggestions as to how to overcome these difficulties. I offer the following:

1st. Disseminate among our teachers, by some well-organized plan, a knowledge of the applied principles of hygiene and mental science.

2d. Establish the office of State School Architect, to whom all plans for new school buildings shall be submitted, and who would examine all our chief schools as to their sanitary conditions, and report what changes are needed and how they should be made.

I believe that some such plan as this would be popular, for while Boards of Education are desirous for information they have not the time to acquire it. I know of one Board that spent a large amount of money for a philosophical system of ventilation that was as philosophical as trying to pump the air out of a door-yard with a pop-gun.

Let us go on with this well-begun and grand work. There are mountains which, lifting their lofty summits into the skies, catch the first gleams of the morning sun and gradually return them till their reflection lights up the plains below; such is the mission of hygiene.

WHAT IS FEASIBLE FOR THE PROTECTION OF SCHOOLS FROM UNCLEANLINESS AND CONTAGIOUS DISEASES.

BY REV. F. R. BRACE, SUPT. OF SCHOOLS FOR CAMDEN COUNTY.

I. Subjects like the one assigned to this committee are assuming a greater magnitude every day. Populations of cities and towns are increasing rapidly, and with the increase comes the attendant danger from crowding and the evils which necessarily accompany a crowded condition. So long as a fair degree of separation can be maintained, or a sufficient space allotted to each individual, there is but little danger to be apprehended from the evils connected with uncleanliness, but when the populations begin to crowd together and large assemblages are packed in small inclosures, the dangers become so great that the necessity arises to adopt means for the protection of health and life.

The old Jewish code, in its ceremonial requirements, was not only of a religious nature, not merely to keep the people a separate people, but was a grand sanitary set of regulations for the physical well-being. Any kind of uncleanliness, arising from disease, from touching the dead, from touching any diseased or unclean person or thing, made it necessary that the person rendering himself unclean should be immediately separated from all other persons. And, according to the danger from the defilement, he must remain separated a greater or less portion of time. Then came the ablutions, the bathings, the inspections by proper authorities, before admission to the congregation. Well would it be for society to-day, for the preservation of the health of the people, if some of those old regulations could be put in force. With all our knowledge of the great laws that govern life and health, and with all

the advancement in the care of life, we might still learn much from the old Hebrew commonwealth. It was an excellent feature that cleanliness was made part of their religion. I think there can be no doubt that every community, whether it be large or small, has a right to throw around itself all necessary protection to prevent injury to physical well-being. If it be true that an individual has a right to preserve and protect his life, it must be equally true that a collection of individuals has an equal right to do so. Nay, the right of a community is greater than that of an individual, as the injury may be more extensive.

These general principles apply to the communities that we call schools. Let us make specific applications of them.

II. Under the rule laid down that crowding has a tendency to increase the danger from uncleanliness and disease, so that disease can be more easily propagated, if not generated, there ought to be a requirement of law that a certain space should be allowed each pupil, that is, a certain floor space. There should not be any huddling of four, five or more scholars together on one bench, so as to pack as many pupils in the school room as it can be made to hold. That has been done in some districts. It is still done in some districts, I am sorry to say. There is sometimes such a crowding of children, bringing cleanly and uncleanly together and into very close contact, that conditions are created to receive whatever evils arise from uncleanliness. False ideas of economy, ignorance of the common laws of health, or at least gross carelessness with regard to them, lead men to be satisfied with such a condition of things. In an ordinary school room there ought to be allowed for each pupil at least an average of fifteen square feet of floor space. This will give in the ordinary school room, an average of from 150 to 180 cubic feet of air, a quantity which, although seemingly large, will be rendered unfit for breathing in less than half an hour. When the room has the number of pupils that this limit will permit, then the door ought to be closed against the admission of all others. The room, even with the greatest attention and precaution, will become uncleanly from the deposit on desks, and walls, and ceiling and floor, of the worn-out matter thrown off from the lungs, and from the exhalations that will arise from the dirty clothing of some of the pupils. When fifteen square feet of floor space is mentioned as the limit for each pupil, it is not meant that even that limit will entirely prevent the evils from

uncleanliness, but that is the smallest amount of space that ought to be allowed for each pupil.

III. When the proper space is allowed, there ought to be a separate seat for each pupil. As a rule, no two pupils ought to sit together. It is the custom in all our homes in these days to have separate seats for the members of the family. It ought to be the custom in all our school houses to have separate seats for the members of the school. It is more needed in school rooms than in private abodes, because the system of classification according to studies will place together on the same seat children coming from different homes; one, perhaps, with body and clothing in a pure and clean condition, and the other with body and clothing in an impure and unclean condition. Thus, the one whose parents have taken pains to put him in the very best condition to preserve health, is placed in contact with one whose uncleanly condition makes him, if not a generator of disease, a fitting subject for the reception of germs of disease, and this contact is not a passing one, but one that is kept up for several hours of each day, and in a room which has often all the necessary conditions to develop and propagate diseases that are begotten or nourished in uncleanliness.

We have made a great stride forward in the sanitary condition of our school rooms by having them built larger and by removing the old forms and desks from nearly all the school houses and substituting for them the seat that will hold only two persons. We have decreased the danger that arises from placing so many together, but we must go a step further than this, and endeavor to have in all our school rooms desks that will seat only one. This is done in some school rooms already, but generally for the older and more advanced pupils, while the pupils in the primary and secondary departments are obliged to sit two on a seat; and yet it is in these departments where the crowded condition exists, and where, from the young age of the children, there is likely to be the greater amount of uncleanliness.

In the interest of health, of the proper care of the young, of the strength of the future generation, we ought to see to it that such measures as are found promotive of health, shall be adopted in all school districts.

IV. It is necessary for the teacher to see that the room has a regular air bath three or four times a day. Every door and every window ought to be thrown wide open to let the air pour through and carry

off all the foul matter possible. It is astonishing how indifferent to such matters some teachers become. They live every day in rooms that never have a sweep of air through them, rooms whose walls and desks are reeking with the foul matter that has been thrown off from lungs and bodies and clothing, making these rooms dens of uncleanness, bringing their pupils into forbearance with uncleanness and guilty carelessness, the whole being saturated each day with uncleanness. It ought to be required of every teacher that at least once during each session, after the cold weather has set in that requires doors and windows to be closed, perhaps once every hour, the pupils should be made to leave their seats and move around the room, and every door and window be thrown open for a few minutes. It would not chill the room, as walls and floor and desks are all heated, and on the closing of the windows and doors the temperature would soon be restored.

V. Desks soon become very dirty. Hands are necessarily placed on them, hands that are moist, and the dust with the moisture soon forms a coating that a dust-brush or dry cloth will not remove. The heads of the pupils are not very far from the surface of the desks, especially when they are studying and the process of expiration is throwing out used-up matter on these desks, and the process of inspiration is taking in air that has come in contact with these desks, or that has been affected with the insensible exhalations from them, and thus the air that is inhaled is to some degree poisoned. It would be well to have the desks washed with soap and warm water once a week, at all events once every month.

If any one needs convincing of such a requirement, let him examine the desks in any school room after a month's use, and he will easily see that purification by soap and water is a very necessary thing. If he is unable by inspection to see the impurity of the desks, let him try a little warm, clean water and soap, and then inspect the character of the water and see whether the desk did not need cleansing. Attention to such matters as these will produce a very excellent effect upon the pupils. It will lead them to see the value and beauty of cleanliness, and cultivate in them unconsciously a love for the clean, and an abhorrence for the unclean, that will cause them to take better care of their own persons.

VI. In our school law there is no special enactment of the duties of trustees in the matter of sanitary regulations, but full power is

given them to make all rules and regulations for the good of the schools. The thirty-ninth section, second subsection, says: "They shall have power, and it shall be their duty, to make and enforce rules and regulations not in conflict with the general regulations of the State Board of Education for the government of schools, pupils and teachers." This is very comprehensive and is really adequate for all purposes. Under this, rules can be made requiring attention to all sanitary matters. While trustees cannot determine the size of the school house, or, perhaps, the character of the desks, at least in country districts, they can determine how many shall be admitted to the room, and say to the teacher, when so many pupils have been registered, "You must refuse to admit any more." They can require that all pupils shall present themselves in a cleanly condition, and, if they do not, they can refuse them admittance. They can order that no children coming from families where there are contagious diseases, shall be permitted to attend the school.

In Gloucester township, Camden county, the following rules were adopted several years ago, and have worked well:

"Cleanliness in person and neatness in attire are expected from all. A violation of this rule will cause the pupil to be sent home to have the fault remedied.

"No pupil known to be affected with a contagious disease, or coming from a family in which a contagious disease is, shall be allowed in school."

While full authority is conferred upon trustees by the provisions of the law, there are many of them ignorant of the evils of uncleanliness and the danger arising from contagion. They have never given any attention to laws of health, and some of them consider the studies of physiology and hygiene as absolutely unnecessary. Indeed, from the condition of some of the school houses and outhouses one is almost led to believe that some of them consider uncleanliness as promotive of health. After the close of school, in May or June, the school houses are sometimes allowed to remain in their dirty condition all through the summer vacation, and when the teachers enter the houses in the autumn, they find that they are not in a fit condition to receive them or the pupils. The outhouses have also been neglected. The trustees give as their excuse that they have not had time to attend to such things. What shall be done in such cases? It is now left to the discretion and good judgment of trustees as to whether such matters shall be attended to or not. It does seem as though rules and

regulations should be drawn up, by some body having competent authority, for the government and guidance of boards of trustees, rules and regulations in which specific directions shall be given in regard to these all-important matters.

VII. It seems to me that in this and some other respects there is too great a limitation of the authority of the teacher. The teacher ought to be the supreme authority in the school room, and held responsible only for the abuse of that authority. To put one in charge of from twenty to sixty boys and girls and require him to keep them in order, to teach them, not only secular knowledge, but manners and morals, and then tie his hands, is putting him at a great disadvantage. In this matter of cleanliness, I doubt whether a teacher has any authority to send a child home to be cleansed unless a rule is first passed by the board of trustees giving him that authority. He may assume it and require every child to present himself in a cleanly condition, and if any child should attempt to enter the room without having complied with his rule, he might send him home; but, as I said before, it is doubtful whether he has any right to do so. The right to make rules and regulations for the government of pupils is committed to trustees, and yet the very necessities of the case require that the teacher shall have full control in all these matters. It is doubtful whether a teacher has a right to exclude a pupil that comes from a family where a contagious disease exists, unless a rule is first made by the board of trustees. I think that in everything pertaining to the sanitary condition of the school room, to the proper cleanly condition of pupils, the teachers ought to have full control. Especially does it seem right in these days when nearly all our teachers are intelligent men and women. With very few exceptions they have all been taught the subjects of physiology and hygiene, at least so far that they are acquainted with the great general laws of life and health. I think it is not casting any reflection upon members of boards of trustees, either in city or country, to say that teachers are better fitted to judge in these matters than trustees are, for the very reason that the majority of trustees have never paid any attention to such matters and are not called to attend to them every day. This is part of the teacher's daily work, and there is not an hour in the day when something connected with the sanitary condition of the school room, or of the pupils, does not present itself. I am aware that teachers are liable to bring censure upon themselves if they carry out what they believe to be

necessary for the health of the children, in requiring them to present themselves in a cleanly condition, and in preventing their entrance if they are not in that condition, or if they refuse admittance to children coming from families where there are contagious diseases. We are all apt to be found fault with if we attempt to perform duties that necessarily spring out of our positions, and yet our responsibility requires that we have the power to meet that responsibility.

VIII. The State Board of Education of this State have power to prescribe and cause to be enforced all rules and regulations necessary for carrying into effect the school laws of this State. Whether this gives them power to prescribe size of buildings, site of buildings, seating accommodation, character of seats, sanitary regulations for the government of trustees, teachers and pupils, may be a matter of dispute. My own opinion is that it does. General rules for the government of all schools, coming from this highest school authority, would be treated with great respect. Already a rule has been made that county superintendents shall note the condition of school houses and outbuildings. This is in accordance with the section of the school law that requires each county superintendent to report to the State superintendent any and all facts within his purview which touch and describe the location and capacity of each school healthfully to accommodate the pupils in attendance, to the end that a full observation may be deduced, favorable or otherwise, as to an ample supply of sittings, suitability of conveniences, eligibility of position, attention to ventilation, and as to all such other pertinent subjects as may clearly and fully exhibit the sanitary condition of the public schools under his official inspection. This gives no authority to the county superintendent to determine anything in these matters. All that he is empowered to do is to inspect and report. But if the law requires that these matters be reported, by inference, at least, it gives the power to the body to which the report is made to make rules and regulations with regard to the matter reported. Then if rules should be made by the State Board of Education determining what is healthful accommodation and what is detrimental to this healthful condition, it would become the duty of the county superintendent to see that such rules were observed.

It seems to me, then, that under our present law we have the means for protecting the children in our schools from anything that may

prove injurious to health, although the local authorities that have the power seldom use it.

Let me now put in brief the points made:

1. A crowded condition of school rooms makes the danger from uncleanliness greater.

2. At least an average floor space of fifteen square feet should be allowed to each pupil.

3. When the number allowed by this limit is reached, no more pupils should be admitted to the room.

4. There ought to be a separate seat for each pupil.

5. The room ought to have a regular air bath once every hour during the day, every door and window being thrown open for two or three minutes.

6. The surface of desks should be washed every week with soap and warm water; at least once a month.

7. Trustees have the power to make rules for the government of schools in sanitary matters, but they frequently forget to make them.

8. Teachers have not the authority. It would be well if they had larger powers in these matters. They ought to have the power to send any child home that presents himself in an uncleanly condition, or that comes from a family where a contagious disease exists.

9. As many trustees are ignorant of laws of health, or careless in making rules for the protection of the health of the pupils, it would be well for the State Board of Education to make such rules. If that authority is not invested in the State Board of Education, then it would be well for the State Board of Health to make them.

ABSTRACTS FROM ADDRESSES AND PAPERS OF THE NEW JERSEY SANITARY ASSOCIATION.

The second report of this Board (1878) contained an outline of and abstract from the annual meetings of the New Jersey Sanitary Association to that date. Five meetings of the Association have been held since, viz., the fifth, at the State Normal School, Trenton, in December, 1879; the sixth, at Elizabeth, December, 1880; the seventh, at Rutgers College, New Brunswick, December, 1881, and the eighth and the ninth, at the State House, Trenton, December, 1882 and 1883. As there is no printed volume of the transactions of this Association, it is of permanent service to our citizens to make brief notices and abstracts of the papers presented or the discussions which arise.

Dr. J. L. Bodine, the President of the Association in 1879, after giving various reasons why sanitary science and art should receive attention, showed why this study was impossible until physiology, chemistry, geometry and kindred subjects had been pursued, as also why it is that even yet our knowledge is so imperfect:

"Modern sanitary science, or public hygiene, is a development of the present generation, and it is coincident with the advancement of knowledge and improvement in the social condition of the dwellers in civilized communities. The Irish famine, with its large mortality from fever, scurvy and starvation, the various epidemics in recent times of cholera, diphtheria and yellow fever, the great waste of life in the Crimean and our civil war, the systematic study and registry of vital statistics, the investigations into the causation of various diseases and the conditions under which they arise and spread, and many other social influences, have powerfully aided in its development, and have caused it to be the subject of the hour—the subject for discussion and illustration in our daily press and in our popular magazines. Sanitary progress was possible, and some of the greatest triumphs of knowledge in the direction of disease-prevention really did take place in an age before ours. Edward Jenner, in the last century, as a result

of the patient observation and interpretation of a neglected fact, did show how that most contagious, loathsome, fatal and disfiguring disease, small-pox, could be stamped out by the protective influence of an artificial disease communicated by the process of vaccination; and John Howard, that greatest of philanthropists, by intelligent, self-denying and persistent labor in the accumulation and presentation to the public of the facts of the management of jails and prisons, caused the disappearance of the jail distemper and the black assizes, and so promoted prison reform that it has become the fact, a well-managed modern prison—by its cleanliness, by its equable temperature, by its ventilation, by its abundant water-supply, by its speedy removal of all excreted and refuse material, by the discipline of its occupants, by their regular hours of labor and rest, by their plain, yet sufficient diet, by their protection from changes of the weather, by their depriviation of artificial stimulants, and by their constant medical supervision, so that the beginnings of disease are prevented or treated—has become an exceptionally healthy institution."

Some of the contributions to sanitary science were then noticed:

"Of the contributions to sanitary progress, in modern times, probably no single one has been so fruitful as the discovery of vaccination by Edward Jenner, and none illustrating more clearly Christian charity and self-denying labor for others than the work of John Howard, but modern sanitary science has done much towards improving the knowledge of external conditions and surroundings in their influence upon the health and mental and moral welfare of men. It has traced the causes of diseases and the conditions under which they arise. By the aid of chemistry, and the microscope and other instruments of precision, it has shown the relations of healthy and diseased structure, the adulterations of food and the amount and kind of impurities in air and water, with their results. It has shown the relations between the ground atmosphere and disease, or, in other words, the results of the impregnation of the ground around and below human habitations with organic refuse and impurities. It has established the casual relation between a damp soil and consumption, neuralgia, rheumatism and catarrh. It has shown that drinking-water and the supply of milk may become vehicles for the transmission of the material poison of the contagious diseases. It has studied the subject of physical training, in relation to health; the methods of school management and discipline, and the kind, variety and number of school studies in their relation to mental and physical development. It has investigated the relations of heredity, training and environment to the great social evils, crime and insanity. It has shown the effect of occupation upon health and has demonstrated that by overcrowding and defective ventilation the air of workshops and factories may be made such that pulmonary diseases appear to spread from one to another.

"The earthenware manufacturer, or potter, occupies a low place in expectation of life, being below the glass manufacturer, the tool, saw and file-maker, the hatter and the needle-maker, and dying at the same rate as the inn and hotel-keeper. The occupation of the potter is by no means a healthy one. The atmosphere of a pottery is filled with minute particles of quartz and clay, which are by the respiratory act drawn into the lungs, producing, by their presence, irritation, and, in time, structural disease of the lungs. The mould-makers, who work with insoluble plaster of Paris, suffer equally with the working potters from lung disease, and the kilnmen's work is heavy and of such a character as to subject them to extreme alternations of temperature, and especially liable to rheumatic and catarrhal attacks. The dippers and some others of the operatives suffer from the poisoning of lead. Another source of bad health among the potters is the excessive use of stimulants which prevails among them; but their desire for and use of stimulants may be a result of impaired health as well as a source of continuous impairment of health. I have a decided impression, as a result of considerable experience in attending upon the families of working potters in Trenton, and from such information as careful inquiries have secured from them, that pottery operatives in this country are in better health and longer lived than in England. Our climate is drier; the workshops are new; more work is done by machinery. The lighting and ventilation of the workshops are really attended to, although indefinite improvements in the direction of cleanliness and the supply of pure and dustless air to them are possible."

The question as to the specific origin of typhoid fever was referred to, as advocated by Dr. William Budd, Prof. Tyndall and Sir Thomas Watson; while Dr. Murchisen, Sir William Jenner, Dr. Bastian and others insist that it may be developed as well as propagated by certain filth conditions.

The chemical analysis of air and water has not yet informed us as accurately and exactly as we could wish as to other sanitary conditions. Important statements were made as to the sanitary defects of Trenton.

Among the available paths for future sanitary progress, the address notices the powerful influence of heredity in the development of scrofula, cancer, consumption, rheumatism, gout and various neuroses; the influence of school life on sight and figure, and the social and financial as well as sanitary importance of a closer study of the prevention of insanity. "Our hopes for sanitary progress are the common hopes of humanity for more perfect light and wisdom; we need, for the fulfillment of our hopes, the coöperation of all men who believe that disease is a physical, a social and a moral evil, and therefore

worthy of efforts for its prevention." The subjects under consideration at this meeting were: "The Relations of Soil and Drainage to Death-rate in Jersey City, Hoboken and Paterson;" "The Sanitary Regulation of Schools;" "The True Sphere of Sanitary Laws," and "Sanitary Reform in the Smaller Towns."

The report on the drainage and death-rate of Jersey City was ably presented by L. B. Ward, C.E., E. W. Harrison, C.E., Arthur Speilman, C.E., and Charles P. Brush, C.E., with a report on the drainage of Paterson by J. S. Hilton, C.E. These reports embraced careful details as to the needs of drainage and the actual conditions of the most populous parts of Hudson county and the city of Paterson. The interest elicited was such as to attract the attention of the National Board of Health, as well as of the State Board of New Jersey. The facts revealed, as to the condition of parts of Hudson county, seemed to make it proper that in the interests of commerce there should be still further inquiry into a locality that had an extended water front, and was adjacent to the most important harbor of the country. This led the National Board of Health to make a special appropriation of $1,000 for more extended surveys and maps. The work was done under the oversight of the New Jersey State Board of Health, and, after the approval of the Board, the whole amount was paid to the local engineers and officers employed. The results are already on record, in part, in the first report of the National Board, 1879, and in the report of this Board, 1880, pages 48–63, while so much of the report as relates to Jersey City is on file in this office. As these reports are already accessible in print, we need not abstract here, but only refer to the important aid furnished to the work by the preliminary efforts of this association.

In a paper with regard to the sanitary regulation of schools, with special reference to the control of infectious diseases, Dr. H. A. Hopper, of Hackensack, urged the relation which all public and private schools bear to the extension or limitation of disease. We present the following abstracts from this paper:

"The limitation of the spread of contagious and infective diseases, whenever they make their appearance in any community, is, and will always be, a matter of deep concern to the sanitarian, and this concern must extend to a desire for their entire suppression. Most particularly when it involves the safety of a class of our population, whose tender years and helpless dependence appeal strongly to the guardianship of parental affection and through it to a publicly-applied hygienic philanthropy.

"In the midst of our boasted improvements in sanitary plumbing and our knowledge of preventable disease, we find that in many city school buildings exhalations from badly-ventilated and worse-washed water-closets, as well as from entirely unventilated soil-pipes, are constantly permeating the class rooms. Inspection will bring almost daily proof that the ground floors appropriated for recess enjoyment are almost entirely shut in from the open vaulted sky above, and thus from the true source of pure air. This multiplies the avenues of enervation, and constantly defeats the noble design for which such places were instituted—the replenishing of wasted physical force.

"The country school house is amenable to as severe criticism for its defective appointments and surroundings. Such establishments can, with very few exceptions, boast of the convenience of their privy vaults in close proximity to the school building, their contents very rarely removed, sending up the gaseous products of organic decomposition, which are wafted by favoring winds through open windows to regale the nostrils of patient—because disciplined—inmates, and scatter the seeds of disease among them. In this connection it is no uncommon discovery to find such privy vaults with uncemeted bottoms, in loose, gravelly soils, percolating their liquid contents through subterranean streams to reach the nearest well or spring from which the potable water-supply is derived to meet the thirsty demands of the teacher's wards.

"On account of these and other multiplying facts, quite as important, the subject of sanitation in connection with school management addresses itself with peculiar force to the consideration of the thoughtful in every community.

"In order to deal practically, instead of theoretically, with the subject, we propose to present a few tabulated statistics, as a basis for the suggestions which are herein made, for the consideration of this association. The mortality rates of early life, growing out of infectious and contagious factors, it will be found, are so large as to become seriously suggestive to the sanitarian, and should prompt investigation for the discovery of the possible, and probably fruitful, sources of them, and at the same time lead to the most earnest inquiry for the best means to be employed for their abatement.

"By consulting the *Bulletin of Public Health*, we find that the following average monthly data since April, 1879, present a table of no small proportions in illustration of the whole subject.

"Tabulated reports from twenty-three towns and cities, representing nearly every section of our country, and including a population of 6,000,000 souls, exhibit more or less perfectly the monthly death-rate:

Scarlet fever	440
Diphtheria	400
Measles	200
Whooping cough	124
Total	1,164

"If we multiply these figures to represent the annual mortuary account, we will have, in a population of 6,000,000, nearly 14,000 deaths from diseases incident to early life, of the contagious and infectious type alone. This death-rate, we must bear in mind, does not represent the true number of cases of disease of the class just named; but for a more satisfactory presentation of the number of cases occurring, we may refer to the statistics of the city of New York, with a system of Health Board and vital statistics as nearly perfect as is practicable, and reach an approximation to the truth, which can be made applicable to our own city and village population so nearly, that we will not fail seriously in reaching a conclusion as to their importance, and the duty of the State to her citizens, to provide some relief, by the direct or indirect appointment of local Boards with authority suited to local necessities, for the removal or stamping out of the causes of at least some of our infectious and contagious diseases. For the five months inclusive, from July 1st to November 26th, 1879, we find reported by the city authorities the following number of cases:

	Scarlet Fever.	Diphtheria.	Measles.
July	236	92	80
August	305	140	218
September	331	173	89
October	135	117	119
November	162	151	316
Total	1,169	673	822

"In one city, therefore, we have a report of no less than 2,664 cases in five months, of that class of diseases alone which are peculiarly liable to occur in early life, and hence probably largely affecting those likely to be found in schools, both public and private. This, too, in a city where the untiring industry of its health officers aided materially by school authorities, has been to a considerable extent successful in its mission, and such labors give promise of greater future usefulness. It is to be regretted that our own system has not yet reached a point of perfectness adequate to the recording of all cases of disease with the same exactness as our death record, and cannot, therefore, be resorted to and made available for exact statistical record, but our death-rate warrants the conclusion that our largest cities and smaller towns will not, in the aggregate, fall anything short of the above, in proportion to their populations.

"It is not claimed that, in these figures, we have reached a point of exactness, but one of probable approximation, which is more likely to be seriously increased than pleasantly diminished, if the whole could be obtained. In the absence of any records on this subject, connected with school management, we are unable to say how much of infectious spreading may have been due to carelessness or entire disregard to the danger of converting endemic into epidemic increase of malignant disease, both on the part of school authorities and private families. It has too frequently happened that indifference in this matter has spread death, dismay and domestic distress, together with pecuniary loss, to individual families and whole communities.

"Where no legal restraint has been imposed, the experience of every observer records the fact that children who have been detained from school by illness, for even a short time, have been hurried back to studies often by foolish ambition to recover lost positions in their classes, and in many cases to remove them from the irksome care of domestic supervision, the germs of disease being carried with them in the clothing worn, or, as in scarlet fever, by means of the desquamating cuticle adhering to the person. For the correction of this evil, we ask for authority with legal power to enforce it in every hamlet and school in the State.

"Pertinent to this matter is the consideration of an apparent indifference to danger in our day, which has frequently made our halls of learning pestiferous propagators of disease and death. For the truth of this statement the testimony of scores of observers stands pledged. We need not spend time in multiplying illustrations when we can turn to the report of our own State Board of Health concerning the Jamesburg disaster, which was of very recent occurrence. In pursuing this study, let us profit by the lesson taught in the investigation made by that industrious sanitarian, Dr. E. Harris, into the causes of a fearful scourge, which sent death and dismay into the homes of no less than twenty families in the township of Newark, Vermont, last spring, through the district school, and by means of only two pupils, carelessly and too early returned to the school after an attack of diphtheria. The investigation tells us that from so insignificant an origin, of ninety-two persons residing in the families affected, forty-eight suffered with the disease. If healthfulness of natural locality could contribute anything to prevent such an issue, we can find it there. The doctor tells us that 'although located amidst the steep hills of Vermont, in one of the most salubrious regions, where the annual death-rate seldom exceeds fifteen in the thousand living inhabitants, and where nature proffers the purest air and water, with ample nourishment and separateness of families, are witnessed the combination and progress of the causes which enter into the most rapid and destructive propagation of malignant disease;' nor are we informed that by the law of natural selection the disease weeded out only the feeble and left a more vigorous race to populate the desolate region. More probable is it that in many cases some organic lesion is still telling the story of wasted physical power baffling the best scientific skill."

A valuable paper on "The Domain of Sanitary Legislation," by E. S. Atwater, of Elizabeth, which was read at this meeting, has since been published in the report of this Board.

In a paper on "What has been Done and what Neglected as to

Sanitary Reform in the Oranges, Bloomfield and Montclair," J. C. Bayles, C.E., editor of the *Iron Age*, detailed various efforts that had been made to remedy evils arising from the disposal of excretions and garbage, from the absence of a sewer system, and from the need of a more reliable water-supply.

It is believed that this paper, together with other local efforts, has contributed much to awaken the attention of the citizens of these districts to their sanitary necessities, some of which have since been well provided for.

At the next annual meeting, held at Elizabeth, the address of the President, L. B. Ward, C.E., of Jersey City, was a historical survey of the progress of sanitary science and legislation abroad and in this country. He gave a clear and exhaustive history of sanitary legislation in England, which we have not space to reproduce. It regulated streets and buildings, the water-supply, sewerage, drainage, sewage utilization, nuisances, adulteration of articles of food and drink, analyzation of food, and penalties for adulteration and other matters of a similar character. From time to time, various acts were passed touching these matters with ever-widening authority, until there has grown up a vast sanitary system, the details of which will bear the most careful examination and application here, as far as our circumstances will permit.

The President then dwelt upon the importance of the National Board of Health work, which owes its existence to the yellow fever epidemic. Sanitary administration in this country is still in its infancy, and its object has hitherto been principally to collect information for future deductions, and local Boards are clothed with little more than police powers. But governmental powers should be expansive and progressive in this respect, and reference was here made to the varied and progressive experience of England in the application of sanitary laws. This legislation was influenced by and began with three outbreaks of cholera, which led to investigations of the means of preventing or mitigating infectious diseases.

The early work of Massachusetts was then traced and its valuable relations to the progress of sanitation shown. Also, the history of our own State Board was outlined, and its work reviewed and commended.

In addition, the special work of the Bureau of Vital Statistics was alluded to. As to the death-rate, except in Hudson county, Paterson and Newark, nothing certain was known in regard to it, previous to

the passage of the existing law. Returns of births, marriages and deaths were generally very loosely made. Under the present law, the returns of vital statistics are made to a competent officer, who shall examine them carefully and prepare the proper tabulated statements as to the causes and sources of death, sources of social progress and deterioration, and report annually to the State Board of Health, which reports shall be published as part of the report of the Board. By this means, the reports of deaths are now believed to be practically correct.

Mr. Ward next dwelt upon the sources of water-supply in the northern part of the State, and thought that the establishment of private water companies should be fenced around with proper safeguards and restrictions. Among the powers which the Legislature must intrust to local authorities is that of borrowing money on the security of local resources, for the construction of works necessary for the public health or desirable for the advancement of the community. As he had given personal attention to a study of the water-sheds of the State, his remarks on the subject were of much value.

In addition to the matters discussed in this address, the inspection of buildings, the subsoil drainage of cities and towns, the examination of wells and control of their use in cities, the diseases of animals in their relation to human diseases, and drainage for health and the power to condemn lands for this purpose, were the topics which came up for consideration.

As to the inspection of buildings, reports were made as follows:

J. C. Bayles, of Orange, among other things, said: In making a thorough inspection of a house, let us begin with the cellar. It needs to be dry and clean to be safe. Not many cellars in city houses have perfect drainage and ventilation, and such as have not should be given a thorough cleaning. The main drain, leading to the sewer, should be iron, extending at least through the basement wall, and the outlet should be free and the pipe without leakage, else it causes dangerous saturation of the soil. Next in importance is the soil-pipe, which rises vertically from the cellar. Each joint should be inspected, and it will do no harm to call in a plumber to your assistance. It should be condemned when not found tight, or when not carried through the roof. The fixtures of the closets are often the cause of great trouble, and he would condemn all the closets that are built in small pantries that have no ventilation, and open only into a hall or bed-room. The custom is to waste baths and basins into the nearest closet traps, but such traps are what their names designate.

There should be vent for every trap in the shape of an air-pipe, and with this vent and an open air-pipe there is no danger from closets in houses. All the branch wastes need looking after, and it is better to give them a vertical waste-pipe of their own. Slop hoppers on the upper floors, though seemingly necessary, are causes of trouble, and should be flushed out.

Some additional points were presented by Prof. Jacob Cooper, of New Brunswick: His subject was, "The Proper Sanitary Conditions of Buildings in the Country." In treating it, he said he would consider, first, the natural location; second, the interior structure; third, the artificial surroundings. Level plains are less likely to be healthy than undulating country. The house should front the south, and be located west or south of a public road, on a slope, yet not at the bottom of a hill. Drainage is a prime condition of health. The well should be a little higher than the house, and the sewers should be carried far away. No sane person will construct a cesspool in the vicinity of any building for man or beast. Natural forests should be on the northwest, north and northeast, but no trees very near the house on either side, and no sunlight should be cut off. Regard should always be had to sunlight, and the kitchen should be toward the sun, while the parlor and spare rooms, less used, should be on the north side. The internal structure of the house should compass drainage and ventilation. It is hard to fight against nature; water-closets should never be in the house, but in an addition, not opening in it nor in connection with it, but reached by a covered way, and should be such as can be disinfected all the time. The contents should not pass into a subterranean drain. Such closets do no harm and do much good. The bath may be in the house but not in the water-closet, and though it is not so convenient to have the closets outside, the annoyance is in no proportion to danger of having them in the house.

Ventilation in the country presents but few difficulties. There should be in every room a fire-place, whatever the means of heating the room. It is worth more than any other method, and an open fire, by blaze of wood or the coals of fire, causes the circulation of the air to be perfect. It is the most simple system devised. In reference to cellars, Professor Cooper said they needed more precaution than care. They are not to be used for all the vegetables of the farm, nor for more than are needed for the present, for the evaporation is disagreeable and dangerous when they begin to decay. The dish-water and other waste water of the kitchen can be used to feed grape vines,

which are proverbially hungry. The outbuildings intended to house cattle of every kind should be at the east or north of the dwelling, so that the prevailing winds, which are from the west and south, would blow the odors away from the house. They should not be close to the dwelling, not less than 300 feet, and on sloping ground. No standing water should be permitted in or about them. Liquid manure should not be left in the center of the yard, but should be led away and taken up by muck or some other absorbent. The floors of the stables should be inclined, so that they could be constantly drained off, and all the outbuildings should be lower than the surface of the water in the spring or well. All animals require pure air and should not be crowded closely in stables where there is not free circulation. Even the pig-pen and the hennery should be well cleaned and ventilated, and no animal should be fed with spoiled food.

Prof. H. B. Cornwall, of Princeton, next spoke on the same general subject:

Cellars, he said, should be well ventilated and dry. We may presume we have a good cellar if the bottom is clean, yet he gave an instance of sickness in three houses that were built over a place upon which a privy had stood, but which had been cleaned out, filled in with new earth to the depth of six or eight feet, and a coating, four inches thick, of cement placed over that, on the bottom of a cellar. Yet ammonia was formed in that soil in large quantities. The drainage should be good, but the question in the country is, What shall we do with it? The easiest way to get rid of all the drainage of a house is to run it off to a cesspool. There are certain circumstances where that may be allowed. If we have a large lot, the soil gravelly, not sandy, extending fifteen or twenty feet, or more, and then striking a sound rock, under such conditions, a cesspool 75 or 100 feet from a house, and a well and a properly-ventilated connecting pipe, leave very little risk. The danger is in a sandy soil, or where it beds on a seamed rock, where it is traversed or seamed by vertical joints that are apt to be open. These carry the water anywhere. They have been known to carry the drainage seventy-five feet to a well. In the towns where lots are small, where they empty out in fissured rocks, or where they meet clay, they will not do; and the question in cities, What are we to do with our sewage? is one of much importance. There are two ways, other than running it off with water. They are, first, to let it run over the ground; second, where the lot will permit it (where the water does not contain fœcal matter), use subsoil irrigation. It is

expensive, but there are numerous books to show us how to do it. The earth-closet will serve the purpose if well taken care of.

Prof. Cornwall referred at length to well-water, and analyzed it, with a view to finding causes for typhoid fevers and malaria. He questioned if there was any direct connection with water and malaria, never having heard of a case where chemically pure water ever caused malarial fever.

For a water-supply in the country, dig a well—and an open well; protect it by a cemented well, six or eight feet below the soil; fix the surface higher than the land around, so that rain-water can't flow into it; and when contamination is discovered, remove the cause. It is not necessary to do more, as the well will generally do the rest itself, in time. The cistern water-supply is best in a small town. It is free from privy contamination, and a well can't be depended upon in this connection. An old shingle roof is good, but a slate roof is best, to gather water from; but do not use the water of any rain-fall that does not thoroughly cleanse the roof. The water will be very soft, but as pure as can be. It should be thoroughly cleaned out at least twice a year. A newly-cemented cistern will give hard water, but it will cure itself in time. Filters—there are cases where they are good, but they should not be relied upon, as they become so impure that if you put perfectly pure water in it, it will come out impure. The distribution of water through a house should be through iron pipe. Pure lead pipes are not good, for, though spring-water does not long affect them, rain-water will continue to act on them as long as used.

The paper of Ashbel Welch, C.E., on "Subsoil Drainage," has since been published in one of our reports.

Dr. H. A. Hopper, in a paper on the "Sanitary Examination of Wells, and How to Control Their Use," emphasized the dangers to public health arising from the use of impure water, and claimed for the public a control over all sources of water-supply. This paper has an important practical bearing upon questions constantly recurring, and so is given with but slight abbreviation:

"First among the facts we present is the commonly accepted truth that the quality of water is fixed by the character of the soil through which it percolates. It may hold in solution or suspension a large amount of mineral or earthy matter. It may be alkaline or contain the salts of iron alumina, silica or even chloride of sodium. It may contain ammonia or phosphates derivable from the soil constituents, or, as in the case of ammonia derived from the atmosphere, descending with the rains, and be free from deleterious influences; but much of the dangerous combination which may be found in solution must depend upon the source of derivation of the water. Ammonia—harmless when derived from rain-falls—often is the result of organic decomposition, and when associated with the organic substances from which it has been evolved, becomes a dangerous constituent of the water in which it is held. Such organic impurities in water challenge the closest scrutiny, and require investigation to discover their sources. Although ammonia and nitrogen in a free condition, as may be inferred from the preceding statements, may be entirely innocuous, in some of their combinations they do become dangerously toxic in their influence upon the human organism. Water, by its solvent power, is capable of holding in solution, to some extent, at least, whatever comes in contact with it; rain and snow as they descend through the air carry with them particles of dust mingled with the germs of animals and plants, which, under favoring seasons and atmospheric conditions, may multiply and die, and thus become sources of putrescence and of that chemical change known as organic decomposition. In some localities open wells are largely supplied from hillside springs, whose streams run through low, marshy fens, and carry, with very little filtering through the soil, the products of such decomposition; but with this source of contamination we shall deal less in this report than those larger and more decidedly prevalent reservoirs of pollution which abound in thickly populated districts. Professor Chandler, of New York, asserts that as an impurity in water is almost always present, we have organic matter whose exact chemical character has not been fully determined. This, he says, is a collective term for a great many different substances derived from decomposing vegetable and animal matters. Although we may be at present reduced to admissions of defects by reason of the imperfect demonstration of some of our scientific problems, practical familiarity with the deplorable results of the neglected warnings scientifically given, concerning the dangers to health and life, from the unconsidered sources of our well-water supplies, should demand a larger share of our daily investigation than is usually accorded to them. Treatises almost exhaustive of this subject have come from prolific pens to a very large extent, and still the demand for agitation of its life-saving truths are continually made upon the teachers of social science problems. Frankland, Letheby and others abroad; Chandler in the papers of the American Public Health Association, Jules Lefort in the *American Chemist*, and Professor H. B. Cornwall, of Princeton, N. J., and Dr. Pinkham, of Montclair, N. J., before this Association, have so carefully discussed the present and prospective of its influence on the lives and health of communities, that the literature of the subject is so full it appears to be just now a supererogation to attempt to add anything beside some practical observations for personal use and the guidance of Health Boards in the discharge of their duties

to the people, for whose safety they hold their appointments. First in the series stands the necessity of a careful examination of the surface surroundings of any given well requiring examination. Next to this an investigation of the character of the soil strata and depth from which it is derived. Of the first it may readily be understood that the duty of the careful sanitarian covers a wide field, in which he is likely to encounter hereditary prejudice, domestic convenience, and too often the cherished plans of the enlightened (?) architect; and it not infrequently happens that limited ground area seems to demand certain relations between the dwelling, well and privy vault. In every case where those relations are inconsistent with the strictest rules of sanitary propriety, a decided judgment, based upon hygienic considerations, should be expressed in terms not to be readily misunderstood. The examination of the local surroundings of wells includes suggestively a review of some of the practical literature of the subject, and it will not be amiss at this point of its consideration to refer to reports and opinions in confirmation of its necessity. Prof. Chandler, in his report published among the papers of the American Public Health Association, says: 'In many cases, from the proximity of cesspools and privy vaults, the water becomes contaminated with filtered sewage matters which, while they hardly affect the taste or smell of the water, have, nevertheless, the power to create the most deadly disturbances in the persons who use the waters. In the neighborhood of grave-yards the water of wells is often impregnated with animal matters from recently-filled graves.' The popular and widespread belief that to effectually 'dispose of decomposing organic matter, it is only necessary to remove it from sight by burial in the earth,' is founded, no doubt, upon a half intelligent trust in the power of the soil to retain or neutralize in some way, all organic matter from solutions. This has begotten an indifference to the subject of soil saturation and filtration. As a result, the wells in many large cities, as well as those of extensive rural districts, are receiving pollution from privy vaults, cesspools, cattle-yards, and even cemeteries. Strange as this may sound to the intelligent investigator of to-day, its proof abounds in every direction. Dr. Vaughan, of the University of Michigan, in a paper read before the Sanitary Convention of Detroit, this year, January 7th, 1880, says: 'During the past three months the authorities of a growing village in the interior of this State have, in spite of the remonstrances of many citizens, located a cemetery within a few rods of a deep well, the water of which is used for household purposes.' That the danger of such practices has been for a long time appreciated by careful observers, needs no special proof, notwithstanding the present widespread indifference. In an article by Jules Lefort, in *American Chemist*, Vol. II., page 448, he declares that 'as long ago as 1808 it was decreed in France that no one should dig a well within one hundred metres (about 330 feet) of any cemetery.'

"In our presentation of the branch of investigation covering surface surroundings, we include necessarily some of the serious results of its neglect. A few examples of such results are of value for a demonstration of fact above the fallacy of conjecture. Sudden outbreaks of disease, sometimes of a gastro-enteric type, and at others of a purely typho-malarial fever, often follow the unsuspected ingress of sewage matter into the well, either from leakage from soil-pipes, cesspools and other contaminating sources, and more frequently by gradual percolation than by sudden irruption. From such a source, at a convent in Munich, thirty-one out of one hundred inmates were affected with typhoid fever. At Pittsfield, Mass., a large number of pupils in a boarding school for young ladies were similarly affected. The history of the case given recently by Professor Cornwall, as having occurred near Princeton, N. J., of the colored man whose typhoid disease was communicated to a number of others through the use of well-water, is too familiar to you all to need recapitulation. What shall we say of the late calamity which befell our ancient seat of learning at the city just named, where modern vigilance failed to discover those surface surroundings which should have averted the cause thereof. The force of this reflection is not diminished by the consideration whether or not it may have happened in part from poisoned atmosphere in conjunction with polluted well-water, but it presents the fact as its own unpleasant commentary. It is not necessary to multiply examples of this kind by a recitation of dozens of cases which have been reported in our own and neighboring States; but it is well to bear in mind an important practical fact pretty well conceded by nearly all scientists, that water once contaminated by sewage, especially that containing the detritus of certain diseases, may communicate those diseases after an apparently thorough purification. Professor Cornwall, in his paper published in the second report of our State Board of Health, says 'that it is not possible, within certain limits, to say how long a dangerous water will continue to be dangerous; still, analysis very often serves to detect danger where it was hitherto unsuspected.'

"We are quite safe in concluding that this view of the matter in its relation to well-water is entirely correct, and not subject to those restrictions placed upon the views of scientific experts, who, like Dr. Frankland, conclude that all waters once contaminated by sewage poison are never afterward fit for use; while Dr. Letheby, Dr. Miller, Dr. Parkes and others insist that waters of open streams do purify themselves after the processes of passing along several miles subjected to oxidation, fish feeding, &c., and become entirely pure. This point is made with special reference to the control of well-water used in cities. In regard to the next consideration named—the depth and soil strata through which the well may be obtained—we are likely again to meet with popular delusions which have been largely fostered and developed by the teachings of well-informed *quasi*-experts. Chief among these errors is the idea that a rocky bottom, particularly

one with drilled holes to reach a water-supply, must be exceptionally safe from surface contamination; putting out of mind an important factor which may make such wells exceptionally unsafe—we allude to the possibility not only, but in our own State to the probability, that the perpendicular fissures and longitudinal or horizontal and irregular strata seams of sandstone, shale and even trap-rock formations, may afford a more direct conduit for unfiltered sewage, than a compact, loamy soil. It is no less important that the idea of perfect safety attached to driven wells should receive a check by explaining the term as only relative. Cleanliness from direct surface wash is well secured by that kind of water-supply, but in all other respects it is subject to the same regulations and restrictions to be applied to the stone-built or cement tile-pipe well. What influence is exerted by different soils in the removal of sewage contaminations for the protection of well-water from pollution? This is eminently a practical question and must sooner or later be intelligently answered, not by chemical theorizing, but by practical experiment conducted in particular and special localities, for an enlightened guidance of the dwellers on the soil. The importance of it will be understood when we consider that after near local surface surroundings have received due attention, distant sources of danger may exist to awaken apprehension. We are able to answer this question only in part, and in doing it must have recourse briefly to some experiments made in a distant State, suggestive of what made be done at home.

"At Ann Arbor, Michigan, in 1878, the discovery was made of offensive water in a cistern which was twenty feet deep and found to leak six feet under the surface of the ground, affording through the opening as good opportunity for the ingress of sewage as for the egress of all water above that point. An investigation into soil power for filtration, oxidation and thus purification, was made for the testing of different soils, and an answer to the question, Do different soils differ in their capabilities of removing organic matter? This was done with special reference to the removal of organic matter held in solution, and not merely in suspension; the latter is all that can be pretended for any filtering apparatus usually employed for cleansing drinking-water. The conclusions reached were used with especial force against the location of cemeteries within even long distances of wells, and concludes with this language: "We honor the dead as highly as others do, but it is not right that the dead should be allowed to murder the living." If, in the sanitary examination of wells, occasion arises for the special examination of the water of a suspected well, recourse must be had to chemical agency. Many methods have been suggested in connection with the examination of different classes of water, and whether one method or another be employed in the analysis, a classification of substances occurring or likely to be present must be observed, and will always include matter in suspension or in solution, either organic or inorganic, solid or gaseous, animal and vegetable. The bibliography of

this department is so extended that an attempt to compile a small part of it for this report, is impracticable. Having traversed the ground to some extent pointed out by the naming of this subject, we need only to add to the matter of inspection that the deeper the well, all other things being favorable, the less the danger of contamination, especially when the boring is through a heavy strata of clay, or what is popularly known as hard-pan, which will for a long time resist the percolation of surface-water. Artesian wells, although too expensive for general adoption, when sunken to great depths, afford a more perfect security. If, however, strict attention be given to surface surroundings, and soil advantages and disadvantages, we will hear less frequently of the dangerous outbreaks of endemic disease. A review of the facts presented in the discussion of the first part of our report points unmistakably to the necessity for some restrictive supervision of the indiscriminate use of wells in cities where, no doubt, long before urgent sanitary necessities existed, such wells were built regardless of increasing filth deposits above and around them."

At the meeting held at New Brunswick, December, 1881, Dr. Hopper, as president, treated of the "Danger in Noises," and discussed the question how far excessive and unnecessary noises should be brought under the restrictions of law. Reference was also made to the sufferings of the traveling public as follows:

"Imperfect, and sometimes impossible ventilation of railroad cars, became a source of such persistent and loud complaining that improved construction has now presented within our reach, as we delusively think, a correction of former wrongs; but while improved facilities are afforded for the correction of an over-heated and vitiated car, the stubborn or careless persistency of railroad employes in opposing a proper use of the means provided, is a subject of almost universal complaint. The conductor will very blandly promise suffering passengers to find a man who will regulate the ventilators; the brakeman, in turn, growlingly declares that he cannot warm the cars with the ventilators open; the resulting issue is, continued suffering, until some passenger, bold enough to move, applies the remedy. Contagious and infectious diseases frequently find a favorable means for propagation in the unventilated and miserably cleaned railroad car, and until some terrible calamity stares several communities in the face and calls out the activities of National and State Boards of Health, very little of well-directed effort is made in the direction of a proper cleansing of cushioned seats and bespattered floors. Perhaps we may find some grains of comfort in the lengthy correspondence between the National Board, a few State Boards of Health, and the Pullman Car Company of Louisville, under the threatened spread of yellow fever in 1879. All of this is as it should be, but the forced cleanliness of a dire emergency should be made the rule, and not the exception, to daily management

in the interest of public health. Another and quite as important matter, in connection with railroad sanitation, is the architectural construction and daily management of passenger depots.

"It has grown to be a crying evil against which public protest should be made, that, in a great many instances, to avoid the contraction of filthy diseases, passengers are compelled to wait for coming trains outside of depot buildings. Badly ventilated waiting-rooms and disgracefully located and managed water-closets, are constant sources of danger to the traveling public; but, as was intimated in the early part of this paper, the easy, idle manner in which our people take these perils by constant familiarity with them, points at once the lesson and the duty of those vested with authority for their abatement. Public opinion must be educated into a calm, grave consideration of the dangers as well as the offensiveness of those places built ostensibly for convenience and comfort.

"Local Boards of Health possess the power, under our sanitary laws to-day, to direct and control the construction and management of railroad depots, with their adjuncts, in the interest of public health, with quite as much success as they can exercise supervision over the plumbing and surroundings of private dwellings, school buildings, court houses, jails and almshouses."

The subject of small-pox and vaccination came up for extended discussion. The facts furnished were somewhat conflicting as to the relative indications for the use of the lymph, derived from spontaneous cow-pock, as introduced by Jenner, or the more recent advocacy for the use of lymph at first similarly derived, but transmitted from calf to calf instead of from arm to arm.

Dr. H. R. Baldwin read a paper which gave a history of vaccine inoculation, embracing important quotations and opinions on the subject of vaccination from the earliest times, and from standard authority. This paper was important and deeply interesting to the medical members of the Association. He condemned the wholesale vending of vaccine virus by apothecaries as tending to mischievous results.

Dr. Dennis, of Newark, followed with some practical remarks on the question of vaccination. He took the view that there was necessity of great care to secure the purest vaccine virus. He gave statistics to show that among the unvaccinated the mortality reached 35 per cent. Among those imperfectly vaccinated the mortality was $21\frac{3}{4}$ per cent. Where one mark was shown, $7\frac{1}{2}$; two marks, $4\frac{1}{2}$; three marks, $1\frac{3}{4}$; four marks or scars, which is proper vaccination, the mortality was only three-quarters of one per cent. Further statistics of interest to the medical fraternity were given. The conclusion

reached from these tables was that at least thirty unvaccinated persons died of small-pox where one died not properly vaccinated. He favored the use of bovine virus, and, to secure the greatest protective power from vaccination, he would favor the making of four marks or scars on the subject.

Dr. Baldwin spoke of the German plan of continued applications of virus at intervals of three days, until the virus ceased to take effect, and until the system was saturated with it.

Dr. Williamson said his plan was to make a large mark and spread the virus upon it thoroughly. Sores have been as much as parents or children could stand from one application of virus, and if there were four spots an inch apart they would run together. The better plan, he thought, was a repetition of vaccination two or three years after, if parents would be willing.

Dr. Hunt read extracts on this subject. He suggested that physicians labored under one great disadvantage, in that they did not know what kind of lymph they were using. He thought physicians should be exceedingly inquisitive on this subject.

The subjects of "Tube Wells and Water Filters" were presented by Prof. Cook, of New Brunswick, and J. C. Bayles, of Orange.

Prof. Cook discussed the whole subject of driven and bored wells, showing when and how each were applicable—their value in some cases and their failure in others. He showed that the water of deep wells was not generally to be considered as the rain-water of that season filtered through the soil, but rather as resident water which had been stored there for long periods; such wells, therefore, are not so easily affected by drouth. He expressed the opinion that a water-supply along our sea-shore would yet be found by driving wells deep into the lower marl strata, and gave some statements as to wells that have been put down in various localities.

Mr. Bayles showed how imperfect are most of the water filters in use, and that many of them merely detained coarse particles and in no other sense purified the water. Filters made by a brick partition thus strain the water and retain organic matter until the bricks themselves become foul and can only be cleansed by their removal. He expressed the opinion that spongy iron is the best filter material, but a good preparation of it is not now to be had in this country. Next in value is the magnetic iron ore, which is easily had in a coarse state. He objected forcibly to the use of zinc water coolers, inasmuch as the zinc

contains much arsenic, and is otherwise objectionable. The Kedzie water filter is the best one now in use, if only the zinc receptacle is replaced by galvanized iron or some other material.

The eighth annual meeting was held December 14th and 15th, 1882, in the Senate Chamber, at Trenton, and was one of the most useful meetings of the Association.

The address by the President, Prof. J. Madison Watson, of Elizabeth, dealt chiefly with the subject of "Social Sanitation." Only a few of the more important suggestions can be quoted:

"Sociology recognizes humanity as a triple unit, naturally divided into the family, the State and the church. These social divisions are not man's invention, but the outgrowth of his nature. Beginning from the sexual relations, all the family conditions are fulfilled in a society of two parents and their children, united by free choice, by consanguinity, natural affection and mutual interest. How instinct, reason, love, and all the natural forces of man, are thus securely bound to work together for the common weal.

"Since the State is the outgrowth of the family, and exercises its original defensive powers, the family is thereby entitled to protection in all rights essential to its integrity and prosperity. Some of these rights, such as marriage and parenthood, are not created by legislation. They exist prior to and independent of human enactment. The State is bound to give form, recognition and protection to these rights. Questions so grave, urgent, far-reaching and profound, involving ethics, anthropology and psychology, the entire history and science of man, should receive the most studied consideration of political philosophers and experienced jurists.

"Assuming to maintain all these rights of the family, the State must be held to a strict account for the discharge of its obligations. Necessary precautions must be taken, in establishing the society of the family, to secure deliberation, freedom of choice, and mutual protection and regard. Wise Christian laws must be devised, recognizing marriage as a *union* and not a voidable contract; for 'The man shall cleave to his wife and the twain become one flesh. What, therefore, God has joined together let not man put asunder.'

"And still, while happily constituted families, consciously or unconsciously, do much to prepare citizens to regard the State as the fatherland, the State, in wisely promoting the universal good by the establishment of free schools, in ministering to the alley and byway as well as the avenue and boulevard, has her chief promise of increasing prosperity and perpetual security.

"The period prescribed by the State for the attendance at school, between the ages of five and eighteen, is wisely chosen. It is the period freighted with peril, brightest in promise, decisive in result. Not too early to rescue thousands of young children from close rooms, filthy streets, or cruel neglect, and place them in charge of the trained nurses of the State; not too early to begin systematic instruction with youth from homes of plenty; nor is it too prolonged to give the decisive bent which leads to usefulness and fortune. The curriculum adopted should be of such a character and scope as to fully satisfy the needs of this entire period, and awaken the desire for continued improvement.

"The worst impending evil arises from unduly taxing the growing frame with competitive mental effort, while its nervous force is needed to supply its natural wants, thus creating a distaste for all labor and blighting every flower of hope. Another inflicted evil, unwise and cruel, and injurious beyond expression, destructive of self-respect and brutalizing, is the commission of corporal punishment on young children. Happily, this relic of barbarism is no longer permitted in the schools of New Jersey. Many of the schools, however, suffer from insubordination; and many excellent instructors, not apt to govern, earnestly seek a substitute.

"Now I am prepared to say, with perfect assurance, that a suitable system of gymnastics, properly used in the schools, will almost wholly remove these two great evils. Its disciplinary effects on the pupil correspond to those of the soldier on the recruit. Nothing else is so effective in fixing habits of attention and obedience. The results of its use, even in institutions for the feeble-minded, are well nigh miraculous. Should not a practical knowledge of physical training be made an essential requisite for the graduates of the State Normal School and the public teachers? Do not the sanitary, material and military interests of New Jersey, imperatively demand the introduction of gymnastics in all schools and corrective institutions that are sustained, wholly or in part, by the State."

The articles of J. A. Adams, C. E., on "Disposal of Sewage in Cities," and of Professor Charles McMillan, on "Disposal of Sewage in Inland Towns and Places," both of which have since been published, elicited an important discussion as to the relative claims of large or general sewers and the smaller sewers which exclude storm-water. The opinion of most seem to conform to that of Mr. Adams, that the question was one of local adaptability, to be determined by soil, by natural drainage, by surface declivity and by the relations to adjacent water-courses. The discussion on the paper of Professor McMillan turned chiefly on the question of how far a stream could be relied upon as a neutralizer, dilutant or purifier of sewage. While the paper sought to give an approximate formula of calculation, Professor Leeds gave his experience with the Passaic river, and especially with the Brandywine, at Wilmington. At Coatesville, higher up, the water was found much polluted on account of certain factories there, but the

water just above Wilmington, before any refuse from the city was added, was found suitable for drinking purposes. Then, again, the water below Wilmington was polluted. Thus we are able to practically trace the process of purification taking place. We are not only to consider the change made by oxidizing processes, but by precipitation, by sunlight over the whole stream, by animal and plant life of all varieties from the great to the minute, and thus to remember that many agencies more than we have yet estimated, are at work in the conservative transformation and resultant purification.

J. C. Bayles, C.E., of Orange, read a letter which exhibited the method of dealing with the sewage of Birmingham, at Saltley.

"The sewage is carried through drains from the city to a farm where the land is irrigated with it, and crops of potatoes, turnips, etc., are raised. The soil is too rank for cereals. The wonderful feature of the farm is the absence of all offensive odor. Lime is used as the deodorizer, and it renders the sewage perfectly inodorous. Large tanks at the farm receive the sewage, and the overflow of the tanks is conducted through the farm by means of drains. There are 275 acres in the farm. It does not pay the expenses of keeping it, of course, as nearly 100 hands are employed, but it is cheap when the advantages to the city are considered."

Mr. Adams stated some facts as to it, and said the sludge was so unsalable that very much of it had to be buried at heavy expense.

Professor A. R. Leeds made a report as to the adulteration of foods. He showed a series of experiments as to infant foods. The facts as to these have since appeared in the State report.

The relative value of different forms of vaccine lymph, and the needs of revaccination, were ably presented by Dr. E. L. B. Godfrey, of Camden, and Dr. D. Warman, of Trenton. Dr. Godfrey first considers the objections urged against the Jenner or humanized lymph.

The paper next considered animal lymph and the three discussed methods of its propagation, viz., variolation of kine, retro-vaccination, and inoculation from original spontaneous cow-pox. The history of each of these was given, and the reasons why at present variolation of kine and retro-vaccination are not feasible sources of supply. The methods of inoculation from original cow-pox are then described, as well as the embarrassments connected with the present trade methods of supply. The conclusions arrived at by the author are thus stated:

"From a knowledge of the cultivation of bovine lymph, and from an experience in its employment for vaccination, two points, in conclusion, suggest themselves:

"Firstly. That lymph should be procured directly from propagators of acknowledged skill, intelligence and honesty; not through agents paid from thirty to sixty per cent. for its disposal.

"Secondly. That this Association should recommend legislation that would enable the State Board of Health to cultivate bovine lymph for gratuitous distribution.

"In our generation, when vaccination has curtailed small-pox to an almost incomputable degree, but a faint conception can be formed of its ravages in former times. From the middle of the sixth until the announcement of principle of vaccination, near the close of the eighteenth century, the most destructive epidemics of small-pox prevailed in every quarter of the civilized globe. Procopius, who flourished in the sixth century, gives the first description of the character of the disease, then raging in epidemic violence in Egypt and Arabia. Bruce, in his 'Travels to Discover the Source of the Nile,' expresses his belief that the abandonment of the siege before Mecca by the Abyssinian army was due to the effects of small-pox among the troops. During the ninth century the disease invaded England, and was carried throughout Europe by the Crusaders. In 1516 it was carried to St. Domingo by the Spaniards, and three years later it entered Mexico, destroying more than three millions of its inhabitants. In 1707 it reached Iceland; extended to Greenland in 1733, and in a short time destroyed one-quarter of the population of those islands. So terrible have been its ravages that, not excepting the black death, which destroyed in the Eastern countries during the fourteenth century more than twenty-four millions of people, or the sweating sickness of the sixteenth century, has this scourge been regarded as the most destructive of all the acute diseases known to man. Not alone for its great fatality, the loathsome condition attending it, or the disfiguration of those who escape it dangers, but for the demoralization it engenders, as seen in the prostration of business, the desertion of friends, and the abandonment of homes, has it been regarded by Macaulay as 'the most terrible of all the ministers of death.' When it is remembered that, in the century preceding the discovery of vaccination, forty-five millions of people died from the effects of small-pox; that more than two hundred thousand, according to Dr. Lettison, fell annual victims to it on the Continent of Europe; that two millions perished in the Russian Empire in a single year; that the yearly mortality in England was forty-five thousand, forty times greater than it is at this time, in proportion to the increase of population; that an epidemic existed in London for more than ninety continuous years; that cities have been desolated, villages abandoned, and armies disbanded, some estimate can be formed of the transcendent importance of the discovery of the principle of vaccination."

The paper of Dr. Warman confines itself chiefly to an exhaustive discussion of the ground on which animal lymph (not humanized) is to be preferred. He thus states some of the advantages of bovine lymph:

"Relying upon the statistical information which has been presented, showing the infrequency and small mortality of variola, in the early history of vaccination, that is, in the days when humanized lymph had undergone but few transmissions from the natural disease in the cow, the conclusion would seem to be fully warranted that frequently renewed bovine virus would afford an equal protection in our day. M. Warlomont (*Br. Med. Jour.* 1881) strongly reiterates the assertion made by him as to this matter some years ago. He states that out of more than 10,000 children vaccinated at Brussels with animal vaccine from 1869–70, not one case has to his knowledge been reported as having been attacked by the terrible epidemic that ravaged Europe soon after. He has made a number of appeals for information as to cases of variola, after animal vaccination, but so far without result. Others have made similar requests, and have offered large rewards for such information, but without avail.

"It has been repeatedly urged by some that bovine virus 'does not take well.' Without any reference to individual success, which of course depends altogether upon personal skill and experience, we have recently been put in possession of certain statistics which show that in experienced hands animal vaccination gives, to say the least, as good a percentage of successes as can be exhibited by vaccination done with ordinary current lymph by equally skilled vaccinators. Dr. Warlomont writes that when calf lymph is inoculated direct, taken from pustules at the proper age, no other failures are known but those resulting from the manipulations of the operator. Out of 300 children thus vaccinated by himself, not one puncture failed to produce a good pustule. When preserved vaccine was used in primary vaccination, the successes were at the rate of ninety-six per cent., and in revaccinations at the rate of sixty-two per cent.

"Ernest Hart (*Med. Times and Gazette*), in a recent address on animal vaccination, presents some further statistics which were supplied him by Dr. Carstan, of The Hague, as follows: In 1869, when animal vaccination was begun in Rotterdam, there were sixty-seven failures out of 542 operations; last year, 1880, there were only four failures in 2,727 operations, whilst in 1,563 of these the full amount of ten vesicles was obtained.

"At Amsterdam, there were nineteen failures in 1879, when animal vaccination was started, out of 626 operations; whilst during the last six years there has been but one single failure, out of a total of 14,849 operations. Similar experience comes from The Hague, Utrecht and Haarlem; and the gross total of all the vaccinations performed in Holland with animal lymph, including all the early efforts, shows

that out of 60,754 operations, only 720, or little more than one per cent., have been unsuccessful. Testimony such as this, says Mr. Hart, and on so large a scale, shows indisputably that the allegations made against the taking power of calf lymph have no foundation in fact.

"The conclusion of the whole matter, therefore, from all the testimony that we have been able to gather, establishes the following facts:

"1. That both humanized and bovine virus are good, but that, in point of protective power, bovine lymph is superior to humanized virus.

"2. That humanized lymph, but few removes from its bovine origin, as in the days of Jenner, is but slightly, if at all, inferior in protective power to the bovine; but that continually transmitting it through the human system is a cause of gradual and certain deterioration.

"The bovine lymph is preferred again for the simple reason that with humanized virus certain dreaded diseases may be communicated with vaccination, although the danger is no doubt greatly exaggerated. However, the public is entitled to the benefit of the doubt. Besides, the production of bovine lymph can be carried on in a much more regular way, affording a constant unlimited supply, as needed. And finally, we desire to emphasize and impress upon your minds that all these superior merits which we claim for bovine virus, apply only to a pure and genuine virus. It is a well-known fact that the business of producing the bovine lymph in this country has been undertaken and carried on by persons of neither skill nor knowledge of the subject, and much spurious virus has been sent broadcast over the land. The cultivation of bovine lymph may be considered a skilled pursuit, and a liberal amount of training, experience and knowledge should be required of those who engage in it. The propagation of animal virus, of perfect quality, is of such momentous importance to the public, that it should not be left solely to private enterprise or business cupidity, nor degraded to the level of a commercial trade, but should be under the control of the national or State government, so that lymph of undoubted good quality could be always obtained."

A paper was presented by the Rev. F. R. Brace, Superintendent of Schools for Camden county, as chairman of the committee, as to "What is Feasible as to Method and Law for the Protection of Schools from Uncleanliness and Contagious Diseases?" The paper has important suggestions, and so is published with this report.

Professor H. B. Pierce, city Superintendent of Schools for New Brunswick, as a member of the committee, made an unwritten address on the same subject.

He opposed general recesses at school, on the ground of dangers to the children, moral and physical, but said that the pupils should be allowed individual recesses. In place of general recess, he suggested

calisthenic exercises, during which the air of the school room may be entirely changed. He advocated yearly sessions of nine months, and the teaching of physiology and hygiene in their elementary forms.

In conclusion, he offered the following:

Resolved, That the State Board of Health be requested to have printed slips, containing the names of dangerous diseases, which are considered contagious, distributed among the city and county Superintendents of Schools.

That physicians be requested to notify either the Superintendent or Principal, whenever a contagious disease is found in a family, of whose members one or more attend school.

That when such notice is received, the teacher be authorized to suspend all pupils from such family until the attending physician certifies that all danger from contagion has passed.

That the State Board of Health be requested to obtain the passage of a law forbidding the holding of public funerals in all cases where death was caused by a contagious disease; also, when public notice of funerals is given, such notice shall name the disease of the deceased.

In order to improve the health of school children, the following was submitted:

Resolved, That the school year begin on the Monday next to the 15th of September, and close on the last Friday in June.

That the morning session commence at 9 o'clock, and close, for primary classes, at 11:15, and for all other classes at 11:30; that the afternoon session commence at 2 o'clock, and close, for primary classes, at 3:45, and for all others at 4.

That no general recess be given, but individual recesses be granted whenever needed.

That calisthenics be required twice in the morning session and once in the afternoon, allowing from three to five minutes for each exercise, and during such time the air of the room be wholly changed.

That the State Board of Education be requested to require of all teachers, as one of the necessary qualifications to obtain a certificate, a knowledge of the elementary principles of physiology and hygiene.

At the ninth annual meeting of the New Jersey Sanitary Association, held at the State House, Trenton, December 6th and 7th, the President, J. C. Bayles, of Orange, presented the annual address, on "Methods of Popularizing Sanitary Information." He showed that people had and felt much interest in the subject, yet, because they depended mostly on newspaper items, they were often misled. Half-knowledge can do a great deal of harm. He urged the importance of information for

the people from authorities, and of the distribution of sanitary leaflets, and instanced the effective service of some of the State Boards. The value of local Sanitary Associations was also urged and illustrated.

J. J. R. Croes, C.E., presented a paper on "The Methods of Sewage Disposal Without Discharge into Streams."

He alluded to the fact that sewage-water contained organic matter, both in suspension and solution. The solids, in ordinary town sewage, comprise from 70 to 200 parts in 100,000 by weight, averaging about one-eighth of one per cent. of the whole volume, which is equivalent to 128 parts in 100,000. Of these 128 parts, 82 parts are held in solution, and 46, or only one twenty-second of one per cent., are in suspension. This, although small, is very troublesome, since the parts are finely comminuted and settle slowly, and, when precipitated, form a slimy and offensive mass, ninety per cent. of the bulk of which is water, and which can neither be pumped nor shoveled by ordinary processes. This is known as sludge. The eighty-two parts of impurities in solution need also to be diminished. Ordinary sewage contains 10 times as much organic carbon, 600 times as much ammonia, and 10 times as much chlorine, as is considered admissible in drinking-water. The sludge, which is of little value as a manure, must be separated and disposed of, and the effluent water, which is highly polluted, must be purified. Simple subsidence of the solids is slow, and produces offensive odors. The addition of some chemicals hastens subsidence and retards decomposition. Sulphate of alumina and chloride of iron are the most effective.

For oxidation, which is the chief desideratum, no method has been found as efficient as passing the water intermittently through porous soil. To effect disposal of the particles, so that every one can be brought into contact with the air, the most effective method is to "saturate, with the fluid, the upper stratum of a bed of porous earth, and then dry it by absorbing part of the fluids by the thirsty roots of plants and letting the rest drain through the soil, into which, as the fluids disappear, fresh air enters from above and furnishes a fresh supply of oxygen to repeat the operation when the time has arrived for another supply of filth-laden fluid to be poured into the soil." As the matter in suspension can first be removed in the shape of sludge, and as this tends to clog the trenches and to impede the circulation of air, the author contends that, in many cases, the sewage should first be clarified by the precipitation or removal of the grosser or suspended material, and then the principle of intermittent filtration be applied.

He believes that all that is needed is for chemists and mechanical inventors to grapple with the problem of clarification. In the plan of precipitation and running off into vats for evaporation, there is too much offensive odor. In others it is drawn off into canvas bags, which are subjected to hydraulic pressure and the moisture thus squeezed out. A process which promises good results, is that of filtration of the sewage, after the addition of the precipitant, by a mechanical filter, in which sawdust is used as the filtering material, and the surface of the material removed by a revolving cutter as it becomes clogged. The combined sawdust and sludge is readily compressed into cakes. This may be burned under the boilers which furnish steam-power to operate the works. The idea of profit must be secondary to that of health. In a number of English towns, the expense of preparation of the ground for intermittent filtration, including the settling tanks and all the pipes, averages $400 to $500 per acre. Preparing the land for *sub-surface irrigation* would probably cost $2,000 per acre. The annual cost of maintenance of sewage-disposal works, in several English towns, averages twenty-five cents per head of the population. Where sewage is to be purified, it is desirable that its volume should be as small as possible, and it is not advisable that any more rain-water, or drainage-water from the soil, should be delivered at the disposal works than is absolutely necessary.

C. F. Wingate, C.E., Prof. C. F. McMillan, E. M. Hunt, M.D., and others took part in the discussion.

Mr. Wingate urged the importance of a due consideration of all such methods of sewage disposal as will be necessary to such towns as cannot or ought not to dispose of their sewage into streams.

Prof. McMillan thought that Mr. Croes had overlooked that much land would not permit drainage six feet in depth with proper outfall, and so could not be prepared for soil absorption or distribution so as to permit the sewage of 1,000 persons to have intermittent filtration on one acre. He alluded to the successful dealing with an uninviting piece of ground at Princeton by means of the small pipe system. The value of all small pipe and of deep drainage was urged on the ground that these serve as air-tubes through the ground, directly, as well as by being water carriers, and relieving the soil from its water and so admitting more air.

Dr. Hunt suggested that the arguments for sewage disposal, other than into streams, must be based on considerations of locality, economy, etc., in all cases, since it could not be admitted that many

rivers may not in distances of a few miles dispose of fresh sewage. He drew attention to the fact that uncropped soil, in itself, had no great oxidizing value, but that those who advocated ground disposal concentrated their chief plans on securing the presence of air in the soil. If so, and if this is, after all, the great agent, air can reach sewage in the great open and in uncovered streams and rivers and amid the flow of currents, and over rocks and stones amid light and wind and wave as well as in most ground.

T. W. Harvey, M.D., of Orange, presented an elaborate paper, in which the following contention was supported:

I. That malaria chiefly occurs as a result of heat, moisture and vegetable decay.

II. That it is probable that there is a germ entity, the development or sedation of which, amid fertilizing and proliferating conditions, gives rise to malaria.

III. That, oftener than we have thought, malarial diseases result from drinking water charged with vegetative life, or the specific products of decomposition.

Dr. Harvey supported this view by some opinions of others and by interesting cases of his own, in which the use of particular wells or waters had caused malaria in neighborhoods or under circumstances where those not using them escaped.

Dr. Hunt, by direction, opened the discussion. After alluding to the recent tendencies to limit or deny the paludal origin of malaria, he showed how, while admitting a biological factor, it was still in full evidence that abnormal conditions of vegetable decay and neglect of proper drainage were the occasions of the disease. It was also pointed out that not only were marshes, etc., the habitats, but that these differed, and that individuals also differ as hosts for malaria. Some of these differences were noted. Those localities and those individuals which are best made to conform to known laws of prevention are the most successful in preventing malaria.

Dr. Benjamin, of Camden, gave great prominence to the germ view of malaria, and showed how it, and it alone, would account for the natural history of the disease.

H. P. Godfrey, M.D., of Camden, read a valuable paper on the explanation which the germ theory affords as to the origin, cause, conduct and prevalence of the specific diseases. He illustrated how, in one disease after another, the phenomena of occurrences were thus explicable.

J. W. Pinkham, M.D., of Montclair, read a paper on "Domestic Wells and Cisterns, and the Best Method of Construction." After an analysis of the sources of water, and objections to water as obtained from shallow wells, the author claimed that the open well must go, and that there is more safety either in driven wells or in such as are arched and concreted to at least six feet below the surface. Dr. Pinkham alluded to the error of view induced in digging wells by the apparent running in of rivulets from one or more special directions. While it is true that the stratification or looseness of soil may determine some of these, it is also true, practically, that a well is the drainage-tube of a general area of ground surrounding it, and, as such, must represent to no small extent the organic and some of the inorganic material contained in the vicinity. The use of cistern-water was also advocated, it being shown how cisterns could be protected from leaves and settling on roofs by screens, and how a brick septum would serve as a filterer.

George P. Olcott, of Orange, indorsed the views as to the feasibility of cisterns, and showed how the outside finish of ground cisterns and proper puddling or cementing are important. For the sake of cheapness, many cisterns are very carelessly built. Warning was given, both in the paper and discussion, against the building of cesspools where they might get access to wells.

Prof. A. R. Leeds treated of "The Agencies, both Natural and Artificial, Affecting the Purity of the Passaic River Above and Below Paterson." After giving various facts as to the water of this river, and after statements as to various other rivers and localities in comparison, he spoke as follows:

"It should be distinctly stated that there is no foundation in fact for the oft-repeated statement that water once polluted by sewerage can never again become safe for drinking purposes. If this statement were true, it would exclude the water of London, and of very many towns in Europe, and with the exception of Brooklyn, Rochester, and a few other cities, most of the large towns of the United States, from the number of cities having safe water-supplies. There is a *vis medicatrix* in the general operations of nature as well as in the human system, and no one whose attention has not been particularly turned to this subject, would adequately realize the resistless energy with which nature, when we do not interfere with her operations, as we do in noxious grave-yards, oxidizes and soon gets rid of every particle of effete organic mattter. But when this effete organic matter is placed under conditions most favorable to chemical change, as it is when dissolved in an extremely dilute condition through a vast volume of water; when it is directly acted upon by the oxygen in contact with the surface of flowing water, or artificially mingled with the air in tumbling over rocks and falls; when the oxidizing action thus produced is aided by the oxygen dissolved in the water and that which is liberated by the pores of aquatic plants, then this destruction is much accelerated. But this is not all. Light itself is a most powerful aid in increasing the rapidity of oxidation and in effecting these decompositions. Until the discovery of chlorine and bleaching powder, light was the only agency used to bring about an oxidation of the coloring matters in cotton and woolen goods, and thereby bleaching them. The same oxidizing action is taking place, aided by the chemical energy of sunlight, in the case of the matters dissolved in water, with the difference that the nitrogenous organic matter, which is the most objectionable part of this organic matter, is far more prone to decomposition and far easier of oxidation than the comparatively stable bodies which form the natural or artificial coloring matters of cotton and woolen goods.

"In the third place, aquatic plants and living organisms of unnumbered variety play a great part in altering, decomposing and assimilating organic and even mineral constituents in the water. Finally, clay and earth have an energetic attraction for ammoniacal compounds and nitrogenized organic substances. Every rain which washes into a stream finely divided earth, has a powerful influence in purifying and sweetening the water, because this mud in its precipitation carries down with it a large amount of organic material which it has removed from solution. The action is analogous to that of charcoal, which absorbs the noxious gases of water, and is able to remove from solution the strongest tinctorial substances, such as indigo. Indeed, the use of clay to remove sewage from water has been recognized in many patent processes of sewage precipitation. But what man does on a small scale and in a very crude manner, is done on a great scale and most perfectly by nature. The fact that lands periodically overflowed by river-water are so fertile, like the banks of the Nile, which have never lost their fertility, though longer cultivated perhaps than any part of the earth's surface, is due to the organic matter carried down by the finely divided mud, and not merely to ordinary organic matter, it should be remembered, but to ammoniacal and nitrogenized organic matter, such matter as is very easy to decay on the one hand, and very easily assimilated as nourishment by growing plants on the other.

"I hold, therefore, that the statement so frequently made, that water once polluted by sewage cannot again become safe for drinking purposes after flowing any number of miles, is contrary to our common experience and observation. Furthermore, that the statement ignores the operation of natural agencies, the reality and efficacy of which are readily apparent. Finally, that wherever the pollution and subsequent self-purification of a flowing stream has been patiently

investigated, the chemical testimony as to the reality of this self-purification has been convincingly demonstrated.

"It is due to this process of self-purification, as I believe, that of the sewage of Paterson and Passaic a certain residue only remains at Avondale bridge. But each year this process is less adequate to deal with the increment of pollution, and each year the perils attendant upon the influx of sewage from above increased. The following is a recent analysis:

"PARTS PER 100,000.

	Newark Intake.	Jersey City Intake.
Free Ammonia	0.0065	0.045
Albuminoid Ammonia	0.027	0 03
Nitrous Acid	0.008	0.008
Nitric Acid	0,37	0.39
Chlorine	2.85	9.70
Oxygen required to oxidize organic matters	0.46	0 49
(Same) as determined by reduction of silver	0.25	0 27
Total Solids	12.50	27.50
Dissolved oxygen per liter	3.65	4.01

"The meaning of these figures is that the Newark sewage must be kept out of the Passaic, or the Passaic must be abandoned by both Newark and Jersey City as a source of water-supply. The grand jury of Hudson county has accordingly presented the mayor and corporation of Newark, for maintaining in the present sewage system of Newark a nuisance, and it is upon the issue of this procedure that the future history of the water-supply depends."

In the discussion, allusion was made to the fact that *in very large or deep reservoirs* the lower water sometimes seems to become dead. It was suggested that there was interference with the vitality of the lower forms of bacterial life which were believed to conserve the purity of water. Not infrequently reservoir-water is not up to the quality of that in the river or source from which it comes. If so, even the water in stand-pipes need occasional comparison with that of the source. Pipes also vary in their supply. Professor Cook stated that just now two pipes in New Brunswick showed difference in supply which as yet was not accounted for. Changes that may occur in the inner surface of pipes must be studied. Sometimes these changes are such as impart taste or smell without any serious results. But we must seek to know the cause in order to determine whether it is casual and harmless or dangerous.

The subject of school hygiene was presented in papers by Professor H. B. Pierce, of New Brunswick; James Green, of Long Branch, and J. Madison Watson, of Elizabeth. Professor Pierce had been appointed the chairman of a committee with reference to resolutions

relating to school hygiene, which had been presented the former year. Already these resolutions had resulted in some valuable leaflets from the State Board of Health. Professor Pierce still urged the importance of compulsory ordinances as to contagious diseases, and for the prohibition of public funerals where there had been deaths from contagious disease; also that in all communicable diseases the notice should name the disease, so that those not wishing to attend, and especially children, might avoid exposure. While the value of these suggestions was recognized, Dr. Hunt, Dr. Newton and others expressed doubt as to the feasibility of including all these in compulsory legislation. Already the law gives authority to local Boards of Health, where they deem it necessary to the public health, to interdict public funerals and to require the notification of contagious disease. To compel local Boards to do this should not be the work of State legislation, unless in emergencies where the evil was spreading beyond localities and jeopardizing the State.

Professor Pierce again urged examination of teachers in the elementary principles of physiology and hygiene. The evils arising from long recesses and the advantages from calisthenics in the school room, and reliance upon very short recesses or individual permission, was again urged. The Association showed much interest in the views expressed and appointed a large Committee of Conference, with power to act by way of recommendation to the Legislature or to School Boards.

The substance of Principal Green's paper will appear in this report. That of Professor J. Madison Watson will be in the ninth volume of the American Public Health Association.

Professor C. F. Brackett, of Princeton, explained such appliances for the raising and distribution of water as are of more recent application. In Manchester, N. H., the source of supply has been made to furnish the power by water-wheels and pumps much above the source. By another contrivance, a bucket, automatically filled, is made to work a pump-plunger in connection with a counter-weight so as to supply water from a small stream to a number of houses. Solar heat has been applied so as to work an engine and pump, and raise water from driven wells. By the use of electricity as a transmitter of power over long distances, the sewage of a city situated in a valley entirely surrounded by hills, may be made to run dynamos, drive water-wheels and so transfer power to a pumping station as to raise sewage or water over ascents where drainage and tunneling would be impracticable.

In that distribution, which needs to take place after water has become the vehicle of organic matter in suspension or solution, as in the ordinary sewer-pipe, he illustrated the advantage of a running stream constantly fed with air at every possible point. Air tends to adhere to surfaces and to water and to mingle with it. If, from the upper segment of the pipe, there go up wherever possible small tubes for admission of air, and if these tubes reach down so as to go into the flowing stream, there will be a constant adherence or drawing in of air which thus mingles with the water and performs its oxidizing and purifying processes with remarkable rapidity.

The subject of filtration was treated by Professor Geo. H. Cook, of New Brunswick. Its contents will be found in this or a subsequent report. These selections from the meetings of this Association thus present an index of the broad field of sanitary science and art, and contain very valuable suggestions for the people of the State. Physicians, engineers, chemists, teachers and the workers in the practical details of mechanics find these conferences of great value and are thus contributing to the social, household and economic welfare of the State.

TRADES AND OCCUPATIONS.

BY EZRA M. HUNT, M.D., SECRETARY.

The relation which an inquiry into trades and occupations has to public health and welfare has been recognized from the first conception and application of sanitary art.

It first became apparent in an inquiry as to poor laws and the effect of friendly societies, because it has so often found that penury or sickness had resulted from the effects of trades or from the conditions under which they were followed.

The first official appointment in England that can be said distinctly to have had its origin from the writings and appeals of sanitarians, was that made in 1832, when Dr. T. Southwood Smith, Mr. Thomas Tooke and Edwin Chadwick were appointed to investigate the question of factory labor.

The prosperity of a country and the welfare of the population are very dependent upon the various trades and occupations and consequently upon the health of the operatives.

There are various reasons why so important a public concern cannot be left to self-regulation. The multitudes of workmen, as well as their employers, are ignorant of some of the necessities of physical life and of the special complications and embarrassments of various occupations. The harm done is often gradual and is not realized until well nigh irremediable.

Most, even, if feeling the embarrassments to which they are exposed, do not know how to ameliorate or avoid them, or, if they do, cannot enforce the provision of and compliance with the needed adjustments.

First of all there is need that there be a better understanding on the part of all of the demands of life and health and the conditions and surroundings which are most favorable thereto.

Next to this is a knowledge of the real evils and how to counteract or correct them.

Each trade and occupation needs to be considered as to its special demands, exposures and liabilities. Circular XL. of this Board, as contained in this report, outlines these. The effect of each department of any given trade needs to be considered. Then comes the general question as to by what methods or devices the evils are to be overcome or reduced to a minimum. There is but little realization in very many trades how much human life is shortened or its powers abridged by the occupation or by the place and circumstances under which it is followed. There are many industries in which the power to make full time and do good work does not extend over twenty years of the artisan's life.

From the elaborate and proximately correct tables of Hirt we have, as averaging, for those under treatment, *of under fifty years of age at death*, for agate-polishers, britannia-workers, cabinet-makers, cement-makers, chimney-sweeps, coppersmiths, cotton operatives, diamond cutters, glass-cutters, goldsmiths, locksmiths, laborers on artificial flowers, arsenical mines, color-works, lead mines, lead smelting, quick-silver, silver smelting, sugar of lead, machinists and stokers on rail-roads, millers, millstone-makers, mirror-makers, needle-polishers, painters, plasterers, porcelain-makers, sandstone workers, stone-cutters, tinkers, varnishers, while various other occupations follow in close degree of briefness of life. It is noticeable especially how large a portion of these are trades in which there is inhalation of irritating dust. It is also to be borne in mind that often these deaths at middle life stand for long years of sickness or of enfeebled and diminished work. Our climate, our methods of work and the use of machinery, make some modification as to trades, in some cases increasing and in others diminishing the evils.

We need to take the facts in evidence as furnished by careful statistics and deductions from foreign sources, and then, by our own close examinations, see how far these are to be accepted. This Board has, from time to time, directed its attention to various industries, in order to acquaint itself with the character of each and the peculiar liabilities which they involve. We now have under systematic observation the effects of pottery, printing, glass making, oil cloth, and flax and jute industry.

The object of this paper is to furnish some facts as to some of these, preliminary to those special observations which are now being made and which will be reported in due time. The interests of the working classes in all these regards must not be overlooked.

PRINTERS AND PRINTING.

Dr. R. S. Tracy, of New York, in his Treatise on Occupations, says: "Printers, including compositors and pressmen, are generally pale and unhealthy in appearance. The characteristic anæmia is largely due to the bad ventilation of the rooms in which they work, to the lack of exercise, and, in the case of pressmen, to the heat of the press-rooms. Compositors frequently suffer from dyspepsia and diarrhœa, and also from bronchial catarrh and phthisis. According to Tardieu, twenty-five in one hundred die of the latter disease. Pneumonia is common among them, and is likely to be severe. The habit of putting type in the mouth, leads to the formation of cracks and fissures of the lips, and small tumors on the inner surface, caused by the obliteration of the mouths of the follicles, which sometimes ulcerate and form painful sores. Lead-poisoning is very rare among them, but there are occasional cases of 'professional cramp.' Pressmen are said to suffer frequently from varices and heart disease."

Printers, from the sedentary character of their work, incline to keep the rooms hot; and being susceptible to draught, breathe much foul air if they are compelled to depend upon open windows for ventilation. Where this is the case, the windows should always be provided with a board piece to put under the lower sash, and so raise it as to let in air between the upper and lower sash, or should have an opening at the top and a hood or device for directing the cold air first upward to the ceiling and thus prevent draught.

Dr. Edward Smith has written a valuable report on the sanitary circumstances of printers in London. (6th Report Medical Officer Privy Council, 1863.)

He divides them into the following classes: Readers; compositors, who are remarkable for quickness and nervous excitability; pressmen, machinemen, and then warehousemen, who are essentially porters. Reading boys and boy machine-tenders are also spoken of.

In newspaper offices, the extra demands made by night work and by irregular hours, need to be given full consideration as increasing the tax and risk to vitality.

The *Reader* is necessarily more educated than the usual workmen and has often both literary and constrained labor to perform. In large establishments he must often be ready at hand with his correction, work rapidly, and at late hours. He is very apt to be put in some

corner closet or confined room, ill-ventilated, subject to draught from the opening and shutting of the door to his den. Many of them have a pale and overworked aspect, which comes from confinement and want of exercise out of door and all over the body. They often have headache, dizziness and eye affections, caused by their close reading and correcting of proof. They should have every advantage of light, warmth, pure air and a comfortable position, and should often change posture while at work. Many are forced into other occupations by the failure of their eye-sight. Careful periodical examination of the eyes by a skilled oculist, would save many of them form permanent disability or embarrassment. In a close observation had of one hundred for ten years, in London, in various leading offices, the average age at death was forty-five, and chest and nervous diseases predominated.

Compositors—These usually work standing, or varying occasionally to a high sitting postute for rest. The distribution of light for them, which should be mostly from above and on the left side, is often defective. We have generally found the rooms in which compositors work, illy-ventilated and dirty, because there is no thorough system of room-cleaning. It is of great service if, during meal hours, for a longer or shorter time, the windows are thrown open and the air changed. Tubes similar to the Tobin ventilator, communicating with the outer air and permitting of opening and closing, are often of service. During the time when the gaslights are used, there is less ventilation through the side and other apertures. In such rooms the air is often too moist, as shown by the rills on the inside of the window-panes, and thus the air is more oppressive. Often, by means of stair-cases, the upper rooms receive both hot and foul air from the lower ones, and so are more unhealthy. When the heating is by hot water or steam-tubes passing around the sides of the room, it is to be remembered that it is the air of the room, and not fresh air introduced from without, that is being heated, and that there is much more heat around the sides than in the center of the room. This is said often to give rise to rheumatism, and, to those who have one leg near the tubes, to the "printers' sore-leg disease."

Dr. Smith, after making many special facts as to health and disease, says: As to compositors, as a rule, I can arrive at no other general conclusion than that they are a "sensitive and not robust race, enjoying life in only a moderate degree, and not peculiarly liable to varied and acute diseases, but with a tendency to defective alimentation and

assimilation, and thence towards exhaustion of body and consumption." Short sight is common, and it is also commonly believed that "the conditions of the employment lead to habits of drinking." New type and case dust are also claimed as injurious—the former because the metal gets into the skin or mouth, and the latter as an irritant to the lungs. It is noticed that many printers keep at work with an amount of disease which would effectually disable a person exposed to the weather or engaged in more laborious occupation.

"Consumption is known universally to be the chief cause of death among printers." "It is about twice as prevalent among them as among the members of the whole community. What may be called stagnant heat, as well as foul air, greatly depresses the vital powers. The whole excess of death-rate over that of the general community is due to the unhealthy conditions in which they are placed, and to causes quite preventable." Both on account of the heat and of the consumption of oxygen caused by the gaslights, it would be a great improvement if electric light, properly shaded, could be introduced for all night work. Each room should have a thermometer.

Pressmen—The occupation of pressmen is more laborious and a more general exercise of the body. It develops most the right side of the body, and inclines to roundness of shoulder and constriction of the chest. The room is generally in one of the lower floors, and often lacks in light and ventilation. As the heat in the press-room is greatest at night, from the perspiration and the handling of the damp paper, there is liability to rheumatism or myalgia in some form.

Machine-Minders and Engineers work mostly in the basement or on the lowest floors, where bad air, dampness and the absence of light are unfavorable to health. We know of no special evils incident to their actual work. The boys who assist and remain long at the work are usually pale and lightly built, and do not grow rapidly. The place, the monotony of the work, long hours of labor and little change of posture are probably accountable for this. These and irregular or restricted sleep tell upon these more than adults. As a rule, a printer's office is a poor place for the growth and physical development of young persons.

The improper location of closets and urinals is found to be a great source of foul air in printing houses, as in many other close industries. Lime washing of all the rooms and painting of the rooms each year,

and a more special housekeeping care is greatly desirable, because the walls, as well as wood-work, become blackened and soiled, and light and color, as well as cleanliness, are important.

POTTERS AND POTTERY.

The diseases of operatives in clay and in pottery have been studied at various times and in different countries from the days of the learned Ramazzini, of Modena, to the present. But occupations and the modes of their pursuit have so changed that we have to confine our studies to those modern times which have to do with the introduction of machinery.

In the supplement of the Registrar-General of 1871, reviewing the statistics of ten previous years, Dr. Farr says: "The earthenware manufacture is one of the unhealthiest trades in the country. At the age of joining it is low; but the mortality after the age of thirty-five approaches double the average; it is excessively high; it exceeds the mortality of publicans (inn-keepers). What can be done to save the men dying so fast in the potteries and engaged in one of our most useful manufactures? Among the glass manufacturers the mortality is highest at twenty-five to thirty-five than among the earthenware manufacturers, but it is lower afterward."

Dr. Parkes, in his "Manual on the Personal Care of Health," laments that, "in the pottery factories where, as in metal trades, there is much dust, very simple plans, such as wearing, in certain operations, canvas masks or respirators, are never thought of," and that men "go carelessly on in the old way, letting ill-health come as if it were inevitable."

The most valuable report on the diseases of potters is that of Dr. Greenhow, made to the Medical Officer of the Privy Council (1860), Great Britain. Although the inquiry had special reference to lung disease, it fairly presents the various exposures which this industry involves. The observations were chiefly made in the well-known pottery district of Staffordshire, England.

A very careful census of population and comparison with other industries showed that "this class of operatives suffered a much larger mortality from pulmonary disease in proportion to its number than did others."

In pottery districts where the industry has long existed, the potters are short in stature and sickly in appearance. In Stoke and Wolstanton, this could not be attributed to poor dwellings or length of hours of work. As the female population is largely employed, good authorities have attributed it to poor care of children at home, poor housekeeping and general want of race vitality. There are so many departments in pottery, and so many kinds of work, that they cannot all be considered together.

The *Slip-Makers* are those who attend to the grinding and mixing of the clay, so as to form a dough suitable for handling. This work is often done in damp cellars, and causes rheumatism; the workmen get wet with the clay.

The *Mould-Makers*, who make the moulds upon which the various articles are shaped, use much plaster of Paris. There is much fine dust and, sometimes, excessive heat in the process of drying. Many of the workmen suffer from throat and chest irritation, ending in cough and bronchial expectoration. Cleanliness on the part of the workmen by the use of overclothing, proper ventilation and a thorough cleansing of the shops, so that dust would not be raised in moving about, would aid very much. As this matter of dust is so common a cause of irritation, we may notice it here as connected with many occupations. All devices that diminish the amount of dust are valuable. For this purpose, wet grinding is often resorted to. This is of great service in such industries as admit of its application. Thorough cleansing of the rooms and removal of all fine dust between the hours of work is a great advantage. Next to this, is the arrangement of fans, or some method of removing the dust, both from the person and from the room. Various forms of masks, respirators, etc., have been employed. Some of these are useful, but as most of them impede respiration, they are not acceptable to workmen.

The keeping of the mouth closed and breathing only through the nose, and the occasional cleansing and wetting of the nostrils by a sponge, is of great service. Those who thus manage, and several times a day clean the mouth and throat by cold water, very much diminish the evils of dust inhalation. Thorough washing of hands and face, and change of garments, on which the dust falls, is of much service. The habit of eating in the work room is not a good one.

Flat Pressers are those who roll out the dough to proper thickness and fit it to the mould. The material is wet when used, but the scrapings soon become dry and cover the floor and work benches with

dust. As boys are constantly engaged in carrying the various pieces for drying or baking, there is generally a great deal of this fine dust in the air, even when it is not visible. Proper ventilation and cleanliness are necessary. If the drying places are near, both the moulders and the boys suffer from the temperature. As much of the work is piece-work, and many employ their own assistants, evil sometimes comes from irregular haste.

Dish-Makers are less exposed to heat and dust than saucer and plate-makers, because the process is slower. *China flat pressers* are less exposed to heat, but a little more to dust. *Saucer and plate-makers* create much dust in giving an edge to the saucers after they have been dried in the stove. Intermittent currents of hot air strike the worker, and this, with the dust, is one of the causes of potters' asthma.

Hollow-ware Pressers are exposed to much of the same influences as the flat pressers. Both these and the hollow-ware pressers have their full share of dust, and somewhat constrained positions. The sameness of posture and motion needed, both by its constriction and routine, is wearing upon many of the constant workers in pottery.

Throwers suffer chiefly from their constrained position, and, if young, from the weight of the mass.

Turners, who turn into a complete form the ware formed by the throwers, are considerably exposed to dust, but not much to heat.

The *Sagger-Makers*, who make the saggers, which are to hold the ware to be placed in ovens, both in their forming and in their placing-in and removal from hot ovens, have both dust and extremes of temperature.

The *Placers or Oven-men*, who pack the ware in the saggers and afterward place it in the ovens, use sand or flint-powder, and are much exposed. The ware is drawn when the heat is very great.

Scourers are those who remove dust, sand and blisters from the work after baking. They are much in dust. Where there is flint-dust it is all the more penetrating. Biscuit scouring being a most hurtful operation, needs special provision. All these are directly in dust below their nostrils.

Handlers, who make or put on the handles to jugs, cups, etc., are

liable to suffer from heat and dust. Those who carry the ware have frequent changes of temperature.

Decorators, or those who engrave, print or paint, are often in close rooms, in constrained positions, and sometimes overheated by reason of the nearness of ovens or fires in which the work is dried.

Dippers, who dip the work into a liquid glaze, containing lead, previous to its final baking, are said to occasionally show the blue line and other signs of poisoning.

China Scourers respire the most irritating flint-dust, and seldom can work more than five years. All become asthmatical sooner or later. Other pottery workers, as in other harmful occupations, appear to resist the deleterious influence of their calling for some years and then break-down at middle age. Some form of flint is used in most ware, and its sharpness and hardness make it especially irritating to the lungs.

The only alleged effluvium nuisance connected with pottery which is recognized as affecting health, is that resulting from the process of firing. Ballard, in Part III. of his valuable papers on "Effluvium Nuisances," eighth annual report of the Local Government Board, 1878–79, (medical supplement,) includes this among his investigations:

"After being dried, articles of earthenware are subjected to their first firing in what is termed a 'biscuit oven.' When the ware leaves this oven it is in a hard but porous condition, termed 'biscuit.' It is on this ware that any pattern it is to receive is laid on. The pattern is printed with oil upon thin paper, and, being laid smoothly upon the ware, it is absorbed by the porous surface. The paper is now rubbed off and the ware dipped in its appropriate glaze, and when dry is fired in what is termed the 'glost oven.' The articles to be fired are first carefully packed in oval coarse boxes or deep trays, made of strong fire clay, and termed 'saggers,' which are piled one on the top of another in these ovens. After dipping in the glaze it is cleaned by rubbing, and in this process much dust arises. This glaze is made of lead, zinc, hydrochloric acid, clay, etc., which is chiefly injurious by reason of the lead it contains.

"Salt-glazed ware is fired sometimes in open kilns. 'The workman judges from the aspect of the contents of the kiln when it is in a proper condition for salting, and then salt is thrown in with a shovel,' at several points. An abundance of white fume escapes during the salting process, for about twenty minutes after each salting, and passes

off by the chimney. It is the smoke that, in ordinary pottery-making, (earthen-ware, china, parian-ware, etc.,) occasions nuisance. The stacks are not high and much of the smoke reaches the ground. The enamel ovens have still lower chimneys. This fouls the skin and clothing, is not good for the breathing apparatus, and, although not directly causing disease, is not favorable to good health."

The result is not so serious here, as soft coal is not generally used.

The smoke from salt glaze has a more special effect. It is acid and irritating to the organs of respiration, especially those of persons who are suffering from pulmonary affections. It is said to produce in such persons a sense of oppression at the chest, bronchial irritation and cough. The fume consists in a great part of salt, but it also contains hydrochloric acid. It is practicable to reduce very greatly any nuisance from pottery ovens and kilns, as has been done in many places in England. Both in the interests of workmen and of the people of pottery towns, there is need that wherever this becomes a nuisance it should receive sanitary attention.

All the facts as to the perils of this industry point to impalpable dust, constrained positions and sudden alternations of heat and cold, as the causes of shortened lives and of pulmonary diseases so common as to have made the "potters' asthma" a designation for a class of chronic ailments which kill many and are life-long to many more. These causes so far admit of removal or amelioration, and are so destructive in their character that the means of proper cleansing, ventilation and heating, the management of dust and the details of method should be closely inquired into. In no department in our State is there more need of close inspection and of such law as will relieve this skillful working class from evils alike destructive of life, of health and of prosperity.

SUMMARY OF REPORTS FROM LOCAL HEALTH BOARDS.

In October of each year a printed schedule of inquiries is sent to each local Board of Health in the State. The schedule of subjects is as follows:

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

Other subjects may be named under X, Y, Z. The subjects may thus be referred to by the letters.

If the sheet provided is not sufficient, add others, marked with the letters.

In addition, Circular XXXIX., to be found in this report under the heading *Circulars*, with its suggestions and questions, is sent to each Assessor for the Board, and should be now referred to by the reader. It is not necessary to repeat each year these reports, but to select from them such parts as the Board may deem of local or general value for publication. Those from which no abstracts are made often contain information of value to the Board, and such as much aids in correspondence. While some Boards exist only in form, others are very efficient. Sometimes the Assessor or Board Physician shows great diligence in promoting the general health, and in informing

themselves as to local causes of disease, where other members of the Board give it little attention. Like school trustees, such persons are of very great service to the communities in which they dwell. By reading and observation they come to recognize sources of disease, and often, by advice and suggestion, appreciate the health of the community.

No one can carefully read over the summary we here present without seeing the value of such inquiry and observation, and the careful reader will, from it, obtain many hints as to the work which Health Boards can accomplish. We place the report of the Health Board of Paterson out of its regular order, and give it nearly in full, because it is so near to furnishing an outline of what city health administration is or should be. Other examples will be found in the summary of local Boards of smaller precincts, which are doing much to oversee and regulate the local health interests. The yearly reports we now have in hand cover almost every township of the State, and give most valuable information as to all the topics embraced in the schedule of inquiry.

FIRST ANNUAL REPORT OF THE BOARD OF HEALTH OF THE CITY OF PATERSON.

October 1st, 1883.

EZRA M. HUNT, M. D., *Secretary State Board of Health:*

Organization.—The Board of Health of the city of Paterson was established under the provisions of the State laws relating to the public health, by an ordinance passed by the Board of Aldermen November 13th, 1882. On the same date, the Mayor, David T. Gillmor, Esq., nominated Dr. Elias J. Marsh, Dr. John Quin, Mr. Henry L. Butler, and Mr. James Beggs, who, with the Health Inspector, the City Physician and the Registrar of Vital Statistics, should constitute the Board of Health. The Board organized on November 16th, 1882, by the election of Dr. E. J. Marsh as President, and the adoption of rules for its government. Mr. Henry L. Butler was elected Secretary *pro tem.;* subsequently Mr. John J. Warren was elected Clerk, as required by the State laws, and Secretary, as required by the city ordinance. Dr. William K. Newton was appointed Health Inspector for three years.

Work of Board.—Among the first acts of the Board was the adoption of "An ordinance respecting contagious diseases." This was made necessary by the existing epidemic of small-pox. Subsequently an ordinance concerning nuisances, one relating to the food-supply and one concerning tenement houses, were adopted. These ordinances, the result of much study, not only point out and prohibit violations of sanitary laws, but serve the purpose of educating the people in matters pertaining to the health of the city, and, although not perfect, have proved of great value. They will be amended, from time to time, as may seem necessary, and will finally be made into a code.

Meetings.—Regular semi-monthly meetings, to the number of twenty-three, have been held during the year, and special meetings were called when necessary. Early in the year, the time of the Board was mostly taken up with the management of the small-pox epidemic, the care of the city hospital, public vaccination and like duties. As a brief resume of the year's work will be given further on it need not be referred to here.

Rules of the Board—Meetings.—Regular meetings of the Board of Health shall be held on the second and fourth Tuesdays of each month, at 8 o'clock P. M., unless otherwise ordered.

Quorum.—A majority of the Board shall constitute a quorum for business.

Committees.—The standing committees of the Board shall be four in number; shall consist of three members each, and shall be appointed by the President. The standing committees shall be as follows: Sanitary Committee, Law and Ordinance Committee, Finance Committee, and Conference Committee.

Sanitary Committee.—To the Sanitary Committee shall be referred all subjects of a scientific or medical nature, and it shall supervise the vital statistics and mortality reports.

Finance Committee.—The Finance Committee shall audit all bills and accounts.

Conference Committee.—To the Conference Committee shall be referred all business with the Board of Aldermen.

Law and Ordinance Committee.—To this committee shall be referred all subjects of law and ordinances.

Order of Business.—1. Reading of Minutes; 2. Report of Standing Committees; 3. Report of Special Committees; 4. Reports from City Counsel; 5. Reports from Police Department; 6. Report of Health Inspector; 7. Communications from other sources; 8. Resolutions; 9. Unfinished Business; 10. New Business; 11. Hearings.

Resolutions.—All resolutions shall be submitted in writing.

Hearings.—Any person feeling aggrieved at the official action of the Board or any of its members, or of the Health Inspector, shall be entitled to a hearing before the Board. *Office Hours.*—9 A. M. to 1 P. M., and 2 P. M. to 4 P. M.

Expenditures.—No expense shall be incurred by any member or officer without an order of the Board, but in emergency expenditures may be made to the amount of $25 upon an order signed by the chairman and one member of the Finance Committee.

Reports.—The Health Inspector shall make a report at each meeting; the Registrar of Vital Statistics shall report monthly, or when otherwise required.

Permits.—1. All permits authorized or required by ordinance of this Board shall be given in the name of the Board.

2. The Health Inspector is authorized to grant permits under sections 3, 4, 5 and 8 of the ordinance respecting contagious diseases, and under section 8 of the ordinance concerning the food-supply, and under section 17 of the ordinance concerning nuisances; he shall record the name, residence or the place of business of the applicant, and the character of the permit granted; he shall also report to the Board all permits granted or refused.

3. All other permits required by ordinance of the Boord shall be issued upon orders from the Board, and shall be countersigned by the Secretary.

4. Applications for permits under sections 1 and 10 of the food ordinance, and under sections 7, 8, 9 and 12 of the nuisance ordinance, shall be made in writing to this Board, and the Health Inspector shall inspect the business, matter or thing for which the permit is sought, and shall report to the Board at the next regular meeting the result of such inspection. All permits provided for in this section shall be issued and signed by the Secretary.

5. The Secretary shall keep a record of all permits granted by him and of all applications in case of refusal, including the name and residence, or place of business, of

each applicant, the date of the application, the business, matter or thing for which the permit is asked, and the action of the Board, if any, thereon, and such facts as may be necessary for a complete record of each application.

6. Permits when granted shall be good until revoked, but any permit may be revoked by the Board for cause.

7. *Cows*.—No more than one cow shall be allowed to be kept on any city lot on which a residence is built, and no cow stable shall be built at a less distance than fifteen feet from any house.

8. *Goats*.—When a permit to keep goats may be granted, it shall be understood that such goats shall be either kept within the premises described in the application or tethered on pasture, and such proviso shall be stated on the permit.

Contagious Diseases, Management.—1. A notice of infectious disease being received, the Health Inspector shall at once visit the house or put himself in communication with the reporting physician, as he may deem necessary; he shall see that the family receives the printed circular of the Board giving necessary instructions regarding the danger of contagion, the method of disinfection, etc. He shall keep observation of the case until its termination.

2. The Secretary shall notify the Board of Education, or the principals of private schools which the sick children may attend.

3. The Registrar of Vital Statistics is required to notify the Health Inspector whenever a certificate of death from scarlet fever or diphtheria is received by him.

4. The Health Inspector may give a permit allowing the children to attend school, after he is satisfied that there is no reasonable danger of carrying the disease; he shall give no such permit, however, in less than thirty days from the beginning of the sickness, unless the case may have been terminated by death or removal of the patient from the house, and in such case he may give a permit as soon as the house shall have been fumigated.

5. A suitable person shall be employed by the Board to take charge of disinfection and fumigation, under orders from the Health Inspector; he shall, when required, visit houses infected with contagious diseases, and instruct the family in the method of disinfection. At the termination of the case he shall disinfect the house or the room infected.

(NOTE.—Exposure of the corpse or public funeral is forbidden by ordinance.)

Expenditures.—The Board was under great and unusual expense during the months of November, December and January; the city hospital and the various measures necessary for the checking of the small-pox epidemic were a constant but unavoidable drain on the treasury, but the demands were liberally met by the city government. From November 17th, 1882, to the end of the fiscal year, March 20th, 1883, expenditures were made to the amount of $5,153.49.

Appropriation, 1883-84.—An appropriation of $3,500 was placed to the credit of the Board, for expenses during the fiscal year ending March 20th, 1884.

(Although this report is made for the year ending September 30th, 1883, it must be remembered that the time covered by it is but ten and one-half months. The work, as previously stated, did not commence till about November 17th, 1882.)

Nuisances.—During the time embraced by this report 529 nuisances have been abated. These nuisances were caused by filthy privies, cesspools, gutters, yards, or some one of the numerous forms of filth. It does not seem necessary to particularize the different varieties, but the aggregate will give an idea of the amount of work done, The following method is employed in the abatement of minor nuisances:

In no case is a report accepted without investigation by the Health Inspector, some

employe of the Board, or a police officer. It was early learned that complaints made by people were, in a large proportion of cases, unreliable, and that the Board was to be used for purposes of revenge, or to aid in a landlord-tenant fight, or to assist in some neighborly contest.

Not ten per cent. of the nuisances abated were discovered by reports made to the Board by tenants or others, but house to house inspection by the Inspector or notification by police officers revealed the cause of ill health or annoyance.

An inspection of the premises having been made and the nuisance discovered, a notice is sent to the responsible person requiring him to cause the abatement thereof within a stated time. An exact copy of the notice is kept in the office, together with notes as to when the time expires, etc. At the expiration of the stated time a re-inspection is made. If the nuisance has not been abated a complaint is immediately filed with the Recorder, who issues a warrant for the arrest of the culprit. When brought before the Recorder, the defendant is directed to attend to the order of the Board, or a light penalty is imposed.

In the case of filthy privy-vaults or cesspools, no re-inspection is necessary, for a permit is required before the scavenger can empty a vault; the stub of this permit records the date of abatement and hence checks off the notice sent.

All notices quote the section of the nuisance ordinance that is violated, thus informing the person notified just what is expected of him.

As to complaints, not more than thirty have been filed before the Recorder, and fines not to exceed fifty dollars in all have been imposed. A rigid system of inspection and close watching have enabled us to insure the abatement of nuisances without much litigation. But two trials have been held during the year.

Privies.—Of all the forms of filth which we have to combat, the stored-up filth in privy-vaults is the most annoying and probably one of the most fruitful causes of ill health, and we shall have accomplished a great deal towards making the city healthful when we shall be able to limit, or prohibit, the use of the leaching vault. It has been the custom in Paterson, heretofore, for persons to manage matters of this kind as their ideas of economy or convenience might suggest, and it will take a long time, and compulsion will have to be employed, to remedy this great evil that has existed for the past thirty or forty years.

Of the 7,000 vaults in the city, we venture to say that not more than 500 are water-tight, properly constructed or emptied at frequent intervals. All kinds, sizes and forms are in use, from a hastily-dug hole in the ground to an elaborately-constructed vault, with its walls built up without cement or mortar, with a porous bottom, and all in a more or less filthy condition.

Sections of the nuisance ordinance regulate the building of vaults and require that no vault shall be constructed of any material except brick; shall be at least eight inches thick; shall be water-tight, and shall not be more than six feet deep. It is also provided that the filth shall not be permitted to rise within two feet of the top of the vault. These restrictions have accomplished much good, but we are compelled to acknowledge that we have not yet made the advance we had expected or desired. We feel that we should have increased power to pass ordinances regulating the capacity, the construction, the method of emptying and the frequency of emptying vaults. The nuisance ordinance does not cover the subject, for too much time is consumed in the work of inspecting, and it should be the rule that all vaults should be cleaned at least once each year.

Much of the time of the Inspector has been taken up in his endeavor to abate this great nuisance, and, notwithstanding the fact that 782 vaults have been emptied this

year, there yet remains vast quantities of filth capable of polluting the air and the ground and rendering them hurtful.

To give an idea of the neglect that has prevailed we will state that many vaults had not been cleaned in five, ten and even fifteen years, until ordered emptied by the Board. Without dilating more on this subject, we will state that some rigorous method must be adopted to enforce cleanliness.

Paterson being situated in the center of a rich farming country, it seems necessary that the enormous quantities of organic waste of its 56,000 inhabitants should, to a certain extent, be restored to the land, else the farms be impoverished. Hence, for economic reasons alone, the compost should not all, even if it were possible, be disposed of by water-carriage. At least 18,000 of our population have no sewerage provided for their use, and there must, therefore, be frequent removal in order that a nuisance be not created. This we think possible, if frequent removal be insisted on and made compulsory. Perhaps the city might be induced to take charge of this, as is done with the garbage.

Cesspools.—The number of cesspools in the city is not large. Probably the First and Second wards, where but few sewers are laid, suffer more than the rest of the city from this evil.

The Board, by a vote, discountenanced the building of cesspools, and argued that it was better to allow the slops to flow into the gutters, where it could be washed away either by the rain or flushing, than to encourage the storing up of liquid filth on the premises. Cesspools are placed under the same restrictions as privies, and must be emptied by an odorless excavating apparatus.

Scavenging.—We found scavenging conducted on the usual primitive plan; that is, removal in carts at night, with little or no precautions. An ordinance was adopted requiring the odorless apparatus to be used in all cases where possible, and when that could not be done, tight-covered barrels are insisted on. No vault or cesspool may be cleaned without a permit from the Board. This serves as a check on the work, and serves to record the amount of work done. An improvement, which seems important to us, was introduced, that was the granting of permission to do this kind of work by daylight, for the reason that the work would be more thoroughly done and subjected to proper supervision. Not only was permission given to work during the day-time, but it was encouraged, and now nearly all vaults are cleaned between 6 A. M. and 8 P. M.

Cattle.—The evils arising from the herding of a large number of cattle in the built-up portions of the city were soon recognized, and ordinances and rules were adopted leading to the checking of this practice. It was argued that not only was this a serious nuisance, but that the health of the cattle was impaired, and the milk-supply rendered either dangerous or poor in quality.

These facts being taken into consideration, the following sections of an ordinance were adopted:

No person shall keep cattle in the city without a permit, and no person shall keep a greater number of cattle than is stated on a permit. No permit is granted to keep more than one cow to a city lot (2,500 square feet) on which a dwelling-house is built, and no cow-shed shall be nearer than fifteen feet to a dwelling.

There was more resistance offered to this action of the Board than to any other measure adopted. Many people had collected cows around their houses for years, and did pretty much as they pleased. It was found, on inspection, that as great a number as seventeen were stabled on a city lot, on which was a dwelling-house, sheds and other outhouses. Ten was a frequent number.

The applications for permits were rigidly and carefully scrutinized by the Board, and were only granted after inspection. About 139 permits to keep 361 cows have been granted, and permission to keep 150 head of cattle refused.

Swine.—Only five permits to keep swine have been granted.

Fowls and Goats.—326 permits have been granted to keep fowls or goats, after inspection of the premises, with the proviso in each case that if any nuisance is caused the permit shall be revoked. Permits for goats are only allowed when the applicant promises to keep the animals within an inclosure or tethered on pasture.

Garbage.—The collection of ashes and garbage is made twice each week in the summer, and once a week in the winter, by the city carts. About $8,000 was spent in this work during the year, and a like appropriation has been made for next year.

The garbage and ashes, which are generally mixed, are dumped upon low land and sunken lots within the city limits, large areas of land having been leveled by this method. Part of the land thus made is indicated by red × × × on the accompanying map.

Knowing that land thus made is not fit to be used for building sites—at least for years to come—the Board has strenuously labored to stop the dumping of refuse organic material in the city, and in this it has been partially successful, and now more care is observed in the choice of dumping grounds.

Many methods of remedying this difficulty have been talked over; the separation of the ashes from the garbage by the householder has been advocated, but this will be almost impossible to carry out in the tenement-house districts. Even if separation was carefully done, the disposal of the garbage would still present obstacles to a proper working of the plan. Cremation has been mentioned, and has the indorsement of the Board. This is done in Leeds, Manchester, and other English cities, and no doubt a "destructor" would work well in Paterson. It would probably cost $10,000 for the plant for a city the size of ours.

If each family would burn its own organic waste—which readily can be done daily—the problem would be solved, and the ordinary inorganic refuse of the household could easily be disposed of.

Slaughter-houses.—Three applications have been made to the board for permission to maintain slaughter-houses; one permit was granted, one refused, and the other application is now before the Board.

Careful inspection is made in each case, and when there is the least possibility of a nuisance being created, or where there is no proper arrangement for the disposal of blood and offal, the permit is refused.

At present, at least eighty per cent. of the meat-supply comes from Chicago, already dressed, in refrigerator cars, and very little slaughtering is done here. A few beeves, calves and sheep are killed by the local butchers.

The offal from the butchers' stores is collected by one man, and the work is done only in a passable way. The regulation of the trade is now under discussion.

Kerosene.—The sale of illuminating oil has been closely watched. Forty-five samples, collected from all parts of the city, have been examined, and all proved to be of good quality. Much of the oil sold is of the highest grade.

The State law regulating the sale of kerosene has certainly done much good.

Water-supply.—Our water-supply is derived from the Passaic river, wells and cisterns. We have endeavored to estimate the proportion of the population using water from each of these sources, but only approximate figures can be given.

From notes furnished the writer by the Superintendent of the Passaic Water Com-

pany—a private corporation, owning the water-works—it appears that about 3,500 takers, or houses, pay for water, many factories and dye works being included in this estimate. As one dye works alone takes water from four 4-inch pipes, it can be seen how futile it is to calculate the amount used per capita.

But we may safely say that about 35,000 people use the Passaic water for domestic purposes, and that about 100 gallons per head per day are consumed. The remainder of the population depend on wells, cisterns being used by a very few people.

As to the quality of the water, from the sanitary standpoint, it can be said that the Passaic water is all that can be desired. This opinion is not rashly formed without good foundation, but it is the opinion of Professor Cook, State Geologist, Professor Leeds and others. The analyses made by Leeds and others show that the organic ingredients indicative of pollution are in very small quantities. In fact, there is no source of pollution above the point at which the water is taken to supply the city except the town of Little Falls. This is a small manufacturing town, about three and one-half miles above us, with no sewer system, and discharging into the river little organic waste and moderate amounts of refuse from dye works.

Between the two places the river runs a tortuous course, and ample opportunity is offered for the oxidation and dilution of any organic matter put into it. For the future, when Little Falls shall increase in size, we cannot speak.

We are now anxiously watching the encroachments of our city on the banks of the river above the pumping station, for contamination from that source is feared. Not a little trouble has been caused already by the slop-water flowing down the sloping streets in the western parts of the city into the river, but this has been checked by vigorous measures carried out by the Board.

During the continued hot weather of July and August the water sometimes has a disagreeable odor and taste. This is due to the fact that some of the lower forms of vegetation are killed if the temperature of the water rises above 60° F., and some days it rose as high as 70°; but we are unable to trace any sickness to this trouble.

The water company does its work to the satisfaction of the consumers, and tries to keep up with the demands.

Of the public wells we cannot speak with the same degree of confidence.

At least 15,000 people depend on wells for their drinking-water. The Board has prepared a list of the public wells—that is, wells cared for by the city government—and it is found that there are 102; private wells, if added to the list, would no doubt swell the number to four times that given.

The city spends from $1,300 to $1,500 each year in the care of public wells and pumps.

In considering this subject, the large area of the city and the sparsely settled suburbs where the water mains are not laid must be thought of, and due allowance made. But there is no excuse for the existence of wells in parts of the city thickly populated and supplied by the water company.

It is only the obstructive conservatism of many of our people that will explain the adherence to old and polluted wells, and this class resist all interference with the water-supply that they have been satisfied with for the past fifty years.

Constant agitation of the subject, with unimpeachable evidence, will do much towards closing the dangerous or doubtful wells.

The public wells are, as a rule, located under the sidewalks and on a line with the gutter, where every opportunity is offered for the inflow of surface-water and slops, and the filth-sodden condition of the ground in the older parts of the city, the leaky sewers and leaching privy vaults and cesspools offer the best chances for the wells to become polluted with filth. That there is not more sickness directly traceable to the use of city well-water, can only be explained by the fact that a certain degree of filth contamination seems necessary before a water is made dangerous.

We are watching this subject very closely, and are prepared to close all wells unfit for use. The Health Inspector is now at work, making analyses from time to time, so that we shall know just where to look for pollution.

Food-supply—The markets were watched for some time to stop the sale of unsound meat. About 1,500 pounds of immature veal and 2,000 pounds of unsound beef were seized. The work has lagged, however, because of the difficulty of obtaining a competent man to take charge of meat inspection. The system of inspection will be resumed this fall.

Milk.—The milk-supply of the city has been so closely watched, for the past three years, by the State Inspector of Milk, that it is now in a very satisfactory condition. The milk law has done much good here.

A book is now kept in the office of the Board, in which the name and residence of the dealers, and the source of milk sold, are recorded. It is our intention to note the result of inspection, the breed and condition of the herd, the feed used and other facts of value. There are about 120 dealers now recorded, and the history of each is more or less known. It would be a wise provision if local Boards were empowered to compel the registration of dealers.

Tenements.—The inspection of tenement houses has not been done systematically, cases of flagrant violation of sanitary laws only being noted. According to the United States census of 1880, there were 6,712 dwellings in Paterson. This number has been increased to at least 7,000, for probably 400 new buildings were erected in 1881, 1882 and 1883.

A glance at the accompanying table will give an idea of where Paterson stands respecting the population of each dwelling:

City.	Persons to Each Dwelling.	Dwellings.	Number of Families.
Camden	5.05	8,246	8,772
Philadelphia	5.79	.....	.....
Newark	7.26	18,796	28,386
Paterson	7.60	6,712	10,679
Jersey City	8.59	14,049	23,957
Hoboken	11.50	2,695	6,717
New York	16.37	.....	.....

It will be seen that our city stands about midway between Philadelphia, the city of homes, and New York, with its overcrowded tenement houses.

The number of overcrowded houses is small. Two-story dwellings predominate, occupied in many cases by the owner, who rents one floor to a tenant. There are a few tenement houses built on the plan of a great city, with little land to spare, and we regret that the tendency to erect houses on this plan is rapidly becoming popular with landlords. As land in the center of the city increases in value the proportion of high buildings, with but little surrounding ground, will multiply.

There is a vast amount of work for the Board to do in this line of sanitary reform. Our tenement house ordinance is but a feeble attempt at legislation and will be perfected soon.

Sewerage.—The accompanying report of the city officers for the fiscal year ending March 20th, 1883, contains the report of the City Surveyor. By reference to his

report (page 97) it will be seen that 21.67 miles of sewers had been laid prior to that date, since then enough has been laid or contracted for to swell the total to 24.50 miles. The reports also give the sizes, shapes and material of the sewers. I have roughly indicated on the accompanying map, in blue lines, the situation of the principal sewers and the points at which they discharge.

The Broadway sewer, now under contract, will be of great service to the city. It is about one mile long, and the greater part of it runs through either swampy, water-soaked or undrained land. The easterly portion of the city, through which it passes, has been noted for the prevalence of malarial troubles. This has checked the growth of what will, in the future, be a popular section for the better class of homes. We venture to predict that, within two years, the ground will be thoroughly drained by this sewer and rendered salubrious. This opinion is based on our experience with the sewer laid about two years ago in Clay street. The neighborhood through which the latter sewer runs was swampy and water-soaked. To-day the land is comparatively dry, and will be built on in a few years.

The Second ward, with a population of 6,000, has no sewers, and, in the First ward, (population 5,500,) only a few short sewers have been laid. These two wards are in danger of soil pollution from the privy-vaults and cesspools.

The First ward has been mapped, and sewers will be laid as demanded, or as the finances of the city will permit.

The Second ward sewerage system will be a problem hard to work out, for the district is mostly on very high ground and on a line with the river above the pumping station. Hence, careful plans will have to be devised to carry the sewage below the falls.

The sewer system of this city is being very carefully mapped out, and we shall not again make the mistake, as was done years ago, of building them too small to carry off the surface-water. The rainfall in Paterson is enormous at times, and this was not taken into consideration when some of the older sewers were built.

The government desires to build carefully and within its means, without placing too heavy a debt on the city. All our sewers discharge into the Passaic river within the city limits. The river at present, at ordinary flow of water, is capable of taking care of the sewage, but during a drought it is pressed to its limit. An interesting question for the future to decide is how long will the river take up the filth poured into it and when will its saturation point be reached? This vital question we will not here debate, but at some future time it will be taken up for discussion.

House Connections.—As a rule, house connections with sewers are very carelessly made. The work is generally done by laborers, without supervision, and the sole object seems to be to get the job done as quickly as possible, ignoring all ideas of perfect workmanship.

Connections are made by means of six-inch earthenware or cement pipes, and join the main sewer at varying angles.

To give an idea of the lack of care prevalent in this important work, we will mention two cases brought under our notice. In one case, the workman could not find the stub on the sewer, and, being too lazy to get information from the proper person, he started the house-drain at the side of the sewer and filled up the trench. The reason why the waste from the house did not run off was discovered six months after the drain was laid. In another case, the laborer encountered a bowlder in the trench, and, for economy, this was not moved, but a piece of the drain was laid on each side of the stone. This was not discovered till months after.

The pipes are put into the trench without system, without alignment, without making joints, in short, in any way to get the job done and the trench filled up.

It is recognized that something should be done, but there appears to be no authority to take charge of the work.

The Board of Aldermen conferred on this Board power to order connections with the public sewer when necessary for the public health. Over 200 have been ordered, but we have no authority to superintend the work or regulate the quality.

Plumbing.—It was well known that the plumbing in the houses, and that being put in, was faulty, or even dangerous to health, and a series of recommendations, embodying the best plans for house-drainage, were adopted by the Board, published in the newspapers, and a copy sent to each plumber. This did a little good, but compulsion seems to be necessary in order to insure good workmanship.

All houses of any pretension now building in the city, and about 250 houses already built, have been inspected by the writer, and he regrets to say that in but one of the new houses were the recommendations followed out, and in all the older houses the plumbing was faulty or dangerous.

It is the opinion of the Board that it should have power to compel the registry of plumbers, to regulate the plumbing construction, to require plans to be submitted to it, and to enforce a system of safe plumbing and drainage. This opinion is indorsed by about twenty plumbers, who need protection from dishonest or unskilled competitors.

Infantile Diarrhœa.—Diarrhœal diseases among the children were very prevalent in August, and twenty children under five years of age died therefrom in that month.

A circular was prepared, giving rules for the management of children during the summer months. 8,000 copies, printed in English and the Holland language, were distributed.

Contagious Diseases.—Rules for the management of cases of contagious diseases, adopted by this Board, are given in a former part of this report.

The general plan pursued with cases of scarlet fever and diphtheria is as follows:

Notice from the attending physician being received, the name, age and address of the patient, and the name of the disease, are entered in a book kept for that purpose. If the patient is a pupil at a school, the principal is immediately communicated with, by means of telephone, and all members of the family, and, in some instances, all children in the house, are kept from school. The Health Inspector then visits the house, or communicates with the attending physician, as may, in his judgment, suffice.

A circular, giving instructions as to the contagious nature of the disease and as to the methods of disinfection, is sent to the house.

Upon recovery of the patient—but never under thirty days—the house is fumigated and a permit given to attend school. In case of death, public funeral is forbidden, and the undertaker is instructed either to place the body in an air-tight coffin or to wrap it in a sheet saturated with a solution of sulphate of zinc, and not thereafter expose it under any circumstances. The house is then disinfected.

This plan has been pretty closely followed out, but we are not yet in a position to state whether or not it has done any good, or checked the spread of these diseases.

The physicians, without exception, are very careful to report cases and deaths, and not a solitary instance of refusal to report can be noted. We have never heard from a physician a complaint as to compulsory notification.

If any case has not been reported, it can be accounted for by lack of care or because it was not seen by any physician; in either event, the board is pretty certain to hear of it from a neighbor, so that we think the record is quite complete.

The writer is of the opinion that not much can be done to prevent the spread of

scarlatina and diphtheria until we treat the cases as we do those of small-pox—that is, isolate, quarantine, or remove to a hospital. This cannot be done here for two reasons—public opinion does not reach that pitch, and we have no properly appointed hospital to which cases can be taken.

Measles.—No attempt is made to manage measles, because we recognize the impossibility of limiting the spread of that extremely contagious disease.

The only restriction placed on these cases is to keep the children in the family out of school until complete recovery.

Cases Reported to the Board.—(The system of notification was first employed on November 26th):

Scarlet Fever.—1882, December, 8 cases; 1883, January, 14 cases; February, 13 cases; March, 19 cases; April, 40 cases; May, 48 cases; June, 26 cases; July, 30 cases; August, 34 cases; September, 45 cases. Total, 277 cases. Deaths, 29.

Diphtheria.—1882, December, 1 case; 1883, January, 7 cases; February, 4 cases; March, 1 case; April, 4 cases; May, 8 cases; June, 0 case; July, 1 case; August, 6 cases; September, 10 cases. Total, 42 cases. Deaths, 5.

Small-Pox.—Paterson has had a dire experience with this disease, but so recent is its history that we do not feel called upon to relate it at any length.

Prior to the formation of this Board, November 16th, 1882, there had been 138 cases in the city, extending over the time from July, 1882, to that date.

Coming as it did when the city was unprepared for it, and when the machinery for its management was not complete, it made rapid headway. The people were fully persuaded that the Board of Aldermen was not the proper body to legislate on public health matters, and, yielding to the press of opinion, the Board of Health was formed.

When this Board was organized, measures were immediately taken to rid the city of the epidemic.

The city, when the epidemic burst upon it, had no hospital, save a small building capable of accommodating about eight patients, and, under the press of circumstances, a larger hospital was built. This has been somewhat modified and rebuilt upon plans furnished by this Board, and although it is not what we would have erected, yet it answers its purpose very well.

The hospital buildings are at the extreme northwesterly limit of the city, and are built of wood.

The main hospital building will accommodate comfortably about eighteen patients. Ventilation is provided for by means of sheet-iron tubes surrounding the stove-pipe and passing up through the roof; also by an arrangement fixed on the window-sash. We found this to work well.

The city is now better provided with hospital arrangements than ever before, and if money was furnished the hospital could be used for the treatment of other contagious diseases.

The following number of cases of small-pox were noted during 1882 and 1883: Prior to the formation of the Board, 138 cases; November, 1882, 13 cases; December, 1882, 31 cases; January, 1883, 3 cases; sporadic case from Philadelphia, April 15th, 1883, 1 case. Total, 186 cases.

Deaths.—August, 1882, 1; September, 14; October, 11; November, 9; December, 2; January, 1883, 1; April, 1. Total, 39 deaths.

A brief account of the method of managing a case may be of interest:

A notice being received, the Health Inspector immediately visited the house. If the case could safely be isolated in the house, arrangements were made for strict quarantine, and the family were made to understand that it was only by favor that the patient was allowed to remain in the house and not be taken to the hospital. They were also informed that any breaking of quarantine would be followed by quick punishment. Quarantine at home was only allowed where but one family occupied the house.

Every person in the house, except the sick, was immediately vaccinated. As a rule, two insertions were made, and the people in the neighborhood were offered free vaccination. A placard was placed on the house, warning all not to enter or leave the house, except the attending physician and the Health Inspector.

Upon recovery of the patient, he is given a thorough bath and new clothes are put on. The bedding is removed in the ambulance to the hospital grounds and burned; sheets, blankets and underclothing are soaked in a solution of sulphate of zinc, the room and all the clothing are then fumigated by burning sulphur for twenty-four hours.

If it is impossible to isolate the patient at the house, the ambulance is immediately sent for and he is removed to the hospital, together with the bedding. Any clothing left in the house is disinfected with the zinc solution, and the house fumigated with sulphur. All in the house are vaccinated and also persons in the neighborhood, and strict watch is kept of the premises until the period of incubation has passed.

When the patient recovers he is treated as before stated.

In case of death the corpse is wrapped in a sheet soaked in a solution of sulphate of zinc and salt, and buried as soon as possible.

This method worked admirably and no extension of the disease took place from house to house.

Vaccination.—Two reputable physicians were employed, at a salary of $100 a month, to visit every house in the neighborhood of small-pox cases, and more than 4,000 were carefully vaccinated and re-inspected at the end of eight days. A complete record has been kept of all vaccinations done under authority of the Board. This record includes name, age, address, whether primary or secondary, how long since vaccinated, the virus used, and the result of the vaccination.

Virus Employed.—We used only virus bought from Martin and the New York Health Department, and got excellent results. Much of the success can be accounted for by the care with which the work was done. Ninety-six per cent. of primary vaccinations were successful.

Sporadic Case.—A case occurred in April, in the person of a man from Philadelphia, whose family had but recently come from the small-pox hospital in that city. The origin of this case we never satisfactorily traced, but there are no doubts that there was carelessness in disinfecting the bedding at Philadelphia.

The man had hemorrhagic small-pox and died on the second day of the eruption. No second case occurred.

We have thus briefly sketched the rules by which we work, for they have proved of great service.

Vital Statistics.—We regret that the Bureau of Vital Statistics is under the control of the city government, and the books and returns are not available for our use. The Registrar is very obliging, but, as he is not a physician, he is not competent to elaborate the returns so as to be of any benefit to us. We must refer you to the returns sent you by him.

Area of Paterson, 8.36 square miles; 5,357 acres. Area built on, not one-half. Latitude, 40° 55′ N. Longitude, 74° 10′ W. Elevation above sea-level at Sandy Hook, (at City Hall,) 87 feet. Population, census of 1880, 51,031. Estimated population, October, 1883, 56,500.

Our relations with the other branches of the city government have been harmonious, and we have received valuable aid from the Police Department.

We have been fortunate in securing for our clerk, ex-Recorder John J. Warren, who, from his large acquaintance with people and places, has been of inestimable value and has aided us greatly.

Recommendations.—We would recommend to your Board that a supplement to the health law be drawn up and introduced in this winter's Legislature, giving local Boards the following powers:

1. To ordain regulations for the construction, location, emptying and maintenance of privy-vaults and cesspools; to require emptying at stated intervals.
2. To ordain regulations for plumbing and drainage and sewer connections, and to require the registration of plumbers.
3. To require registration of milk dealers.
4. To close public wells if water is contaminated.

In closing, we will state that this report has only aimed at giving an outline of the work done. We feel that many of the subjects noted require two or three years more study before an authoritative opinion can be expressed thereon. Hence, the schedule sent by your Board has not been closely followed, but we hope in the future to take up several of the topics and exhaust them.

With this report we send the following: 1. A rough map of the city relating to some matters touched on in this report. 2. Copy of the ordinance of the Board of Aldermen establishing the Board of Health. 3. Copies of ordinances of the Board of Health. 4. Copies of blanks used by the Board. 5. Copies of circulars of information issued. 6. Copy of report of city officers for 1882–83. 7. Copy of report of Board of Education for 1882–83.

All of which is respectfully submitted,

WM. K. NEWTON,
For the Board of Health of the City of Paterson.

Paterson, October 11th, 1883.

ATLANTIC COUNTY.

ABSECON TOWNSHIP. - *Report from* E. H. MADDEN, M.D.

No contagious diseases have appeared in town this year, and it has been exceedingly healthy throughout.

The cellars are dry; no water ever appears in them. It is presumable there is no better locality in the State for cellars than in this place.

ATLANTIC CITY. *Report from* JONA. J. COMFORT, M.D., *Secretary.*

Two-thirds in number of the smaller cottages are using cistern-water. A small number rely upon wells. The remainder, including nearly all the larger hotels and cottages, are supplied with potable water, brought from the main-land and distributed through the city in cast-iron pipes. An iron stand-pipe, 132 feet high and 25 feet in diameter, (capacity, 500,000 gallons,) maintains an equable pressure of 60 pounds to the square inch, a pressure available for fire purposes. This water is supplied by a company. It is clear at all times, and soft, being remarkably free from both organic and inorganic matter. Its source is from strong springs, reached by sinking a well thirty feet in diameter and thirty feet deep. This supply, ordinarily ample, can be augmented at any moment by drawing from a neighboring stream of pure water. The water has no taste of iron or other mineral. The pipes are cleansed at proper times.

Atlantic City relies upon surface-drains for surface-drainage, assisted by a few underground conduits. For sewage proper, a complete system of sewers is now under construction, to be built and operated under the West patent. The sewage of the city is to be collected into a large well, and thence pumped to a distance of four miles to a station, where the whole is to be deodorized and filtered, and the filtrate converted into fertilizers. The sewers are to be constructed of glazed terra-cotta pipe, with a fall in no case less than ten feet per mile, with pipes ranging from six inches and upwards in diameter, inside measurement. There is no separate system of drainage for the ground as distinct from sewerage. There are few or no cellars proper, and where there are basements they are not generally lived in. There are salt meadows in the rear of the city, but they are not found to be malarious.

Refuse or garbage is collected from house to house and removed from the city limits by the city, in sealed vessels. During the summer season, this is done daily. Privy-vaults are required, by the Board of Health, to be constructed with sides bricked up and cemented water-tight, the bottom open. They must be emptied each year before the first of May, and oftener when necessary, by the odorless system, and by parties designated in a permit from the Board of Health, and under bonds to perform the work according to their directions. The night-soil is required to be removed beyond the city limits.

There are no cemeteries or burial-grounds in the city limits. Interments are all made upon the main-land.

A Keeper of Vital Statistics has been appointed by the Board of Health from one of their number, and the returns are regularly made and recorded in a book kept for that purpose.

The Board of Health has a hospital for the reception and treatment of severe forms of contagious disease. The milder forms are subjected to domestic quarantine.

EGG HARBOR TOWNSHIP. - *Report from* J. B. SOMERS, M.D.

The water-supply is obtained chiefly from wells, and is mostly of a good quality and in sufficient quantities. The gently undulating character of the surface, and the porous nature of the soil, is adequate to secure, in most cases throughout the township, thorough drainage. I know of no sickness during the past year that has been attributed to this source. Malaria is not our heritage, but rather an importation, largely affecting our sea-going population and modifying the diseases incident to the locality. Where nature has so kindly done her part, no law has been invoked in regard to the drainage question. The township, as yet, has no sanitary map, but it is highly essential that it should have, as an emergency may at any time urgently demand it.

In many cases, slop-water is deposited too near dwellings and wells for good sanitation, and water-closets cleansed only when necessity amounts to compulsion; the nightly accumulations of urine are too often left to stand until the air of the apartments is contaminated with its foulness; probably more ill health arises from these causes than most persons would be willing to admit. In addition, we would say that the garbage, which Atlantic City so generously disposes of, is brought to our doors, and reeks in the compost heaps, or is spread in fields adjoining residences and in villages.

"The offense is rank—it smells to heaven." Beside the annoyance of keeping the whole community in a continual state of nausea, if these are not hot-beds for the generation of all germinal diseases it would be difficult to say where they may be found.

There have been no veterinary diseases during the past year. We have but one slaughter-house in the township, situated in the village of Linwood. It has occasioned no offense.

The local Board has prohibited public funerals in all cases in which the physician's certificate indicates that the death has occurred from small-pox or scarlet fever, and are ready to enlarge the boundaries whenever, in their judgment, the public health is jeopardized.

The law respecting vaccination has been hitherto very generally ignored. Of the 1,038 children enrolled, over 350 have not been vaccinated. The Board has taken measures to notify the chairman of the Board of Trustees in each school district that the law concerning vaccination must at once be complied with.

There have been no especial diseases prevalent during the past year. We have but one public institution in the township—the county almshouse—which is very efficiently managed. During the past year there has not been a death within its inclosures. I doubt if another such record can be shown since the county was established.

In conclusion, permit us to say that we think that the time has fully arrived when the township physician should have the entire sanitary supervision of the public schools. These are centers, whence too often emanates infection and contagion, and where the physical structure of the coming generations of men and women are too ofttimes wrecked for the want of some directing light. As important as is the office of the Superintendent of Public Instruction, it can scarcely be less so to have some functionary to guard the public health.

EGG HARBOR CITY. - *Report from* THEO. H. BOYSEN, M.D.

Water supply is, in most cases, now obtained from driven wells, which undoubtedly are to be preferred to the old open wells, because two or three clay beds are generally penetrated by the pipe, and thus a pure and uncontaminated supply is obtained which has never been known to fail, even in the driest seasons.

Excreta of all kinds are here composted and used as manures, which, owing to the porous nature of our soil, has as yet been without serious effect, but it is to be feared that, if continued as the country becomes more thickly settled and the soil impregnated, such affections as typhoid fever, which are at present almost unknown, and, when met with, of mild form, will become vastly more frequent and deadly.

Our school is now thoroughly equipped and furnished throughout with the most approved and health-preserving furniture. The doors have all been changed in order to comply with the law enacted last winter, and a Babcock fire extinguisher is kept in the building for use in case of emergency; in fact, the entire school is as perfect as can be desired, except in the matter of ventilation, which must be entirely effected through the doors and windows, thus causing draughts which are surely not conducive to the health of the children.

We are now about preparing a health code and ordinances governing all matters relating to public health, registration of vital statistics, quarantine, and sanitary expenses.

During the past year we have enjoyed a fair degree of public health. Of contagious and infectious diseases we had last winter a short run of measles, and, during the last month, a few cases of scarlet fever.

HAMILTON TOWNSHIP. - *Report from* D. B. INGERSOLL, M.D.

There have been no epidemics or special diseases during the year. We have had but few cases of *pure* typhoid fever, and yet there have been a few cases of such. We again have to report some cases of typho-malarial fever. None of these fevers have been of a severe form. A few cases of measles occurred at Weymouth, brought there by families moving into the place, yet these have been confined chiefly to those families.

We are glad that the last Legislature passed an act prohibiting the sale of tobacco to minors under a certain age. But this act is made of almost non-effect by its making the parent of the minor the prosecutor of the offense. In nine cases out of ten these parents will never prosecute. A supplement should be enacted that would correct this difficulty, by making it the duty of any one to prosecute.

We would also call attention to the danger that we of the rural districts are subject to by the allowing of dogs to run at large. They are permitted to run at large both day and night, and wander over the town in search of food; thus they are constantly in the streets, and liable to be bitten by any dog which may have hydrophobia. Should one of these dogs be bitten unbeknown to the authorities and be seized with hydrophobia, the evils that might ensue cannot be estimated.

BERGEN COUNTY.

PALISADE TOWNSHIP. *Report from* S. E. DEMAREST, *Secretary.*

The population of the township is a very stable one, so that there is but little change from year to year. The great majority of the houses are occupied by their owners, so that there is little moving from place to place, and the sanitary condition of most of the dwellings is well looked after. The cellars are used mostly for the storage of vegetables during the winter months, but in the spring they are generally very thoroughly cleaned out and ventilated.

RIDGEWOOD TOWNSHIP. - *Report from* THOMAS TERHUNE.

The chief nuisance is the standing and unloading of cars loaded with manures, in close proximity to the depot and public street.

UNION TOWNSHIP. *Report from* JACOB G. VAN RIPER, *Secretary.*

On the westerly side of the marsh-land is a ridge of high land, occupied as residences. This ridge of high land is sloping to the marsh-land, consequently all the drainage and natural sewerage of the population flows in the creeks and ditches of the marsh-land. Formerly this ridge of high land was considered and known as a healthy location, but since the railroads and sluice companies have dammed and shut out the natural flow of tide-water in these natural drainage creeks and ditches, the drainage and sewerage from the high land make stagnant pools of filth on the borders of the high land. Fevers have been prevalent in dry seasons. As evidence and proof of the above, this season we had frequent rains, which purified these stagnant pools of filth. No fever. But as soon as the dry weather came, in August and September, fever cases were reported, and we may expect to have fevers every dry season, until the tides are allowed to flow in and out of these natural drainage creeks and ditches, to carry off these pools of filth.

BURLINGTON COUNTY.

FLORENCE TOWNSHIP. - - *Report from* N. A. BAKER, M.D.

Florence is located upon the banks of the Delaware river; has a population of about 1,100. The climate is variable. It has a large pipe foundry and about 200 tenement houses. The majority of these houses are in blocks, alleys between, with water-closets along the alleys in which barrels have been sunk; these, in many cases, overflow, making the atmosphere and surroundings very offensive.

The registration of statistics is cared for by a careful and painstaking assessor.

During the winter of 1882–83, we had what might properly be termed an epidemic of pneumonia, not of a very severe or low type, however, with no deaths.

Diphtheria we have constantly with us, but never as an epidemic. Cholera infantum, when it occurs in the foundry or tenement houses, is singularly fatal.

SOUTHAMPTON TOWNSHIP. *Report from* SAMUEL E. BRANSON.

We have a great deal of fever and ague.

EASTAMPTON TOWNSHIP. - *Report from* THOS. L. SHERMAN.

Our water-supply is from ordinary pumps, except in the village of Smithville, which is supplied by a force-pump from the shops and

ordinary pumps and wells; about twelve houses have hydrants in them. The water is very good; the hydrant-water is soft and not fit to drink in summer, but good in winter. It is pumped from the Rancocas creek, with no sewage emptying in it of any account.

Drainage is very good. Cellars dry. No swamps; but malaria is frequent when the creek is low, but that will be prevented hereafter. The H. B. Smith Machine Company have been depending entirely on the creek for their power but are now putting in steam, and the creek will never be lowered so that it will injure public health hereafter.

CAMDEN COUNTY.

HADDON TOWNSHIP. - - *Report from* J. STOKES COLES.

October 31st, 1883. Our local Board held a meeting this evening to hear reports from physicians and others. C. H. Shivers, M.D., gave us a lengthy report, and F. E. Williams, M.D., one not so full of particulars. After reading them over the Secretary was requested to make report for the State Board of Health.

To the State Board of Health, Trenton, N. J.:

GENTLEMEN—After safely disposing of the case of small-pox, last May, this Board has had no case of any kind brought legally before them, and but slight complaint of any kind. Our township has been free from any epidemics, and the death-rate less than usual. Our officers and others are most of them punctual in sending in vital statistics returns.

C. H. Shivers, M.D., reports: Wells are the almost universal source of water-supply in Haddonfield, and our water will compare favorably for purity, softness and good taste with any water in the world.

This assertion, however, must be qualified by excepting the water in that portion of the borough bounded on the north by Park avenue, on the west by Chestnut street, and extending east and south to an indefinite distance beyond the borough limits. The land thus described contains a stratum of marl at a distance of from twenty to forty feet from the surface, which gives to the well-water a disagreeable taste and odor of sulphuretted hydrogen. Most of our wells are dug through a stratum of conglomerate ironstone, and, consequently, contain dissolved in the water, traces of the oxide of iron. The surface-springs in this neighborhood deposit in their streamlets quite a crust of iron oxide. Our well-water is never discolored (marl water excepted), never tastes badly and seldom fails, even during prolonged droughts. Our wells have never been contaminated with sewage as yet, but I regret to have to say that the time is not far distant when this almost exceptional well-water will become a breeder of disease, unless builders of new houses cease making bottomless sinks and other "latest improvements." I have always recommended, and practice it on my own property, to conduct the waste-water to the garden, thus fertilizing the soil, and, by evaporation and filtration, disposing of this powerful agent of death.

I have always recommended privies to be made without wells, so that the excrement might be cleaned out at least every month. It is not practicable to endeavor to make the use of cemented wells and sinks universal in a town like this. Many cannot afford it.

As above stated, Haddonfield needs no other than the natural drainage, and from its elevated position has very dry cellars. Around its easterly, southeasterly and northerly border there is a chain of creeks and ponds with their accompanying malaria, but away from their vicinity the town is fairly free from it. We also enjoy almost an entire immunity from typhoid fever. There are no sewers.

All our houses have cellars, and probably a half dozen have basements. Many people store potatoes in their cellars. We have no tenement houses.

Many of our cesspools have cemented sides, and some are made by sinking a bottomless hogshead in the ground. There are no cesspools with cemented bottoms, to my knowledge.

This summer and fall we have had five or six cases of typhoid fever in the country near Haddonfield, and one case in the town itself. Three of the cases in the country came under my own care, and all of these had been in the habit of drinking water from the barn-yard pump. All the cases I know of this season have relapsed after an apparent convalescence of from three to five days. Almost all had the "rose-colored rash." Some had sudamina also. Epistaxis was a premonitory symptom with almost all of these cases. But one has died as yet, and his death was caused by a dinner of lamb chops. I mention these cases because the disease is so seldom met with here and because so many had relapses.

GLOUCESTER TOWNSHIP. - *Report from* JOS. E. HURFF, M.D.

The general condition of the township is healthy. Malaria is still quite prevalent, and seems to be much greater in the lower, marshy

districts, especially along a branch of Timber creek, the boundary line of this township, although in general it has not been as severe this year as last. A few cases of scarlet fever and typhoid fever occurred this fall.

STOCKTON TOWNSHIP. - - *Report from* P. W. BEALE, M.D.

As the small-pox is continually making its appearance in the township, we enforce vaccination and quarantine at the earliest possible moment.

Houses heated with stoves, mills by steam. Malaria is and has been the prevalent disease of this township for a number of years, but there is a marked decrease in the number of cases of the typhoid type, and, under proper treatment, most every case recovers. There has been under my own observation a number of cases of diphtheria, scarlet fever and small-pox. The reason I mention diphtheria and scarlet fever is, because the number of cases occurring this year, in comparison with those of three or four years previous, have been very considerably increased, and had not the utmost precaution been taken we would, no doubt, have had an epidemic of these diseases.

DELAWARE TOWNSHIP. - *Report from* F. E. WILLIAMS, *Sec'y.*

Cesspools are the usual termination of the drainage pipes and are seldom cemented, though, as a rule, they are placed at sufficient distance from wells to prevent any likelihood of contaminating the drinking-water.

At the April meeting it was reported that several dogs had been bitten by a rabid dog in the township, and that the owners had not killed them; the Board ordered them killed, which order was complied with by the owners.

There has been no contagious disease reported during the past year, except that during the past winter there have been numerous cases of scarlet fever, diphtheria and whooping-cough in the township.

Malarial fevers during the past summer have not increased, but rather diminished, taking the form of remittent-malarial and typho-malarial fevers.

CAPE MAY COUNTY.

CAPE MAY CITY. - - *Report from* JAMES MECRAY, M.D.

We have needed to do very little with our sewers during the last year; most of the work being done by individuals or by corporations

(private). The Stockton and New Columbia have been remodeled. The Stockton Hotel Company have expended nearly $10,000 in perfecting their drainage, and with complete success; as last season there was not a case of fever in the hotel, or in fact in the city. The Board has been called out twice only during the summer, and then to view pig-sties.

The water-supply is unchanged, and is perfectly satisfactory. Am pleased to state that Cape May Point is being sewered on the same plan as Pullman. We know from experience that it was not begun before it was needed.

LOWER TOWNSHIP. - - *Report from* AARON WOOLSON.

Hog cholera prevailed to some extent. We have had complaint of several hog-pens as a nuisance. The Board notified the owners, and they stopped the nuisance at once.

CUMBERLAND COUNTY.

DEERFIELD TOWNSHIP. - *Report from* C. C. PHILLIPS, M.D.

Ventilation of the houses good and attended to better each year; heated principally by coal stoves and heaters in cellar.

Occasional typhoid fevers and typhoid condition of other diseases. But, take the whole township, it is a healthy one—second to none in the State—very few deaths occurring. People cleanly, industrious and intelligent.

FAIRFIELD TOWNSHIP. - - *Report from* HENRY S. LONG.

During the early part of the year influenza prevailed throughout a greater part of the township with very little complication; very few cases accompanied with pneumonia, and we believe there were no fatal cases. About the same time, or shortly after, measles, as an epidemic, prevailed. No fatal cases are reported. The eruption in many cases was very full and extensive. Although this disease was very extensive in this township, yet we heard or know of no cases that did not recover perfectly.

We had some cases of dysentery during the after part of the season or summer.

Of our nuisances, we have to complain that there exists during the canning season a tomato-canning enterprise which, on certain days,

gives out very unpleasant odors. As the season is now nearly over, and for the present none seem to be annoyed, it is quite probable it will not be interfered with this season. Measures, however, should be taken to have it corrected before another season arrives and the same thing be repeated.

HOPEWELL TOWNSHIP. - - *Report from* C. H. DAN, M.D.

The county almshouse is situated in this township, and is located on high ground and in a healthy situation. It is heated by steam and has fair ventilation, but is in an over-crowded condition. The prevalent diseases of the year have been: in the early spring, measles; and during the late summer and early fall, malaria—which has been much more prevalent than usual this year.

ESSEX COUNTY.

BELLEVILLE TOWNSHIP. - *Report from* R. SKAINE, *Sec'y.*

A complete set of ordinances have been adopted by the Board, intended to enforce upon the citizens such cautionary measures as will best conserve public health.

Registration is observed, and reports of marriages, births and deaths are made in accordance with law.

No general vaccination has been ordered by the Board, but voluntary vaccination is quite general, and due precautions are exercised in all cases of contagious disease.

BLOOMFIELD TOWNSHIP. *Report from* JOSEPH A. DAVIS, M.D.

Investigations in sanitary science are more and more engaging the attention of the people. The proper ventilation of houses, the best methods of preventing the poisonous gases of cesspools from entering dwellings, the relation of cesspools and water-closets to wells, the effect of decaying substances thrown upon the surface of the soil, pools of stagnant water undergoing decomposition, polluted streams and ponds acting as fermenting vats and sending off their mephitic gases, and other sources of disease, are looked after with far more earnestness than formerly, and efforts are made as far as possible for their removal.

In our town, outdoor matters have for the most part engaged the attention of the committee. Pools of stagnant water and locations of wet soil have been sought out and received proper drainage. Cesspools

and water-closets have been looked after, and have been, with the coöperation of the people, to a considerable extent improved.

Contracts have been made by the township committee with the East Orange Water Company, to supply water in nine miles of pipe, for ten years, at an annual expense of $6,000. The work is partially completed.

Three thousand dollars have been expended upon the public grounds during the year, and strict attention has been paid to surface-drainage. No prevalent disease has occurred during the year, and it is evident that by following up the sanitary methods now in use great good will be accomplished.

CLINTON TOWNSHIP. - *Report from* M. O. CHRISTIAN, M.D.

The general health in the township has been excellent since April. Malarial fevers of all varieties, which prevailed extensively the three preceding seasons, were almost entirely absent this year.

The same can be said of diphtheria. While it was quite prevalent prior to '83, during this year it has been rarely met with in our township.

In the fall of '82, and continuing well along through the winter, cases of scarlatina were very numerous. During the latter part of the winter pertussis became the favorite and was introduced pretty thoroughly through the schools. This gave place in the early spring to an epidemic of measles, which continued along into April, since which time our vicinity has been quite free from infectious diseases, even cholera infantum having been rare, owing, probably, to the moderate weather of the past summer.

The only means taken to prevent the spread of infectious diseases here is the exclusion from the public school of children who are known to reside in houses where such diseases exist.

A nuisance which had been abated in '82 by order of the court, was continued again for a time this season. It was the garbage from the Newark market: fish heads, entrails, cabbage leaves and other debris usual about markets, received and deposited in an open cellar of large dimensions by a farmer within the village limits.

EAST ORANGE TOWNSHIP. - - *Report from* P. WOODRUFF.

The water company is private. Exact number of subscribers is not known to the Board. Water is never discolored. Tasteless. Neither hard nor soft. The water is uniformly good and the pipes

are cleansed. No reservoirs. No sewage is received. We have no data as to the number of wells or cisterns.

There are no sewers. Cesspools are largely built with open bottom and sides; are generally emptied by odorless excavating companies.

ORANGE. - - *Report from* THOS. W. HARVEY, M.D., *Sec'y.*

The water-supply, which was only projected at our last report, has become an actual fact. The city of Orange is now supplied with a plentiful supply of soft water, from the west branch of the Rahway. The water is brought by gravity, and has an ordinary pressure of eighty pounds, and furnishes an efficient fire service without the use of fire engines.

The summer has been remarkable for the absence of diarrhœal diseases in children. Dysentery, which was epidemic in 1882, has been very rare this year, and our death-rate for the year will be much lower than in 1882.

MONTCLAIR TOWNSHIP. - *Report from* JAS. OWEN, C.E.

There is a hook and ladder company, with forty-five members, with a truck supplied with extinguishers.

Two cemeteries are in the town, Rosedale and Mount Hebron.

The Board of Health organized this year and established a code of ordinances, which is very complete, for the sanitary improvement of the town. The efforts of the Board have mainly been concentrated in preventing the pollution of the streams by direct or indirect connection with cesspools; the proper cleaning of overflowing cesspools, care being taken in having the contents completely removed away; the prevention of garbage dumping, and the proper drainage of surcharged districts. As far as their efforts have extended they have been met with a hearty coöperation of all citizens, even those who were offending. The fact of having attention called to any trouble seemed, in almost every case, the only effort necessary for its removal, showing a strong and hearty interest by all citizens in sanitary matters. Where coöperation would have been necessary, the Board, in such cases, undertook the work themselves, and two or three bad localities have been radically improved. The great trouble, as in all suburban towns, is in getting rid of the sewage, and though all are anxious to do the right thing, yet the difficulties in the way are very great, on account of the want of proper knowledge by experts themselves in the matter.

The Board have as yet had no occasion to resort to any quarantine regulations. The physicians in town are all in hearty coöperation with the Board, and have reported any serious case to them, and investigations have been made into the cause.

SOUTH ORANGE TOWNSHIP. *Report from* A. A. RANSOM, M.D., *Sec'y.*

We have had one year trial from draining the mill-pond, as we let the water off last October, dug a channel through five feet on the bottom, thirteen feet top, some five or six feet deep; as we had this all done in the winter, we now have reclaimed about fifty acres of good land. Have had no malarial fever, or as little if not less than any year for the last eighteen years, the time I have lived here; and all these for the cost of $1,300. All are pleased with the result.

WEST ORANGE TOWNSHIP. - *Report from* EDMUND CONDIT.

The system of drainage is a natural one, and, owing to the rolling character of our territory, is probably as nearly perfect as human skill could make it. The cellars are mostly dry, and malaria is seldom found unless contracted elsewhere.

In most cases the houses have cellars, comparatively few have basements. The cellars are quite largely used for storing vegetables, &c. There are not many tenement houses of more than two families.

GLOUCESTER COUNTY.

GLASSBORO TOWNSHIP. - *Report from* JACOB ISZARD, M.D.

The drainage is not so very good on accouut of the flatness of the ground. The sewerage is very imperfect. The majority of the inhabitants are employes in the glass factories, who do not pay proper attention to their water-closets or drains from the pumps or wells.

Small-pox was quarantined last year, and all the children vaccinated in the township.

GREENWICH TOWNSHIP. - - *Report from* JOHN STETSER.

Two hundred dollars was appropriated at the annual town meeting to drain the streets of Paulsboro. Under the supervision of one of the township committee, the money has been used for that purpose, making a marked improvement in the surface-drainage of the township.

Slaughter-house has been kept in a healthy condition through the year, but one complaint having been entered, by only one person, of a nuisance during the year. The refuse not being allowed to accumulate so as to become a nuisance, and detrimental to health.

Cow-pens, hog-pens and privies have been kept in a good sanitary condition during the year, by the removal of their contents when necessary, under legal notice and inspection, so as not to be a nuisance to neighbors.

HARRISON TOWNSHIP. - *Report from* E. E. DE GROFFT, *Sec'y.*

Cases of malarial fevers, although having prevailed to a considerable extent during the spring and summer months, have not been so numerous as last year.

What few cases of typhoid have come under our notice have been traceable to stagnated pools of water and incomplete drainage.

Our people are pretty well protected against small-pox, there being very few children in our schools but what have been vaccinated.

WEST DEPTFORD TOWNSHIP. - *Report from* EDWARD J. LODGE.

At one of the meetings of the Board, it was resolved to use the authority of the Board to see after the vaccination of the children (if needy) at the expense of the township.

WOOLWICH TOWNSHIP. - *Report from* W. H. MCCULLOUGH.

The township Board of Health is in its infancy, this being the first year of our organization. There has been only one complaint against nuisances, and that was promptly attended to and abated.

HUNTERDON COUNTY.

DELAWARE TOWNSHIP. - *Report from* ASA H. HOLCOMBE.

We consider our township more healthy and less subject to malarial fevers than formerly. The prevailing disease of the various forms of malarial are mostly confined along the borders of the Delaware river, and the disease seems to be in a milder form than formerly.

FRENCHTOWN. - *Report from* GEORGE C. LANDON, *Secretary.*

In regard to sewerage, there seems to be no general system. Most families have a short covered drain leading from the kitchen into the back yard or garden, and terminating in a cesspool, into which all slops are conveyed. Others do not take even this precaution, but throw the waste-water upon the ground in the rear of their houses.

The cellars and basements of most houses are in good condition. The walls of the cellars near the river are frequently very damp during the spring of the year, caused by the water coming into the cellars and remaining for some time. Latterly, however, the cellars have been better drained, and one cause of disease has been greatly lessened. As a general thing, the houses of this borough are in a first-class condition as to cleanness.

KINGWOOD TOWNSHIP. - - - *Report from* H. P. SHAW.

The general health of the township has been good—very few cases of sickness since the prevalence of dysentery last fall. Of the twenty deaths reported since October 1st, 1882, eleven were people of seventy years and upward. A few cases of malaria have been reported, but of a very light form.

LEBANON TOWNSHIP. - *Report from* A. S. PITTENGER, M.D.

Our water-supply is from springs and wells, except in a few instances among farmers, although our largest village in the township—Junction—is wholly dependent on cisterns, and it is in this village that most all our fevers, especially typhoid, exist.

Our Health Board is active, obey all summons, and in all cases strives to do its duty.

RARITAN TOWNSHIP. - *Report from* JOHN H. EWING, M.D.

From January, 1883, to April, 1883, diphtheria epidemic in the town of Flemington. During the summer months very few diseases incident to the season. At present time unusually healthy.

The local Board of Health, during the summer, has taken steps which will result in one of our largest open drains in Flemington being properly piped and closed. No flushing, except surface-water.

TEWKESBURY TOWNSHIP. *Report from* O. A FARLEY, *Secretary.*

Scarlet fever, malaria and phthisis have been the prevailing diseases. Scarlet fever prevailed as an epidemic, there being about one hundred and fifty cases and many deaths.

WEST AMWELL TOWNSHIP. *Report from* S. R. VAN BUSKIRK, *Sec'y.*

Well organized Board of Health; meets regular; looks after all matters.

MERCER COUNTY.

CHAMBERSBURG. - - - *Report from* WARD M. SMITH.

Cellars are generally dry. We have no sewers. Part of the gutters are paved, and part are not paved. Have heard of some few cases of malaria, which some attribute to the foul gutters in the borough. We have a very filthy pond in the borough, called Crow lake, which contains stagnant water and is very dangerous to health.

HAMILTON TOWNSHIP. - *Report from* GEORGE A. HUTCHINSON.

There were several complaints made to the Board of Health of Hamilton township during the year, which were all attended to by the Board. First was the dumping of night-soil on State street road, which was ordered to be removed and stopped dumping there, which was done; and, also, on Chambers' farm the same complaint, the dumping of night-soil, which the Board has also attended to, and the odorous smell stopped by covering it up. There was a complaint made from Hamilton Square concerning the state in which slaughter-houses were kept in that place, which was examined by the Secretary of the Board, and the same ordered to be kept clean, and all offal, from dressing animals, taken from the place, which was done and disinfectants used to keep the place in good order.

HIGHTSTOWN. - *Report from* J. P. JOHNSON, M.D., *Secretary.*

The mill-pond, which receives the sewage from Peddie Institute, (the Baptist school, numbering over 100 pupils,) is considered by the Board to be in a bad condition, and there is a disposition to have the matter remedied.

Two slaughter-houses are quite near dwellings, and some complaint is made of one of them.

A canning factory, which has been in operation for over a year, has been a source of much complaint. The large amount of refuse which finds its way into the brook running through the most thickly-settled portion of the town, becomes very offensive by lodging along its banks.

Malarial troubles have existed to about the same extent as during the year previous.

MILLHAM TOWNSHIP. - - - - *Report from* J. J. CLANCY.

No system of drainage or sewerage. There are portions of the township where there is considerable standing-water after a heavy rainfall, and in the vicinity of this standing-water wet cellars abound. There are swamps and malaria is frequent.

Houses, generally, have cellars, and are not tenanted. Many use the cellars to store away vegetables.

No system for removing refuse and excreta. Privies are usually cleansed yearly by scavengers.

PRINCETON. - - - - *Report from* J. S. SCHENCK.

The most important event of the year is the introduction of public water of fine quality and abundance. Will soon come into general use.

TRENTON. - - - *Report from* WILLIAM CLOKE, *Sec'y.*

The Trenton Board of Health has been very successful during the past year in accomplishing the objects of its existence. It has very materially improved the sanitary condition of the city. The reform upon which it plumes itself the most is the radical abatement of what was known as the "Water-Power Nuisance." This water-power, or race-way, of the Trenton Water-Power Company, winds for about a mile through the thickly-settled parts of the city. The people living along it are mostly mill operatives and factory hands. Nearly all whose back-yards abutted on the race-way built their privies over the stream. They also sewered into it from their kitchens. Several hundred privies lined the edge of the race-way, and innumerable gutters and spouts and sewers poured their nauseous burdens into the filth-glutted stream. The race-way was sluggish with foulness, and reeked with odors inconceivably vile. The Board addressed itself to the abatement of this nuisance immediately upon its organization, a little over a year ago, and its efforts have been crowned with complete success. Every privy has been removed, every sewer and sluice-way cut off, the banks of the stream have been nicely graded, and it is now as clean and sweet and wholesome as the Delaware river itself. The improvement has been very grateful to the people living along its banks. Instead of being stifled and made ill by its fœtid odors, they were able last summer to spend their evenings sitting upon its pleasant banks. To the New Jersey Steel and Iron Company the credit is largely due for promptly complying with the orders of the Board and making these improvements.

The Board also has in hand, with a fair prospect of success, the Petty's Run nuisance. They have begun proceedings in the Court of Chancery to compel people to cease polluting this stream with their sewage.

During the year, since my last report, over six hundred nuisances, of various magnitude, have been abated by the order of the Board and through the vigilance and activity of Inspector McGuire. The sanitary condition of the city is good and steadily improving. Our public markets are in excellent condition, the public alleys are kept pretty well cleared of garbage accumulations, and people are generally careful about the sanitary condition of their premises.

WASHINGTON TOWNSHIP. - - *Report from* JOHN B. YARD.

The Township Committee were called together on the 14th day of July last by order of the Board of Health of Upper Freehold township, to attend to the cleaning out the channel of the Carson mill-pond, in this township. The refuse in said channel had stopped the free passage of the water down through the meadows, and caused the water to back up and become stagnant in and about Sharon, a small village on the county line between Mercer and Monmouth, in Upper Freehold township. In consequence of the stagnant water there were a great many cases of diphtheria—some fourteen, I believe, were reported at once, and some were fatal. Our Board met on the said day and viewed the premises and decided to have it cleaned out in our township, and served notices on the land-owners on both sides of the stream, and it was done very promptly and effectually, but with several hundred dollars' cost. After we had ours cleaned out, then those on the upper end of the stream, in Upper Freehold township, cleaned theirs out, and I hear no more from it now. The water was so poisoned the fish died and floated on top of the water. Our physician said that he thought that the cause of the sickness was owing to the foul and dead water.

Our township is very clear of anything that is considered injurious to the health of the inhabitants. We have no factories of any kind to make any bad odor or anything of the kind. We get our drinking-water from wells, and it is mostly very good and pure, consequently the people are very healthy, perhaps as much so as any township in the State.

MIDDLESEX COUNTY.

NEW BRUNSWICK. *Report from* THOMAS L. JANEWAY, *Secretary.*

Only about one-third of the city is sewered, and this sewage empties into a slack-water, causing the return of noxious and mephitic gases upon the town. It is scarcely necessary to point out its insalubrity. Water is supplied to the city by means of hydrants and wells and pumps. Previous reports have clearly demonstrated that some of our wells have unquestionably caused sickness. The Common Council have been memorialized upon the subject and have failed to abate the causes of disease.

The cellars in the lower part of the town are almost uniformly damp, perfect drainage being impracticable, owing to the fact that the water-level of the Delaware and Raritan canal, running in front of the city, is above that of the bottom of the cellars. The only efficient relief for the existing state of affairs would be found in the construction of a sewer running the length of the town, or in the removal of the slack-water formed by the canal above referred to. Therefore, we may unhesitatingly say that the drainage of a large portion of the city is decidedly bad. Cesspools exist in many parts of the city, and as they are not closely built must allow saturation of the soil.

[I have personally examined the drainage and sewerage of New Brunswick, and must fully confirm these views.—E. M. H.]

The city of New Brunswick has suffered in a moderate degree from scarlet fever, diphtheria, measles and intermittent fever, the latter having been confined to restricted localities.

This Board would call attention to an effort recently made to interfere with the practice of vaccination in our public schools. In our judgment this can only result in evil, as being contrary to the experience of the world during the last century.

PERTH AMBOY. - - *Report from* E. B. P. KELLY, M.D.

Water-supply is public, furnished by a private corporation, known as the Perth Amboy Water Company, from a stream at the westerly boundary of the city, known as the "Five Oaks." The water is soft, and slightly discolored, which will probably be remedied by a filter in the reservoir, now in course of construction. Comparatively a small portion of the inhabitants use it, preferring wells and cisterns, as being more economical.

Sewers are constructed upon the most approved plans, properly ventilated, and arrangements are made for flushing, as often as necessary.

Due care is taken in regard to contagious diseases, and the law relating to vaccination of children is rigidly enforced.

PISCATAWAY TOWNSHIP. *Report from* Dr. A. S. TITSWORTH, *Sec'y.*

An epidemic of measles swept over our township, and in some instances nearly broke up the schools; and although some cases were marked with great severity, there were but few fatal cases, and nearly all of these were the results of complications.

There have been a few cases of scarlet fever, but this disease has not been very prevalent.

There has been an unusual tendency to diseases depending upon so-called malarial influences. Intermittent and remittent fevers have been unusually prevalent, but have generally yielded to proper treatment.

WOODBRIDGE TOWNSHIP. *Report from* S. P. HARNED, M.D., *Sec'y.*

Drainage by natural water-courses, brooks, creeks, &c. Most cellars require drains, which secure dry cellars. Have had less malaria than for many years past.

Some varicella. Acute dysentery has prevailed, more than in any year within the last twenty years.

MONMOUTH COUNTY.

ASBURY PARK. - - - - *Report from* H. MITCHELL.

Since September 1st we have had nine cases of typhoid fever. The type has been mild, only one death resulting. We believe that the appearance of this disease is unquestionably due to the pollution of certain wells by casting waste-fluids upon the ground.

The sewers have satisfactorily performed their duty, and seem to be without objection at present, except concerning their ventilation. The street openings have in some instances been offensive. The outflow has been free from objection during the past year. No odors have existed at the outfall.

KEYPORT. - - - - *Report from* S. V. ARROWSMITH.

We have no systematic system of drainage nor sewerage. A blue clay subsoil, which underlies the greater part of the town, causes considerable dampness in basements and cellars.

Malaria has prevailed to about the usual extent, generally in a mild form.

LONG BRANCH. - *Report from* E. B. BLAISDELL, *Secretary.*

Drainage and sewerage very incomplete. Hotels and large buildings have large sewers and cesspools on the premises. Dwellings generally have no particular system, and water-closets in the general country style. The city Board of Health, but recently organized, hope to remedy the evil as fast as possible.

The Board of Health has been but recently organized, and have adopted a set of resolutions, and hope to improve the condition of the city as fast as possible.

MATAWAN TOWNSHIP. *Report from* BENJAMIN GRIGGS, *Secretary.*

The Board has had a diligent oversight of the sanitary condition of our township.

No report of nuisances has come to our knowledge. There has been no epidemic or prevailing disease of any kind, and our locality during the year past has been, with very little exception, unusually healthy.

OCEAN GROVE. - *Report from* Rev. A. E. BALLARD, *Sec'y.*

The surface soil is composed of sand, reaching down to various depths of from two to forty feet. Underlying this is a strata of variously colored clay, which is underlaid again by gravel. Below this, so far as we have been able to test it, for a depth of from 100 to 120 feet, is a mass of black clay, after which is a thin layer of sand and shell, followed again by the thick black clay to a depth nearly 300 feet; after which comes again sand and gravel for fifteen to twenty feet, and filled with excellent water, which comes to the surface in an artesian well, with a product of fifty gallons per minute. This experiment has been made at great expense, and settles the fact that at a depth of 422 feet, water, tested under the direction of the State Geologist, and certified by him to be of the purest quality, soft and healthful, almost entirely free from mineral matter, can be obtained

in almost unlimited quantities, and beyond the reach of possible contamination.

It is under consideration to increase the number of these wells, as circumstances may call for them, until there shall be a full supply for all the cottages and hotels of the Grove.

The general water-supply is at present mostly obtained from "driven wells" at a depth varying from eighteen to forty-eight feet. Except in the vicinity of a small area near the sea-shore of Fletcher Lake, where there is a marshy taste, it appears, from the scientific tests which have been applied, to be good. The difficulty near Fletcher Lake has been remedied by setting the wells a few feet further away. In some cases the water has been found so impregnated with iron from the corroding of the pipes as to lessen its pleasantness for culinary and drinking purposes, as also for washing. This is being obviated by the introduction of pipes properly galvanized, and inserted in tile wells with either porcelain-lined or wooden pumps.

There have been three cases in which it has been supposed that water deterioration might have come from contiguous cesspools, but investigation failed to show its certainty, and the causes remained unknown. The wells were changed and the difficulty disappeared, except in one case where the cesspool has been removed and the well remains for the purpose of testing. There have been no cases of sickness attributed to water.

The proposition is now to make the supply from artesian wells, which shall be carried through pipes into all the houses of the Grove, and replace in this way the wells now so near to the surface.

The whole place is being sewered as rapidly as possible. Already 23,550 feet, making four and a half miles, are laid, and arrangements are being made to complete the system as rapidly as possible. The system brings all sewage matter into one main pipe, which discharges into the sea at an average height above high-water of four inches, at the foot of Embury avenue. It is taken out for a distance of 500 feet into the sea, in a flume made of Georgia pine, which flume is bolted to piling driven down to the ocean floor under it, and by its side above it. The natural descent is so great that the flow is continuous, and but little offensive odor when opened, and no perceptible odor where it empties into the sea, while the discoloration of the water, wherever there is any, does not extend over three to five feet. There has been no offensiveness from it in connection with the bathing, and no odors along the vicinity since the old ventilators have been closed and the old cessvaults taken away. The works have been erected at a very heavy cost, but it is believed by us that they have solved the question of an outlet for the sewage which shall be in accord both with the laws of taste and health. Our maps are so constructed that all under-ground work, all pipes and the contour of surface, is easily understood and determined. These sewers comprehend the more populated parts of the Grove, and are being extended with the extension of the population.

A number of plans are being considered by which the entrance of sewage above the lake can be prevented, and also by which the lake can be more effectually cleansed, but none have as yet been adopted.

Many of the water-closets are connected with the sewers, and it is the policy of the Association to have them all connected at as early a day as may be found possible.

A plan has been devised, and partly carried out during the past year, to inspect the sanitary condition of every house in the Grove. It is intended to complete the plan during the coming season. The hotels, with a very few exceptions, have all been inspected from garret to cellar, with all the surroundings, by the Secretary personally, and reports kept in a book of minutes. All private houses, where there has been any suspicion or complaint, have been officially inspected by the same officer, and where any offensive or unhealthy condition has been found to exist, the evil has been remedied at once, and, in the owner's absence, charged to the property. In almost every case the property owners have been found to be anxious to coöperate with the Board of Health.

Garbage is collected every day during the warm season, and two to three times during the week in the winter, from tight barrels, and carried away in tight wagons to a distance of four miles and buried, at a contract cost of $1,200. The grounds are carefully raked every day and the refuse carted away.

OCEAN TOWNSHIP. - *Report from* GEO. W. BROWN, M.D.

There is nothing of special interest to report this year, as a "city Board of Health" has been organized since our last report, and most of the sanitary work has been within the city limits.

We are still well organized, however, and have at times found work to do. Since our last report we have adopted a sanitary code similar to the one governing the city of Trenton.

SHREWSBURY TOWNSHIP. *Report from* JOHN S. THROCKMORTON.

One sewer, extending from Mechanic street, Red Bank, to the river, twelve-inch pipe. Cesspools built now are all cemented; the old ones are emptied with steam force-pump into tight barrels and carted away.

No prevalent disease. Some malaria in a few localities.

The Board of Red Bank inspect the slaughter-houses, and have had them kept in order to the best of their abtlity. Still some complaints arise, which are immediately attended to.

UPPER FREEHOLD TOWNSHIP. *Report from* H. G. NORTON, M.D.

We would report Cat-tail brook as opened, and an extensive meadow drained, under the direction of Mr. Geo. Vanderbeck, Assessor. After draining the lowlands around Sharon, which were much of the time overflowed by this brook, much of the sickness in the vicinity disappeared as by magic, especially diphtheria and malaria, which had been rife during the early spring and preceding winter.

There are, in our township, several cesspools with open bottoms, bricked sides, which are irregularly cleaned, generally not until they become full of offensive matter.

Three years ago malaria became very prevalent across our southern line in Ocean county, in a section of pine country always, until then, free from anything like malaria; not until the present fall and summer has it seemed to spread from its origin—in and about Prospertown—while, at this writing, chills is the almost universal complaint in the southern portion of the township.

This summer, disease has shown itself among the hogs; wherever it has appeared the farmers have lost all, or nearly all, of their hogs and pigs. Six farmers have been heavy losers, having lost their entire lot of hogs. As our township produces probably the heaviest pork yield of any in the State, the disease, as it has appeared among us, causes much apprehension, and deserves careful study.

This fall has been characterized by a more than usual amount of typhoid fever, but it seems extremely hard to convince people that there is any connection between poor drainage, cesspools and shallow wells and the fever.

There was an extensive epidemic of measles last spring, but not one case terminated fatally.

MORRIS COUNTY.

MORRISTOWN. - - - - *Report from* C. F. AXTELL.

The water-supply of Morristown is excellent, pure spring-water, furnished by the Morris Aqueduct Company. The supply is not only pure and good, but believed to be adequate.

The natural drainage of Morristown is fairly good, but we need now a system of sewerage. The cesspool business ought to go forever.

Refusé is deposited on a public dumping ground in trenches, and these covered with fresh earth.

There are no slaughter houses or abattoirs in the city limits.

There is no regular quarantine or care over contagious diseases, except as necessity demands. If aggravated cases appear, they are isolated as far as possible from outside communication, under the direction of the Board of Health and City Physician.

MT. OLIVE TOWNSHIP. - - - *Report from* JOHN D. BUDD.

The health of the township has been fair, and, we think, an improvement on former years. Those who were affected, by cleaning their wells properly have improved the conditions of their families and surroundings.

We are decidedly against any further centralizing of power in law to county physicians; as aside from the inconveniences and costs of calling on him as to the cause of sudden death, it is unjust to local physicians and acting coroners, who, as a general thing, are far better posted in their duties as to the cause of death than any doctor appointed by any Board of Freeholders or otherwise, and we shall strenuously use our influence politically, as representatives of both the great political parties, against county centralization of the powers of the Board of Health. We are willing to receive the authority of the State Board, but claim our own township rights.

ROCKAWAY TOWNSHIP. - - *Report from* ELIAS B. MOTT.

Very few changes, affecting the sanitary condition of our township, have occurred since our last report, October, 1880.

Much might be said in regard to our supply of water for drinking and cooking purposes. It is very much to be regretted that no adequate provision has been made for obtaining an analysis of the water

in some parts of our township, obtained from wells, and which I believe to be unhealthful. This would necessitate a knowledge of the structure of the soil, with its effect on the purity or impurity of the water. A thorough knowledge of this subject in all its relations to health would, I believe, cause the abandonment of some of the present sources of supply, and cause other means to be adopted for its obtainment. Although a hilly country, with many fine natural springs and consequent streams of clear water, the greater number of our population depend almost entirely on wells and cisterns for supply. In some parts of the township the wells contain an undiminished supply of pure water throughout the year, regardless of climatic changes. In other parts both the quantity and quality change with the change of seasons, and in some instances are unfit for use during the latter part of the summer months. This is true as regards some parts of the village of Rockaway, and also some of the mining villages. As regards the mining villages, the proximity of mines, many of which are far deeper than the wells, may explain one of the causes; in the other case, perhaps, the geological structure of the earth, or not being sunk to a proper depth, may explain the cause. Quicksand underlies a portion of the surface in our village (Rockaway), rendering it a very difficult feat to obtain water by means of wells. A resort to cisterns is the result. These are constructed in the usual manner, and many of them contain filters, usually a cemented brick partition through which the water must filter. Many are provided with turn-offs, to prevent the first rain-fall from carrying impurities, deposited on the roof, into the cisterns.

But many others are not in good condition, some are built under the houses and the air completely excluded, seldom cleaned, and no means to prevent roof-washings from being deposited into the cisterns. A few have iron pipes. Lead is in general use.

The natural drainage is good, but in some instances artificial drainage is absolutely necessary to prevent disease. This is the case at Mount Hope. On each side of the ridge, containing the ore, is a swamp. The people residing in the vicinity of this swampy land had been afflicted with malaria in its many forms for several years. The present superintendent, Mr. Matson Williams, has caused these swamps to be drained, and malaria is now no more prevalent than elsewhere. Other instances of the beneficial effects of artificial drainage could be mentioned, but still more instances where benefit would accrue from having it done.

There is probably not a brook or stream in the township used to carry off sewage. Cesspools and out-of-doors water-closets are not usually planned and arranged with a due regard for healthfulness. There is not, probably, a cemented cesspool in the township. A trap, inserted somewhere between the kitchen sink and the cesspool, is usually considered a perfect safeguard against any noxious gases or odors arising from this depository of nastiness.

The refuse and excreta from stables, in the villages, are readily disposed of to neighboring farmers, but not so with contents of privy vaults, which remain (in some instances) uncleaned for years. In many instances the closet is removed to a new vault, and the old one covered with earth, as the easiest method of disposing of the matter.

OCEAN COUNTY.

EAGLESWOOD TOWNSHIP. - *Report from* WM. P. HAYWOOD.

Nothing favorable. School houses in a tumble-down condition, and too small and badly warmed and ventilated for cow-houses; too small for the children in attendance. Trustees mostly have no children, and do not urge that their neighbors' children get an education.

LACEY TOWNSHIP. - *Report from* MARCUS KENYON, M.D.

No contagious diseases, but five cases of typhoid fever; the customary precautions taken to prevent spreading. Vaccination not well kept up.

PASSAIC COUNTY.

PASSAIC CITY. - - - *Report from* F. H. RICE, M.D.

The open-bottom cesspools are in use, and usually emptied by pump. We have had less malaria this year than ever before.

PATERSON. - - - - - - - - See page 172.

POMPTON TOWNSHIP. - - *Report from* CLARK W. MILLS.

Drainage and sewerage is of the most primitive kind. There are many small swamps whose outlets are natural, which cause more or less malaria in their immediate vicinity.

WAYNE TOWNSHIP. - - *Report from* RICHARD J. BANTA.

There are many defects in the natural drainage, especially in the western part of the township. But parties owning those lands have seen the necessity of having the land drained, and I have no doubt that, before the next report, it will be properly drained.

It has been very healthy the first part of the season, but at present there are quite a number of cases of malarial fever.

WEST MILFORD TOWNSHIP. - *Report from* THEO. D. COURSEN.

Malaria still prevails throughout the township, but there is a marked absence of the more severe forms.

SALEM COUNTY.

MANNINGTON TOWNSHIP. *Report from* D. F. GRIER, *Secretary.*

We have had some trouble with contagious disease on a farm of Isaac Smith, about one mile from the Hogan farm. In the month of June last he lost six head of cattle and three colts. The disease was anthrax fever. The feeding-grounds were low and springy, about the same as Hogan's were. * * * We had the stock put on different feeding-grounds. First, all died in about three weeks. It was a milk dairy, and the cattle were fit for the butcher. I think one of the best herds in the township. The stock appears to be all well now; none have died since June last.

QUINTON TOWNSHIP. - - - - *Report from* G. A. AYARS.

Three school houses in township. Should be more by all means. They are wanted, and very much needed.

SALEM. - - - *Report from* JOSIAH WISTAR, *Secretary.*

The surface of this, as well as of the surrounding country, is flat, with an elevation above tide-water barely sufficient for good drainage. In former years, when the meadows and low grounds which border our numerous tide-water streams were but partially drained, the town and adjacent country had a reputation for unhealthiness—chills and fevers generally prevailing during the autumn of each year; but for the past thirty years the low lands above alluded to have been more thoroughly drained, and, as a consequence, this vicinity has been as free from malaria as any other locality.

Until within two years past we had no water-supply except that obtained from wells and cisterns; the well-water being hard. The city is now supplied with water from Laurel Run, which is dammed for that purpose, and the water forced through iron pipes a distance of three and one-half or four miles by a steam engine, on what is known as the Holly system. The works were built and are owned by the city. The water thus supplied has not as yet been much used for drinking, except to some extent last winter, its quality during the warm months not having been entirely satisfactory. This Board has had the matter under its care, and made certain suggestions to the city council for its improvement, some of which have been carried out with good effect, and it is hoped time will remedy some of the evils heretofore complained of, particularly as there is no cause of foulness in the stream itself, it being fed by numerous springs. It has been introduced into nearly two hundred buildings or premises, and it is believed its quality will be improved the more it is used.

The streets of our city have been graded, and are well drained by paved gutters, but no public sewers have as yet been built. Some houses in the lower portions may have water in their cellars during the spring or when the springs are unusually high, but generally the cellars are entirely dry, much more so than before the present system of drainage was perfected.

The city not being compactly built, and the lots being of considerable depth, outhouses or privies need not, in most cases, be placed near enough to dwellings to occasion inconvenience or endanger health. But this Board feels that it is a subject that must claim its attention, and has already, in one or two instances.

The slaughter-houses are located to the south of the city, but within its limits, and, when built, were a sufficient distance from any dwelling not to cause annoyance. But as new houses have been built, and the city extended in that direction, complaints have been made of the unpleasant smell occasioned by decaying blood and refuse. A committee of this Board now has the subject under care, and confidently hope to remedy the evil.

We have not been called upon to deal with any contagious or epidemic disease since our organization, except some cases of small-pox, which occurred during the spring and early summer, three of which proved fatal. The Board quarantined the inmates of the houses where the disease existed, and used such other means as were deemed best to prevent its spread, and made certain suggestions to the Board

of Education in regard to the vaccination of the children attending the public schools, which they have adopted. Our population comprises quite a number of colored families, and it is from these we have most to fear in regard to this disease. The Board of Chosen Freeholders have been considering the expediency of building a pest-house for the accommodation of persons afflicted with contagious diseases, and which we hope will be completed in the near future. The expenses incurred in the care of the cases alluded to were borne by the city.

Though the Board has been in existence but a little more than a year, and has not the benefit of long experience, yet we are impressed with the importance of preserving the public health, so far as it depends upon our efforts, and have desired to act in such a way as not to diminish, but to strengthen, our influence for good in the community. Having this object in view, we have endeavored not to interfere where action was not necessary, though at the same time not hesitating where the circumstances seemed to require it.

SOMERSET COUNTY.

BEDMINSTER TOWNSHIP. *Report from* WM. P. SUTPHEN, *Secretary.*

Malaria has existed. The Board officially notified the inhabitants of the southern portion of the town of Peapack to abate causes. The demands of the Board were complied with. The trouble then was malaria, and since that time, which was the middle of June, the town has been healthy.

There was no natural cause or earthly reason for malaria at that time, except one, a habit of letting unhealthy, filthy and poisonous matter lay around loose. The orders of the Board were obeyed; but it appears strange that people, who assume to be sensible, should have to be told to do things for the promotion of their own health, which common decency would demand, without the item of health being considered.

BRIDGEWATER TOWNSHIP. *Report from* WM. S. POTTER, *Secretary.*

Water-supply of Somerville and Raritan is by water-works of Somerville & Raritan Water Company, pumped in stand-pipe at Raritan from the Raritan river. Water is sometimes discolored from

rains, although the company has four large filters of the most approved and latest arrangement, filtering through white shore-sand, which does the work very well, it is said, in all ordinary kinds of muddy water; but our peculiar kind of red shale soil so discolors the water that it baffles the process for filtering for several days after a freshet. The water is soft. The filters are arranged by some back action for cleansing. There is no sewage in the stream or river above the point from where it is taken out of the river.

About half, or more, depend upon wells. A small proportion use cistern-water, arranged with filters.

Slaughter-houses are inspected by the Board of Health in summer time, and ordered kept as clean as possible. Also, all outhouses are ordered cleaned, and kept so, as far as possible.

No evil to health arising from any manufactories.

The Board issue circulars, and distribute them in Somerville, Raritan and Bound Brook, suggesting disinfectants and plans for preventing disease and sickness.

HILLSBOROUGH TOWNSHIP. *Report from* W. H. MERRELL, M.D.

Malaria has been less frequent than for two or three years.

During the winter and March, typhoid-pneumonia prevailed endemically. The type was severe, and several cases proved fatal. The Assessor inquires faithfully as to losses of animals and contagious diseases.

When the last report was sent, the Board were engaged with a nuisance at Van Aiken Station. When Mr. McPherson was informed in the matter, he expressed his determination to do everything in his power to abate the nuisance; and he did; and the Board needed only to advise in the matter.

MONTGOMERY TOWNSHIP. - *Report from* WM. OPPIE, *Secretary.*

In making my assessment this summer I have had a good opportunity to look over this township, and I found it in as good condition for cleanliness as could be expected. We have had no prevailing disease with us this season, and the general health of this township has been good.

What few cases of malaria we have had have been very light, and those mostly persons that came from other localities.

SUSSEX COUNTY.

STILLWATER TOWNSHIP. - *Report from* C. V. MOORE, M.D.

As to the health of the township, there has been less disease and sickness than usual, nearly the same amount of intermittent fever, less typho-malarial cases; a few cases of dysentery in the village of Stillwater, all yielding to treatment.

We have seven other reports from townships of Sussex county, which show that the assessors are attentive to their duties, but that town committees often fail to consult as to the health of the townships. Yet facts are before us which show that malaria factories exist in some localities in the county; that many children have been lost by contagious diseases which proper isolation and instruction would have prevented, and that a local outbreak of typhoid fever occurred, "which was very plainly attributable to polluted drinking-water."

—*Secretary.*

UNION COUNTY.

CLARK TOWNSHIP. - *Report from* WILLIAM J. THOMPSON.

The local Board of Health supervise matters relating to public health, and have acted promptly in all cases brought to their notice.

CRANFORD TOWNSHIP. - *Report from* JOHN W. CLOSE, *Secretary.*

The prevalent disease of the past year was dysentery, which at one time assumed a malignant form; but by prompt action of the Health Board in abating nuisances and using disinfectants, and the untiring efforts of Dr. MacConnell, we escaped a very severe visitation of the disease. It was principally confined to children.

FANWOOD TOWNSHIP. - *Report from* F. W. WESTCOTT, *Secretary.*

I know of only one instance of disease, where a farmer lost five horses; pronounced by the veterinary surgeon spinal meningitis.

A marked improvement in the cleanliness and care of our slaughter houses have been noticed, so that we have been entirely free from complaint or even cause for complaint.

This has been a remarkably healthy year. The only exception was last winter, when a number of cases of pneumonia existed, many

ending in death. Malarial fever seems to be on the decline, and not a single case of cholera infantum, to my knowledge, happened in the township last summer.

Fanwood has had an epidemic of measles during the past year of a very mild type. Typhoid fever is unknown in our township, not a single case to my knowledge during the past three years.

LINDEN TOWNSHIP. - *Report from* Dr. P. P. MEDLIN, *Secretary.*

Malaria has been the most prevalent of any other disease in this township this year, and of that, much less than formerly. A few cases of pneumonia, but one of which was fatal.

The sanitary condition of the township has been carefully looked into, and found to be very good indeed.

SPRINGFIELD TOWNSHIP. - - *Report from* W. B. STILES.

There is a belt of swamp land lying in the village detrimental to health. It needs draining. The bed of the stream would have to be lowered several feet for a distance of two miles, and if the State would make an appropriation for such a purpose, it would be a grand, good thing. There is occasionally a case of malaria in our township.

The assessor makes all necessary inquiry as to losses of animals and contagious diseases, and is ever ready to report any contagious diseases known to him to the Local Board.

SUMMIT. - - *Report from* DAVID M. SMYTHE, *Secretary.*

The water-supply is from cisterns, wells and springs. Many of the springs are impregnated with iron. The water from the wells is comparatively pure. Many of the cisterns are divided by a soft brick partition, through which the rain-water percolates and is rendered thereby very pure.

The depositories for sewage are cesspools, with cemented bottoms and sides, emptied by the "odorless process," the refuse matter, &c., composted and used for fertilizing purposes.

Our township is free from malarial diseases. Several cases of dysentery have occurred this fall, confined to the aged, and, with but one exception, have yielded to appropriate remedies.

The Secretary of the Board keeps a full record of vital statistics for local reference.

The care over contagious diseases, the removal and burial of persons dying therefrom, is regulated by this Board.

WESTFIELD TOWNSHIP. - *Report from* JOHN M. C. MARSH, *Sec'y.*

The local Board has the past year established a system of ordinances for the protection of public health, which have been obeyed, and but very few complaints have been made to the Board for their enforcement.

WARREN COUNTY.

FRELINGHUYSEN TOWNSHIP. - *Report from* F. HORBACH, M.D.

During the year malarial diseases, mostly of the intermittent type, cholera morbus, cholera infantum and dysentery have prevailed to a slightly greater extent than for three or four years previously, but never reached the dimensions of an epidemic. The only epidemic was of scarlatina. Commencing in February it lasted until July, and numbered fifty-six cases. Of the whole number, forty-five were mild and eleven of the anginoid type. Nephritis, followed by anasarca, occurred in eight, acites in seven, and diphtheria in one case. Three cases were fatal, the one complicated by diphtheria and two from the complication of acute nephritis. Enlarged cervical glands occurred as a sequel in seventeen cases, and facial paralysis in one. A few sporadic cases of measles, and three cases of röthlen are noted. Not one case of typhoid has occurred, and only thirteen cases of pneumonitis.

GREENWICH TOWNSHIP. - *Report from* WILLIAM SHERRER, *Sec'y.*

The health of the township has been good. No contagious disease among man or animals. Some malaria still exists. The water-supply is from wells, cisterns and springs. There was complaint in one or two instances of cisterns, during the hot weather of July and August. I think it was owing to the condition of the roofs of the houses, they being very old and rotten. Houses are lighted by lamps, dwellings are heated by stoves, using coal as fuel in winter and wood in summer. In general, dwellings are not provided with fire-guards or escapes.

HACKETTSTOWN. - - *Report from* JOHN S. COOK, M.D.

The year was characterized by a visitation of scarlet fever in the borough, during the months of April and May, of an exceptionally fatal type. We seldom have this disease to prevail as an epidemic, or, at any rate, this has been our experience during the past thirty years. Malarial fever, of a typhoid type, prevailed during February,

March and April, to which your attention was called as it visited the C. C. Institute. Other than these, our town experienced its usual amount of sickness. The present year has been, if anything, more than usually free from any visitation of disease. Malaria has prevailed, but not so generally or of so severe a form as of last year. The Board has been called upon to abate a few nuisances, brought to their notice by personal complaint, and have endeavored to remove them. They have made an effort to instruct the citizens of our borough as to the necessity of removing all sources from which disease may be developed, as well as to the course to be pursued during their prevalence. Enclosed you will find several orders issued by direction of the Board. Much can be done toward the prevention and the abatement of disease by calling the attention of the citizens to its prevalence, and as to what may be done to abate or prevent it. Local Boards can accomplish but little, if they are not supported to a certain extent by public sentiment. Once arouse the citizens of any community to see the necessity of taking a certain course of action and they will respond by initiating and carrying out whatever course may further the accomplishment of the desired result. Our Board is at present laboring under this difficulty. They wish to remove a certain source of disease, but cannot accomplish their purpose until the citizens are brought to see the necessity of making the necessary outlay of money to secure the improvement the Board thinks should be made. They hope, however, at no distant day, to receive the desired coöperation of every good citizen, and thereby remove from our midst a very fertile source of disease.

The following petition was sent to the mayor:

To the Hon. Charles J. Ruse, Mayor, and the Common Council of the Borough of Hackettstown:

At a meeting of the Board of Health, on the 8th inst., called by the President and regularly organized, to act upon a petition in writing and signed by three of our citizens, in which a complaint was presented against the drain or sewer running from Main street to the slough at the head of Bower's pond; the Board having resolved itself into a committee of investigation to view the premises, instructed the President to bring the matter to the notice of your Honor, and through you to the Council of our borough.

The drain is in an unfinished condition, as it empties into the slough instead of into the stream, and leaves a large deposit of surface-water,

after every rain, to run through the swamp and be exposed to the action of the sun. The citizens living in the immediate vicinity are not only annoyed by the noxious vapors emanating therefrom, but residences have been rendered almost untenable by them and the adjacent surroundings. The Board would recommend the opening of a ditch running directly from the outlet of the drain to the stream, which would prevent the spreading of the water discharged from the drain, over the surface of the swamp.

The Board also directed the President to call your attention to the condition of the whole pond, believing, as they do, that it is a fruitful source of malaria. In support of this belief, they would direct your attention to the many cases of malarial fever which has afflicted the families living on the east side of Main street, from opposite Centre street to Mill and Willow Grove streets, and down these streets.

They would also call your attention to the condition of the sink built in Liberty street, near the saw-mill, to receive the surface-water formed in that neighborhood. That there have been serious cases of sickness in that vicinity, of a malarial character, and aggravated by the surroundings, no one can deny. The annoyance of the mud and water in the street, although great to those who are compelled to traverse it, is as nothing when contrasted with the deterioration in the value of the neighboring property, and the detriment to the health of the citizens living near it.

They would also suggest that the condition of our main street calls for your active attention. They would not advise the adoption of any particular plan to remedy the existing condition, but would leave it to the good judgment of your honorable body to do something to remove the existing reproach upon our reputation as a desirable place of residence; and also the threatening of a terrible epidemic which, in consequence of its condition, may visit us at no distant day.

If there be one point where public sentiment should be sensitive, it is in the sanitary condition of the dwellings of the people and their surroundings. If the earth upon which these dwellings are erected, and the soil in their immediate vicinity, is not properly drained, and is permitted to receive and retain the garbage and the surface-offal deposited upon them, thereby giving rise to noxious vapors and a vitiated atmosphere, for every one coming within their range to breathe, there must be but one result, an increase of sickness and disease, and the longer these conditions are permitted to exist the more sure must the ratio of deaths in the community be seriously increased. Such a

condition is of vital importance, so much so that the proper authorities ought not to content themselves with official recommendations, but take immediate action of a most radical nature for its suppression. While our Board, as at present constituted, might be individually benefited, in a business sense, by neglecting to take the proper course to remove, as far as possible, all sources of disease, they claim to be actuated by a higher and more noble motive—that of the promotion of the public welfare. While they regret that their action on a former occasion was not seconded by your predecessors in office, and did not receive the assistance their recommendations warranted, they fully believe that if the opposite course had been taken, not only the number of cases of serious sickness would have been lessened, but the valuable life of at least one of our citizens might have been saved. It is, therefore, for your honorable body to determine whether you take such action to remove these obstacles to the health of our community, by passing the proper ordinances having in view their suppression, or permit them to continue, not only to bring reproach upon the good name of our borough, by driving from us many who might seek to make investments for the purpose of becoming residents with us, but to expose our citizens to the developing dangers we have endeavored to bring to your notice, the ultimate result of which must be the production of disease, so long as these conditions exist, and must certainly result in the sacrifice of many valuable lives.

Sinks and Drains.—The Board of Health desire to call the attention of the citizens of the town to the importance and necessity of looking after the condition of their cesspools and drains. The fact is well recognized that a large percentage of the sickness prevailing in our towns and in closely-settled communities can be prevented by taking the precaution of having this portion of our dwellings correctly constructed and kept in good repair. Every citizen should see that their drains have a capacity large enough to carry away from dwellings whatever liquid material may be thrown into them; that every pipe connecting with their sinks is furnished with a perfect trap, and that their cesspools have capacity sufficient to receive all material coming into them, and that they should be of sufficient depth to insure against the surrounding soil becoming impregnated with noxious material. Those having water-closets in their dwellings should be aware of the fact that these conveniences are not safe unless the drain-pipes are properly ventilated, and this cannot be done unless these pipes run from the closet directly through the roof of the dwell-

ing, so as to secure a circulation and draught of air through them and prevent the syphoning of the traps in the pipes running to the bath-tubs and wash-basins; and when the connections are at all complicated and numerous, the traps should be ventilated through a properly-constructed pipe, which any competent plumber can apply. With these simple precautions, much sickness can be prevented, and when we read of the many fatal cases of diphtheria, typhoid and typho-malarial fever which have been traced to their neglect and which could have been prevented by their observance, we can see the necessity of taking every precaution which may make more secure the happiness, comfort and life of every citizen.

Scarlet Fever.—The experience of this community during the past two weeks should impress upon the mind of every citizen that the scarlet fever is in our midst, and prevailing in a form that, for this locality, is exceptionally fatal. It is essentially a disease of childhood and unmistakably contagious, and every one should see the necessity of using every means of preventing its dissemination. The first and most important step to take is to keep the healthy from the sick, and, where this is impossible, seclude the latter and disinfect as far as possible every article that has come in contact with them. This can be done by the use of chlorinated lime, carbolic acid, and strict attention to cleanliness, frequent changes of linen, which, after being changed, should be placed in water containing these disinfectants, and then washed. The strength of these solutions can be learned from the attending physician. The best mode of disinfection for articles that cannot be washed, is to expose them to a high degree of heat and then give them a thorough airing. There are small articles used about the sick, such as small pieces of linen, which can be burned. Patients should be separated from each other whenever possible, for experience has proved that the neglect of this precaution has increased the severity of individual cases.

Thorough ventilation of the sick-room is of the utmost importance, and this can be accomplished without subjecting the patient to a direct draught of air, although in those cases where the temperature runs exceptionally high, this is of no injury to the patient. Those recovering from the disease should not be allowed to mingle with the well or those who have never suffered from the disease, until the skin has become smooth and well, and not then until the body has been thoroughly washed and dressed in clean, fresh clothes. To prevent the spreading of scarlet fever by means of well persons, brothers, sisters

and other members of the families of patients, should be denied entrance to schools and public assemblies until the complete disappearance of the disease. These precautions are rendered the more necessary when we take into consideration the fact that even during an epidemic of a mild type, or when one or more members of the family have a mild form of the disease, a well child may take the disease in its malignant form and die, or may recover with some unavoidable sequel such as loss of sight or deafness. All display should be avoided at funerals of those who have died of scarlet fever, and the dead should be buried at the earliest possible hour circumstances will permit, and be kept shut off from all contact with the living during the time preparations are being made for the funeral, especially when the disease is of a severe or malignant type. Children should not be allowed to be present or take part in the funeral ceremonies. The opening of the coffin in the presence of the assembly of friends should not be permitted.

KNOWLTON TOWNSHIP. - *Report from* W. F. GREENE, M.D.

Malaria has been, during the past year, markedly on the increase in certain portions of the township. This increase is due to a variety of local causes, and to general atmospheric conditions. One of the former is the raising of a dam along Paulin's Kill, thus overflowing the low lands in the vicinity—the water remaining stationary and becoming stagnant. An undoubted cause is also the removal of trees and a thick, bushy growth covering a considerable area of marshy land in the vicinity of Hainesburgh and along Paulin's Kill, thus exposing the moist, marshy surface to the direct influence of the sun's rays. The great diurnal thermal changes during the past season have also been powerfully instrumental in producing this increase. Such rapid fluctuations of temperature, due in great part to the earth's nocturnal radiation of heat, very decidedly affect, according to medical authority, and indeed to common observation, the conditions of health, and exposure both to the midday heat and the night's chill appears to be a fruitful cause of malarial disease. Says an authority on this subject: "It is after or at sunset that the malarial influence prevails, and it tells most when a cold night follows a hot day." Watery exhalations also favor the increase of malarial disease. The above conditions, more especially that relating to atmospheric changes, have doubtless been influential also in the production of catarrhal fever, many cases having appeared of catarrhal inflammation of the mucous membrane

of the intestinal tract, accompanied with an unusually marked congestion of the membrane and copious sanguineous effusions.

All outbuildings seem to have been located with a proper regard to the water-supply, and, with a few exceptions, occupy the most advantageous positions in a sanitary point of view. Due attention also seems to be devoted to the cleanliness of these buildings, both in the removal of the accumulations when required and in the use of disinfectants.

Distemper, so called, appeared in one instance among horses. No spread of the disease was, however, reported.

OXFORD TOWNSHIP. *Report from* L. B. HOAGLAND, M.D., *Sec'y.*

During the months of May and June we had a very severe epidemic of measles in our township. In the town of Oxford about one-third of all the cases were followed by pneumonia, with a large proportion of deaths, principally due to careless nursing. Have also had an epidemic of mild scarlet fever, with no deaths.

WASHINGTON BOROUGH. *Report from* W. M. BAIRD, M.D., *Sec'y.*

Many cases of complaint have come before our Board the past year. The majority of these were easily disposed of, as the parties complained of would correct nuisances when the secretary would show them wherein they were at fault. With the first warm weather in the spring we had considerable complaint against the slaughter houses situated in borough limits. Some people were so radical as to demand their removal entirely from the borough limits. The Board, however, permitted them to remain, but insisted that the owners should keep them in such condition as would prevent their being a nuisance to any one. This they have done, and we have heard no further complaint.

During 1882 a public water-supply was brought to our town, thus making an increase in sewerage with no public sewers, and has been a means of considerable trouble. The most serious has been with the Washington Building and Loan Association, who own a large hotel property in the center of town. Their waste all emptied in a large cesspool, which had been full for over a year and was only kept from overflowing by frequently carting away part of the contents. But they became negligent as to keeping it down, and frequently allowed it to overflow and so become a nuisance. They then started to lay pipes to a small creek running through town, the pipes to carry the

overflow from the cesspool. The Board forbade this, as in dry weather the creek carried scarcely any water. Paying no attention to the Board, we secured a temporary injunction, and on the association agreeing to empty the contents of the cesspool in the creek only at such times as the creek carried a full supply of water and on approval of the Secretary of the Board of Health, and they paying the costs of the suit, we withdrew the suit. This suit has had an excellent effect, as it has convinced a strong association that they cannot defy the Board of Health any more than any other authorities. But the matter of sewerage is going to remain an important matter here until some means is provided for its disposal.

Lately the Secretary was asked to inspect the public school. This is a large two-story building, with garret and basement. They get their water from a cistern, and the privy-vaults are probably 100 feet from the building. In the basement is a steam-heating apparatus in one room, and the waste-pipes of this empty in a cesspool under the cement floor of the room. This became foul some years since, when the Trustees tore it up and found it to be simply a hogshead sunk in the ground. They made a brick cesspool, broken joints and arched over. Into this cesspool empty pipes from one-half the rooms upstairs, these pipes being connected with wash-basins in each room, and no trap of any kind.

In another room in the basement is another cesspool, into which empty the basins from the other half of the building, and no traps. This cesspool has never been taken up, and is presumably like the former in its original state—simply a hogshead sunk in the ground. An adjoining room in the basement has been fitted up recently for a primary department, on account of the over-crowded condition of the school.

It still remains to be seen what action the Board of Trustees will take in the matter. The argument already used is, that it cannot be seen why any expense should be incurred in changing when this has been there for a dozen years and no sickness has arisen. But we have an intelligent Board of Trustees, and I have no doubt they will correct it as soon as practicable. I think it about time that Boards of Education insist that teachers shall be sufficiently informed in sanitary matters to enter their protest against any such condition of affairs.

REPORT OF THE COMMITTEE OF PUBLIC ANALYSTS AND INSPECTORS OF THE STATE BOARD OF HEALTH.

BY PROF. A. R. LEEDS, CHAIRMAN.

HOBOKEN, January 17th, 1884.

E. M. Hunt, M.D., Secretary of the State Board of Health:

DEAR SIR—I transmit herewith the reports of the members of the Committee of Public Analysts and Inspectors, duly appointed by the State Board of Health. This committee was called together shortly after its appointment, and its members undertook to enforce in their several districts the provisions of the law concerning kerosene, to analyze the samples of milk condemned by the inspectors thereof, and to prosecute offenders against the law concerning the adulteration of food. I transmit herewith the reports of the analysts and inspectors.

The principal new feature of the work done during the past year has been the steps taken to carry into effect the provisions of the law concerning kerosene. The extension of the system of personal inspection, already begun with the most encouraging success, will result in the exclusion from the New Jersey market of oil below the standard prescribed by the State law.

From a valuable report by Prof. Cornwall, upon "Malt Beverages and their Adulterations," it will be seen that no adulterations were detected in a considerable number of samples of beer submitted to analysis, and in their percentage of alcohol they were of full strength. But safety to the consumer, and the proper standard of quality, are only to be secured by a system of constant oversight and inspection. The best interests of both manufacturer and consumer are most effectually served in this way.

At the request of the State Board of Health and the State Inspector of Milk, the Committee of Analysts made a careful re-examination of the composition of the milk produced and sold in the State, to ascertain whether the standard prescribed by the law for market milk had been set too high. The results of all the analyses, both individually and collectively, go to show that this is not the case. To lower the standard, in opposition to the fair and impartial evidence thus obtained, would be for the State to put a premium on the production and sale of inferior milk. The State Inspector of Milk and his assistants have already performed a service of most calculable value, and, in gratitude therefor, their hands should be upheld and strengthened by maintenance of the law as at present existing.

It now remains for the same system of personal inspection and control, which has been inaugurated in the case of kerosene and milk, to be extended to the articles intended to be defended from adulteration by the general law relating to the "Adulteration of Food, Drink and Drugs." This work can be best accomplished by a State officer, specifically intrusted with carrying the provisions of this law into effect. The gentlemen who have given their services to the State Board of Health, in some instances with none, in all the others for a nominal remuneration, in order that the public might be informed, by means of reliable investigations, of the adulterations actually practiced, have accomplished this preliminary work faithfully and well. The work of the future is that of carrying the cases, after the fact of adulteration has been established, into the courts of law, and no one but an executive officer, properly authorized and remunerated, would be able so to do.

REPORT OF DR. T. B. STILLMAN, SPECIAL DISTRICT INSPECTOR, AS MADE TO PROF. A. R. LEEDS.

DEAR SIR—In submitting this partial report on the examinations of illuminating oils, &c., for this district, I would respectfully state:

When the new law went into effect, July, 1883, the retail dealers, as well as the grocers, were entirely ignorant of the law's requirements respecting the flashing-point, &c. I applied to E. M. Hunt, Secretary State Board of Health of New Jersey, and obtained 500 copies of the circular issued July, 1883, relating to the inspection of oils, which circular also included the law as amended, to take effect in July, 1883. From a few examinations personally made in the city of Hoboken, I found that nearly all the grocers sold two qualities of oil, viz: first, "Amber oil," having a flashing-point varying from 85° F. to 92° F., and selling at from eleven to thirteen cents per gallon; second, "White oil," or, as some called it, "Astral oil," having a flashing-point varying from 96° F. to 102° F., and selling for from fourteen to sixteen cents per gallon. The first oil, "Amber oil," does not come up to the test (100° F. flash) as required by law, and in every instance I could have commenced suit; but as many of the grocers had purchased this oil, not by flash test, but as 130° test, they evidently were not the proper parties to sue, but the wholesale dealers; and as this oil, in most cases, had been purchased before the law went into effect, I considered it better to notify each dealer personally of the new law, and by also leaving one of the circulars relating to the subject as issued by the State Board of Health. By this means all of the dealers in Hoboken, and part of Jersey City, have been notified, and have more or less complied with the law by refusing to purchase or sell any oil except "White oil," standing a test of 100° F. flash. Nearly all the first-class grocers refuse to sell the "Amber oil," as the margin of profit is small and the risk of $500 fine too great; and the cases where I have found the "Amber oil" sold are among the grocers supplying the poorer classes of the population. It would seem to be unfair to sue these grocers, but it would be just and right to make the wholesale dealers and refiners of the oils responsible. Not only this, but the actual "flash test," not "fire test," should be upon each barrel as sold. Most all the oil is sold as 150° F. "fire test," and, as the fire test has no relation to the "flash" test, the grocer has no remedy against the dealer of whom he purchases.

Below I give the tests as indicated on a number of samples from this district:

No. 1. Grocer, T. Ward, Hudson street and Newark street, Hoboken.—"White oil." Flashes at 99.5° F.; sells at 15 cents per gallon.

No. 2. Grocer, Grothusen, Washington street and Fourth street.—"Amber oil." Flashes at 89° F.; purchased from wholesale dealer, A. J. Brockwedel, Jersey City; selling price, 12 cents per gallon.

No. 3. From Messrs. Gardner & Dudley, Orange, N. J.—"Amber oil." Flashes at 85° F.

No. 6. Grocer, Woltjen Bros., Fourth and Bloomfield streets, Hoboken.—"Astral oil." Flashes at 97° F.; wholesale dealer, E. A. Brockwedel, corner Harrison and Hoboken avenues; selling price, 15 cents per gallon.

No. 7. Grocer, John Wurdemann, Third and Bloomfield streets, Hoboken.—"Astral oil." Flashes at 97° F.; wholesale dealer, E. A. Brockwedel; selling price, 15 cents per gallon.

No. 8. Grocer, Charles Booken, Second and Bloomfield streets, Hoboken.—"Amber oil." Flashes at 88° F.; wholesale dealer, Gouche, West and Bank streets, New York; selling price, 11 cents per gallon.

No. 9. Grocer, Charles Booken.—"Astral oil." Flashes at 98.5° F.; wholesale dealer, J. Donnelly & Co., Jersey City; selling price, 15 cents per gallon.

No. 10. Grocer, Woltjen Bros., Hoboken.—"Astral oil." Flashes at 99.5° F.

No. 11. Grocer, Winters, Union Hill, N. J.—"Astral oil." Flashes at 99° F.; sells at 13 cents per gallon.

No. 12. Grocer, Moses Blank, Hoboken.—"Astral oil." Flashes at 100.5° F.; wholesale dealer, J. Donnelly & Co., Jersey City.

I could give you a large number of these tests, but they show about the same as the above, viz.: that the "Amber oil" is not suited for use with a flashing-point averaging 90° F., and should be excluded; that the "White oil" stands practically the test of 100° flash, though in a few instances 97°. Every grocer selling "Amber oil" has been notified that his oil is below standard, and not to sell it any more; if found doing so, suit will be commenced at once.

The amount of work required to inspect this district (Essex, Hudson, Middlesex and Union counties, the most populous in the State,) is great, and in Jersey City and Newark large quantities of this "Amber oil" are being sold, and no doubt also in other cities not yet inspected. *Personal inspection* is the only method by which poor oil can be driven out of the market. In Jersey City and Hoboken there are 708 grocers, and in Newark over 1,000 grocers, and as no attention is paid to circulars of the law sent by mail, I have found that the only method is as above stated, taking a sample of the oil personally and notifying the grocer of the result. In no instance can "Amber oil" be purchased now where I have tested the oil and informed the grocer of his liability to a $500 fine.

REPORT OF SHIPPEN WALLACE, ANALYST.

As one of the analysts appointed by you, I have the past year examined a large number of samples of kerosene, a number at the solicitation of individual sellers and users, a larger number obtained by me or at my suggestion. Of articles of food, I have had brought to me three samples of sugar, which proved, on analysis, to be adulterated with grape sugar. I have also had ten samples of "spices," which proved to be adulterated. The price at which they were sold indicated that they could not be pure. The analyses of milk which I made, according to the resolution passed at the meeting last fall, you already have my report of.

The samples of oil which I have tested represent, I think, the quality sold and used in this end of the State. They were mostly under the legal standard of 100°, but not to the extent I had expected to find. Quite a large quantity sold is 112° fire test, Pennsylvania. This oil will not be more, by my experience, than 92°–95°, New Jersey standard of 100° flash. One reason of its sale is that it is a few cents cheaper than higher-testing oil, and some persons claim, erroneously, that it gives a more brilliant light.

I have not found the law to be carried out by dealers in the matter of details as to labels, &c., in fact, a great many claim ignorance of there being any law on the subject. I have found that the sale of oil which is intended for use in lamps, and which is substantially naphtha under another name, such as "Genii oil," &c., has decreased to a very great extent. I know of two persons who continue to sell it, although informed that they render themselves liable to the penalties of the law. We may yet need to prosecute them.

I have a record of fifty-eight samples of kerosene tested, but a number I made no record of, knowing at the time that I had already examined the same dealers' oil a short time previously.

I append the temperature at which the oils flashed, with the instrument adopted by your Board being used. I do not embrace the naphtha samples, which burned at the ordinary temperature, and of which, as I stated, I found two persons selling for use in lamps.

Temperature of oil at flashing..	85°–90°	90°–95°	95°–100°	100 and over.
Number of samples.....	9	22	10	17

REPORT OF WM. K. NEWTON, M.D., ANALYST.

Kerosene Oil.—Sixty-one samples of illuminating oil, from various parts of the State, have been tested during the past year. Some of these samples were collected by myself, while others were sent me for examination.

Of the sixty-one samples tested, only five were below the standard, and, when notified, the dealers stopped the sale of this quality of oil.

The oil law has undoubtedly done much good, and that without expense to the State. The work has been done quietly but effectually.

Milk.—I was directed by your Board to obtain samples of pure milk, and submit them for analysis to the Public Analysts of this State, with the view of testing the State standard fixed by the milk adulteration law, to see if such a limit would do injustice to any producer.

I beg to report that I have attended to your instructions as follows:

Eight samples of pure commercial milk—that is, the mixed milk of more than one cow—were collected in West Jersey, and submitted to Shippen Wallace, Esq.

Eight samples were collected in Hunterdon county, and were submitted to Professors Leeds and Cornwall, duplicates being sent to each.

Nos. 616, 617, 618, dairy of Pickles & Brothers.
615, 619, dairy of P. Voorhees.
614, 620, dairy of G. A. Clum.
472, dairy of J. N. Pidcock; sent to Prof. Cornwall only.
373, dairy of J. N. Pidcock; sent to Prof. Leeds only.

The duplicate samples were to be analyzed as follows:

Prof. Leeds was to follow the Ritthausen process; Prof. Cornwall the Cairns process. This was to be done with the view of testing the methods, to see if concordant results could be obtained by two chemists working on the same sample, but with different methods.

Mr. Wallace, in his samples from other sources, followed the almost universally accepted method of Wauklyn.

SPECIMEN ANALYSES OF MILK AND METHODS.

BY MESSRS. LEEDS, CORNWALL AND WALLACE.

Analyses of eight samples of commercial milk from Hunterdon county, collected by the State Inspector of Milk, and received December 5th.

METHODS OF ANALYSIS.

Determination of Water.—5cc. of milk are weighed in a platinum capsule, coagulated by absolute alcohol, evaporated on a water-bath, brought to constant weight in an air-bath at 105°. (100° C. is not high enough; at 110° there is sometimes partial caramelizing, and therefore 105° is adopted as a satisfactory mean).

Total Solids.—Heat the residue first gently, then at low red-heat until completely incinerated; cool in desiccator and weigh.

Albuminoids and Fat,—10cc. of milk are weighed in a beaker, 100cc. of water added, the albuminoids precipitated by standard solution of copper sulphate, and the supernatant liquid exactly neutralized by standard solution of potash. After filtration and proper washing, the precipitate is dried by opening out the filter-paper on a glass plate and careful manipulation. It is then completely exhausted of fat by allowing it to swim for two hours in ether while properly supported in the filter-paper, enclosed within a funnel under a return-cooler. The ether is collected in a small weighed flask, and, after distillation, the fat is left behind and weighed. The albuminoids are determined by igniting the albuminates of copper, left behind after extraction of the fat.

Sugar.—In the aqueous filtrate from the albuminates and fat, sugar is determined by Fehling's solution.

After having employed for several years the older methods, I have adopted those above stated as being not more tedious than those usually followed, and much more accurate. They render it possible to make a complete analysis of milk in which the sum of the several constituents found should equal the amount of total solids, and thereby afford to that extent a proof of the accuracy of each step of analysis. Moreover, the methods have the elegance and precision of an assay for gold or silver, and I am quite sure that no one who has familiarized himself with them will willingly return to the older methods.

SAMPLE NO. 373.—DAIRY OF J. N. PIDCOCK, WHITE HOUSE.

Specific gravity		1.0288
Water		85.43 per cent.
Total solids		14.57 "
Fat	6.73	"
Sugar	4.02	"
Albuminoids	3.14	"
Ash	0.62	"
Sum		14.51 "

SAMPLE NO. 614.—DAIRY OF G. A. CLUM, WHITE HOUSE.

Specific gravity		1.032
Water		84.75 per cent.
Total solids		15.25 "
Fat	5.98	"
Sugar	4.37	"
Albuminoids	4.21	"
Ash	0.56	"
Sum		15.12 "

SAMPLE NO. 615.—DAIRY OF PETER VOORHEES, WHITE HOUSE.

Specific gravity		1.0323
Water		86.56 per cent.
Total solids		13.41 "
Fat	3.66	"
Sugar	4.33	"
Albuminoids	4.68	"
Ash	0.68	"
Sum		13.35 "

SAMPLE NO. 616.—DAIRY OF PICKLES & BROS., WHITE HOUSE.

Specific gravity		1.308
Water		87.14 per cent.
Total solids		12.86 "
Fat	4.87	"
Sugar	4.07	"
Albuminoids	3.38	"
Ash	0.64	"
Sum		12.96 "

SAMPLE NO. 617.—DAIRY OF PICKLES & BROS., WHITE HOUSE.

Specific gravity		1.0315
Water		87.01 per cent.
Total solids		12.99 "
Fat	3.55	"
Sugar	4.23	"
Albuminoids	4.49	"
Ash	0.53	"
Sum		12.80 "

SAMPLE NO. 618.—DAIRY OF PICKLES & BROS.

Specific gravity		1.0315
Water		86.85 per cent.
Total solids		13.15 "
Fat	4.03	"
Sugar	4.24	"
Albuminoids	4.03	"
Ash	0.62	"
Sum		12.92 "

SAMPLE NO. 620.—DAIRY OF G. A. CLUM.

Specific gravity		1.030
Water	82.93	per cent.
Total solids	17.07	"
Fat	8.10	"
Sugar	4.28	"
Albuminoids	3.90	"
Ash	0.62	"
Sum	16.90	"

SAMPLE NO. 619.—DAIRY OF PETER VOORHEES.

Specific gravity		1.030
Water	86.61	per cent.
Total solids	13.39	"
Fat	5.26	"
Sugar	3.93	"
Albuminoids	3.65	"
Ash	0.43	"
Sum	13.27	"

I have the pleasure to acknowledge, in the performance of these analyses, the coöperation of Dr. E. Everhart, Milk Inspector for Jersey City and Hoboken.

I enclose herewith my report on eight samples of milk received from Dr. Wm. K. Newton, about December 5th. All but the ash determinations were made as soon as the milk came to hand, the ash being determined at my leisure on the solids left after extraction of fat by Cairns' method. Cairns' method consists in weighing out five grammes of milk in a platinum dish, drying on water-bath; then in drying oven at 100° C., until the solids lose less than five milligrammes between two dryings, extending over half an hour. From the solids thus dried the fat is extracted by means of ether boiled with them in the dish, six separate portions of ether, of ten cubic centimeters each, being used. The ether is poured off each time (not through a filter) into a weighed beaker, evaporated at a gentle heat, the fat dried at 100° C., and weighed. The ash was determined by igniting the extracted solids in the dish at the lowest possible temperature, until free from carbon. The specific gravity was taken by weighing in a flask holding about twenty-five cubic centimeters of water, at 60° F., the temperature of the milk being 60° F., at the time of weighing.

MIXED MILK.

No.	ORIGIN OF SAMPLE.	Water.	Total Solids.	Fat.	Solids Not Fat.	Ash.	Sp. Gr.
616	Dairy of Pickles & Bros., White House..	87.18	12.82	3.43	9.39	0.664	1.0303
617	" " " " ..	87.11	12.89	3.19	9.70	0.702	1.0313
618	" " " " ..	86.80	13.20	3.52	9.68	0.691	1.0299
615	" Peter Voorhees, " ..	86.80	13.20	3.43	9.77	0.703	1.0315
619	" " " " ..	86.56	13.44	3.74	9.70	0.693	1.0298
614	" G. A. Clum, " ..	84.83	15.17	5.17	10.00	0.721	1.0299
620	" " " " ..	83.39	16.61	6.08	10.53	0.750	1.0310
472	" J. N. Pidcock, " ..	85.55	14.45	4.73	9.72	0.691	1.0290

I enclose my analyses of twelve samples of herd milk, made for the State Board of Health, agreeable to the resolution adopted at the late meeting of the analysts. The samples were collected by and under the direction of Dr. Newton, by Deputy Milk Inspector Vandegrift and myself, and are known to be pure. They represent milk from herds in Burlington, Camden and Gloucester counties, the cows of which are of no particular breed, but come under the classification of "common," my object having been not to obtain the milk of cows known to yield a product of high standard, but that of those not possessed of any particular pedigree. These analyses do not show, therefore, the standard of the milk in the counties mentioned, as there are herds to be found there equal to any in the State, but they do show that the State standard of twelve per cent. milk solids is not, as is asserted by some, too high.

The method of analysis was that known as Wauklyn's, with some slight changes—the addition of a small quantity of absolute alcohol before evaporating to dryness. This method I consider the best and most satisfactory, the method of evaporating with sand having been shown to have many objections. The details of the analytical work I do not suppose you wish for. All the analyses were made in duplicate, and the formula of Mr. Helmer used in checking the "solids not fat" determination.

HERD MILK ANALYSES.

Total Solids.	Fat.	Solids Not Fat.	Ash.	Sp. Gr.	REMARKS.
13.50	3.93	9.57	.65	1.03132	
13.88	4.65	9.23	.62	1.02900	These analyses represent milk from herds of from eight to sixteen milking cows, the cows being of no particular breed, but coming under the class known as "common," and are from Burlington, Camden and Gloucester counties, and no two herds being near together. The milk was known to be pure and a well-mixed sample of the herd.
13.67	3.83	9.84	.70	1.03306	
13.38	3.69	9.69	.67	1.03132	
13.13	3.50	9.63	.60	1.03190	
13.85	4.15	9.70	.66	1.03248	
13.63	3.59	10.04	.70	1.03306	
13.55	4.55	9.00	.60	1.03016	
12.73	3.85	8.88	.58	1.02958	
13.98	4.34	9.64	.63	1.03190	
13.75	3.85	9.90	.54	1.03248	
13.36	4.13	9.23	.62	1.03045	
13.534	4.005	9.529	.....	.....	Average of the twelve analyses.

NOTE.—The amount of work done by the Committee of Analysts is thus briefly epitomized. The results of the milk analyses by different methods and by different experimenters, show a uniformity which will sustain the standard already adopted.

—*Secretary.*

MALT BEVERAGES AND THEIR ADULTERATIONS.

BY PROF. H. B. CORNWALL, PRINCETON, MEMBER OF COMMITTEE OF ANALYSTS.

It is universally admitted that the most wholesome malt beverages, including beers, ales, stouts, &c., are made by fermenting infusions of

malted barley with the addition of hops, the fermentation being induced by means of yeast.

The barley is steeped in water and then placed in heaps until the spontaneous rise in temperature has induced germination of the seed. At the proper time the vitality of the seed is destroyed by drying or roasting it, and the result is malt. The crushed malt is heated with water ("mashed"), and the infusion, or "wort," thus obtained is boiled with hops, and is then drawn off, rapidly cooled, and fermented with brewers' yeast in large vessels. Before the fermentation is entirely completed the yeast is removed and the beer put into casks, where it undergoes a very gradual after-fermentation.

During the malting process a portion of the starch of the grain is converted into malt sugar and dextrine, by the action of a nitrogenous compound, diastase, which forms at the same time. During the mashing the diastase acts on the remainder of the starch with a similar result. The hops impart to the finished beverage wholesome tonic properties, a pleasant and peculiar aroma and an agreeable bitter taste, while they also aid greatly in preserving it.

During the fermentation induced by the yeast the greater part of the sugar is almost always converted into alcohol and carbonic acid; minute quantities of organic acids are also formed. If an acetic acid or excessive lactic acid fermentation occurs, through mismanagement or use of improper materials, the result is a sour and unwholesome beverage, which is often entirely worthless.

From the above it will be seen that it is possible to make something like beer from any saccharine infusion capable of undergoing alcoholic fermentation, and hence substitutes for barley or for barley malt are often used. Starch-yielding cereals or other materials, such as wheat, maize, rice, potatoes and others, are employed, or various kinds of starch, since all of these can be converted into fermentable sugars. Grape sugar, or glucose, and other sugars are also directly employed. The barley malt is, however, less liable to undergo irregular changes during brewing, while some of the other cereals are particularly liable to lactic acid fermentation, and beers produced from glucose are more prone to acetous fermentation.

It is therefore very desirable that malt beverages brewed from anything except malted barley should receive distinctive names, although their use is very widely extended.

As regards the substitutes for hops, which will be enumerated later, it may be stated here that, while probably no decidedly poisonous ones

are now used, if they ever were extensively, yet not one yields so good a product. Many of them are innocent and mildly efficient tonic bitters; others have a tendency to derange the digestive system, and some simply impart to beer a bitter taste; but none exert the general good influence of the hop. Stillé and Maisch (*National Dispensatory*), after enumerating various ailments in which the hop exerts a peculiarly beneficial action, owing to the association in it of a bitter tonic with a direct sedative of abnormal nervous action, add, that a pure and strongly hopped beer contains all the virtues of this agent, but ordinary malt liquors are too often fraudulently adulterated to deserve such praise.

The use of malt beverages, already widely spread, is constantly increasing; and although beer and ale are often regarded merely as stimulants, yet very many people regard them as in great part both meat and drink. In Germany, especially, beer is regarded as something more than a superfluous luxury. E. Reichardt (*Archiv der Pharmacie*, 1880,) uses the following language: "For the greater number of beer consumers it would be of the greatest importance to educate such landlords as are generally found in Bavaria, who themselves understand how to handle beer, and now, trusted with this important agent of nutrition, exercise much more care in preserving and retailing it." He has been deploring the common practice of keeping beer at too low a temperature just before tapping it, not only to prevent a badly-made beer from becoming unsalable, but in order that its coolness may cover up the taste of an already deteriorated article.

Post (*Grundriss der Chemischen Technologie*) says that, owing to the increased consumption of beer, the art of brewing is emerging from an empirical occupation and is rapidly establishing itself as a science, clearly understood and adapted to its end, while schools of brewing have recently been established in several German towns.

Alb. Schmidt (*Archiv der Pharmacie*, 1878,) says: "Whatever may be thought of the direct nutritious value of beer, it is unquestionably to be removed from the class of luxuries and placed among the agents of nutrition, because the happy combination of refreshing, thirst-quenching properties of normal beer with a moderate nutritious effect (through the carbonic acid on the one hand and the extractives, dextrine, sugar and salts, especially phosphates, on the other,) render it a refreshing and strengthening beverage. It forms, for instance, in South Germany, an important part of the frugal meals of the working

classes, and in this part of the country (Ratisbon) the enjoyment of a certain quantity of beer is necessary for the most humble daily laborer, and furnishes him also, in a certain sense, a means of nourishment." He adds: "As it at present often reaches the consumer, beer does not indeed deserve the name of a nourishing agent, since its adulterations are extraordinarily numerous and widely spread. Adulterations of beer may be divided into two classes—the use of improper means to improve deteriorated beer, and the substitution of cheaper materials for malt and hops."

Here it may be as well to state that the substitution of glucose for malt, while it may increase the amount of alcohol, lessens the nourishing power of the beer, because glucose yields none of the solid extract which is furnished in considerable quantity by malt.

In accordance with a request from the Board of Health of New Jersey, the writer has examined a number of samples of what is commonly known as lager beer, the samples being from various sources. Some were bottled beer, others ordinary beer, intended for immediate use. Two were samples of well-known and favorite brands. The examination was confined to a determination of the alcohol, solid extract and chlorides, together with a qualitative test for certain foreign bitter principles, mostly derived from the hop substitutes said to be most frequently employed.

Beer and malt liquors in general contain water, carbonic acid, alcohol (ethylic), malt sugar, dextrine, resinous and gummy matters, bitter extractive, albuminoids, small quantities of glycerine, lactic, acetic and succinic acids, and salts. The percentage of alcohol and of "extract," consisting principally of the sugar, dextrine, albuminoids, bitter principles and salts, affords a convenient means of comparing different kinds of malt liquors, and it will be found that the proportions of alcohol and extract vary considerably. When glucose or similar saccharine substances have been used, the beer, &c., will be deficient in extract.

Post gives the following as the characteristics of a good beer: A proper proportion of alcohol; a "natural" aroma, dependent on the use of hops; perfect clearness; a sparkling and sufficiently foamy appearance; sufficient viscosity (dependent on the nature and amount of the solid extract), and a refreshing, vinous, sweetly-bitter taste. The description will be recognized by connoisseurs as an accurate one.

The following table, from Post, shows approximately the percentages of alcohol and extract in various beers:

	Alcohol.	Extract.
Bavarian Lager Beer	3.1–3.9	4.0–4.6
Munich Bock	4.3–4.8	8.6–9.4
Vienna Lager Beer	2.7–4.4	4.0–8.0
Pilsen Lager Beer	3.4–4.6	4.8–5.7
Culmbacher Beer	4.2	4.6

Blyth (*Manual of Practical Chemistry*) gives the following table:

	Alcohol.	Malt Extract.
London Porter (Barclay & Perkins)	5.4	6.0
London Porter	6.9	6.8
Scotch Ale	8.5	10.9
Burton Ale	5.9	14.5

In the report of the State Board of Health of New York, for 1881–82, the average of nineteen samples of lager beer tested for the Board, was given as follows: Alcohol, 2.781 per cent. (highest, 4.14; lowest, 1.45); extractive matter, 6.047 (highest, 7.26; lowest, 4.58). As will be seen hereafter, in this article, the average percentage of alcohol in the ten samples tested for our State Board of Health was decidedly higher.

The complete analysis of beer is a complex operation, requiring the determination of specific gravity, carbonic acid, alcohol, total extract, sugar, dextrine, albuminoids, glycerine, degree of acidity (usually reported as lactic acid), ash, phosphoric acid and chlorides, together with tests for hop substitutes, alkalies or alkaline earths (used to correct acidity), glycerine, salicylic acid and other substances which may have been used to improve a deteriorated article or to preserve the beer.

As has been already stated, the tests for the present report were confined to a determination of the specific gravity, alcohol, extract and chlorides, with an examination for certain foreign bitter principles. The determination of the alcohol, extract and specific gravity furnish, together with the physical properties, smell and taste of the beer, important indications as to the quality of the latter and the probable use of malt substitutes.

The estimations of the alcohol and extract were made by Ballings' indirect method, as given by A. Schmidt, (*Archiv der Pharmacie*, 1878); the chlorine (being the measure of the salt and other chlorides present) was made as Blyth directs, by extracting the charred residue from seventy cubic centimeters of beer with water, filtering and estimating the chlorine in the filtrate by standard solution of silver nitrate.

These determinations were all made by Dr. L. W. McCay, in the laboratory of the John C. Green School of Science, at Princeton.

The English authorities consider any amount of chlorine corresponding to less than fifty grains of common salt per gallon as admissible, and in none of the samples did the salt exceed thirty grains, while in general it fell below ten. The method of estimating the alcohol and extract was as follows: After removing the carbonic acid from the beer by violently agitating it in a closed flask and passing air through the liquid, the specific gravity of the beer is taken; then 100 cubic centimeters is weighed in a porcelain dish, evaporated to one-third of its original volume, cooled and water added, until the first weight of dish and beer is again reached. The watery extract solution is then filtered, its specific gravity is taken, and, by means of proper tables, the percentage of extract corresponding to the observed specific gravity is obtained. By subtracting the specific gravity of the beer before evaporation from that after evaporation, and then subtracting this difference from 1.000 (the specific gravity of water), we obtain a figure representing the specific gravity of a dilute alcohol, equal in alcoholic strength to the beer.

Dr. McCay obtained the results given below:

Sample.	Specific Gravity.	Alcohol, Per Cent.	Extracts, Per Cent.
1	1.0155	4.11	5.6
2	1.0124	4.25	5.0
3	1.0093	3 52	4.4
4	1.0136	4.47	5 3
5	1.0188	4.64	6.7
6	1.0227	4.29	7.5
7	1.0175	5.16	6.5
8	1.0265	4.58	8.6
9	1.0191	3.94	6.5
10	1.0153	3.88	5.5
Average.....	.....	4.284	6.16

As a check on the alcohol determination, the writer made two direct determinations by distilling the alcohol from the beer (neutralized with caustic baryta), and determining the specific gravity of the alcoholic distillate. This was done in the case of two of the beers, Nos. 5 and 8, and he obtained for these respectively, 4.55 and 4.29 per cent. of alcohol. The indirect method, according to Schmidt's examples, is apt to give results a little too high, but it is certain that all of the above beers were of full strength. They exhibit no abnormal proportions of alcohol and extract, as compared with published

analyses of German lager beers, but it is not impossible that some of them may owe a part of their alcohol to the use of glucose or similar saccharine substances.

No. 17 contained chlorine equivalent to nearly thirty grains of salt per gallon.

Several of them were not perfectly clear, which is always a sign of some defect, and one had an unpleasant odor. One had an unusually sweet taste, and it could be said of only a small proportion of them that they were really perfect beers, although, with the exception of the one that had a disagreeable odor, it could not be said that any of them were manifestly unwholesome.

The writer subjected all of the above samples to a thorough test for the following foreign bitter principles, which includes the greater number, according to Schmidt, of such substances as exist in the hop substitutes which are believed, with more or less reason, to have been used: Aloes, buckbean, gentian, willow bark, colchicum, colocynth, *cocculus indicus*, *nux vomica*, quassia, wormwood and picric acid. The method employed was Wittstein's, as modified by A. Schmidt (*loc. cit.*) A brief description of it is here given.

A liter of the beer is concentrated to a syrup, and this is thoroughly extracted twice with alcohol of about ninety-four per cent., the alcohol is filtered, evaporated and the residual syrup specially tested as follows:

1. A little of it is diluted with three parts of water, and a bit of white woolen yarn left in it for an hour. If the yarn, after thorough washing in water, is yellow, picric acid may be present. To prove this, the wool is extracted with ammonia, the solution evaporated to a trifling residue and treated with a few drops of solution of cyanide of potassium. The least quantity of picric acid will then produce a red color of potassium isopurpurate.

2. The greater part of the syrup is shaken with six parts of benzol, the treatment is repeated with fresh benzol, and the two benzol extracts evaporated by gentle heating. The residue may contain, besides hop bitters, strychnin, brucin, colocynthin, colchicin and traces of aloëtin (the latter being disregarded). The residue is divided into three parts, one being treated with pure sulphuric acid, another with nitric acid of sp. gr. 1.33–1.4, and the third with sulphuric acid and a little grain of potassium bichromate. Colocynthin would be indicated by a red color caused by the sulphuric acid alone; brucin by a

red color caused by the nitric acid; colchicin by a violet color with this acid; strychnin by a blue or violet color, rapidly changing to red, under treatment with the sulphuric acid and bichromate of potassium.

3. The residue just shaken with benzol is freed from the small residue of this by gentle warming, and is then shaken with amylic alcohol, which may take up picrotoxin, aloin or salicin, and only in such case will taste bitter. A portion of it is evaporated at the ordinary temperature on a glass plate, when picrotoxin would be shown by delicate, white crystalline formations. The remainder is divided into two portions, to one of which caustic potash solution is added, when the presence of aloes would cause a fine purple-red solution, while the characteristic odor of aloes would also be noticed. The remainder is best tested for salicin by adding sulphuric acid, a small grain of potassium bichromate and a few drops of water, and warming the mixture to obtain the characteristic odor of salicylous acid (salicylal).

4. The residue, which has been shaken with benzol and amylic alcohol, is freed from the latter by means of blotting paper and shaken with absolute ether. This dissolves the hop bitter and any absinthin present. The ether is evaporated, and the use of absinth detected by the characteristic wormwood odor, as also by the fact that sulphuric acid would yield with it a yellowish-brown color, quickly changing to violet-blue, and hydrochloric acid (1.135 sp. gr.) would give a green color, changing to fine blue.

5. In the residue which has been shaken with ether, tests are made for the characteristic constituents of buckbean, quassia and gentian, provided it still has a decidedly bitter taste. The residue is freed from ether, dissolved in a little water, filtered if necessary, and a part warmed with dilute sulphuric acid. The characteristic odor of menyanthol would indicate that buckbean had been used. Another part is heated with a strongly ammoniacal silver solution. Should a silver mirror form, menyanthin or gentipicrin would be indicated (in the latter case the treatment with sulphuric acid would yield no characteristic odor.) If quassia is present, no reduction of silver ensues. Dragendorff does not regard the detection of gentian as certain.

None of the samples of beer tested by the writer gave any indication of the presence of anything not normal to beer. The residues from the various operations gave none of the characteristic reactions mentioned above for foreign bitter principles, while scarcely any difference in taste, odor or behavior of the residues could be detected.

It would appear, from the tests here recorded, that at the present time the use of any substitute for hops cannot be very extensive, and also that at least a very fair proportion of malt is commonly used in the brewing of even common lager beer.

In view of the fact that different opinions often prevail, it may be well here to present statements of various authorities as to the adulterations of malt liquors said to have been detected. It will be seen that in many cases, more especially as to the alleged use of poisonous bitter principles, opinions differ.

A. Almen (*Archiv der Pharmacie*, 1879,) states that in the course of investigations in Sweden, in 1871, foreign bitter principles were not uncommonly found in beers, and specifies quassia, menyanthin or a closely related principle, and absinthin. He adds that of late years such adulterations have been very rarely detected, and thinks that there has been for the most part an unwarranted fear that injurious hop substitutes are used.

Dragendorff (*Ermittelung von Giften*) says that foreign bitter principles are not seldom added to beer to lessen the consumption of hops. "Such an addition is an imposition on the public, which is not to be lightly regarded, *hops being employed not for their bitterness alone*, and it is the duty of the government to take cognizance of such proceedings."

Stillé and Maisch (*National Dispensatory*) state that *cocculus indicus* is said to prevent the secondary fermentation of liquors, and for this purpose it is sometimes added to malt liquors at the risk of poisoning those who drink them.

Hassell (*Food, its Adulterations, &c.*,) reports that Phillips found that *cocculus indicus* had been used in the case of two out of twenty samples of adulterated beer, and that tobacco had been used in one. (These were tested some years ago.)

Blyth (*Manual of Practical Chemistry*) states that the bitter principles of beer are occasionally derived solely from the hop, but are very commonly supplemented by so-called hop substitutes, and adds that samples of these all contained quassia, while portions of the following plants were identified: calumba, chirata, gentian and wormwood. He also states that picric acid has certainly been discovered, and picrotoxin is strongly suspected.

Post (*Grundriss der Chemischen Technologie*) says that, as unauthorized hop substitutes, other plants have, in a few isolated instances, been used: wormwood, quassia, buckbean, colchicum, &c.

Parkes (*Practical Hygiene*) gives the following list of deleterious substances whose use in liquors is forbidden by the Licensing Act (England) of 1872: *cocculus indicus*, salt, copperas, opium, Indian hemp, strychnin, tobacco, darnel seed, extract of logwood, salts of zinc or lead, alum and any other extract or compound of any of the above ingredients. It will be observed that many of the substances already mentioned are not included in this list. Parkes also enumerates the following among other adulterants that are used: sulphuric acid, to "age" the beer; a mixture of alum, salt and copperas, to "head" it; carminatives, as capsicum and grains of paradise, to give it pungency. He does not consider the use of *cocculus indicus* as proven.

Wittstein, (*Archiv der Pharmacie*, 1875,) after enumerating the bitter principles already referred to in the description of Schmidt's process for their detection, given in this report, says all the plants containing them, or else the bitter principles themselves, are so marked in their nature that smaller quantities of them will replace the hop, so far as bitterness is concerned, but they cannot afford the aroma nor the tannin and hop resin so important in making beer. He classifies buckbean, gentian, wormwood and quassia among the innocuous substitutes; aloes and colocynth are more dangerous on account of their purging properties. Colchicum, *cocculus indicus*, *nux vomica* and picric acid are absolutely poisonous, but he says that, so far as he knows, none of them have ever been certainly detected, possibly on account of imperfect methods of analysis, or because they were not present in the beers examined. The methods have been much improved of late, but nevertheless in many cases these foreign substances will be vainly sought for, both because they are not used so commonly as is believed and because only a very high price of hops would lead a brewer to employ other materials, which not only fail to produce so good and lasting a beer, but would often cause suspicion by the nature of the beer brewed with them. The fact that more *cocculus indicus* is imported into Germany than can be used as medicine, he thinks may be largely explained by its use as a vermin exterminator or as a means of paralyzing and thus catching fish. At the same time, Wittstein expressly states that he does not mean to intimate that this and other hop substitutes are not used, and he proceeds to give a method for their detection.

A. Schmidt (*loc. cit.*) admits that poisonous foreign bitter principles may have been found in beer, but far less frequently than is supposed; indeed, he regards it as a highly improbable thing that opium, tobacco, *nux vomica* or other poisons should be used in Germany. Good methods exist for the detection at least of the presence of some foreign bitter principles, even if it is not always possible to assert just which one it may be.

There seems to be no reason to doubt that foreign bitter prineiples, not altogether harmless, are sometimes used in brewing the commoner grades of malt liquors, but probably only when hops are high-priced, and also probably by no means so commonly as is often supposed. If a beer has an intensely bitter taste, or one that persists long in the mouth, the presence of foreign bitters may be suspected, and the writer well remembers a glass of ale which produced, not many years ago, so lasting and intensely bitter a taste in his mouth as to excite not only surprise but apprehension. It was unquestionably not hop bitter, although no evil results followed.

Malt liquors are of sufficient importance to warrant a public oversight of their manufacture and sale, in the interests of public health. The use of hurtful hop substitutes, of ingredients for concealing the defects of such beverages, and the addition, by retailers, of water to increase their quantity, should all be rendered dangerous to brewers and dealers. In the interests both of health and temperance, mild malt liquors should be removed from suspicion of injurious properties.

REPORT OF THE MILK INSPECTOR.

WM. K. NEWTON, M.D., PATERSON, N. J.

Ezra M. Hunt, M.D., Secretary State Board of Health.

SIR—I hand you herewith my fourth annual report.

An act was passed by the last session of the Legislature, so amending the milk law that all tests should be made at the station from which the milk should be shipped.

The law in force, states that no complaint shall be made until the suspected milk shall have been analyzed, hence, to require such a test or analysis to be made at the shipping point, would practically stop all the work of inspection, and render the statute inoperative; a result probably not desired by the advocates of the amendment.

The attention of Governor Ludlow was called to this, and other inconsistencies in the amendment, and he withheld his signature.

Upon the earnest solicitation of producers in the northern and western sections of the State, a law was enacted prohibiting the sale of skimmed milk, but this was made applicable to cities of the first class only, to wit, Newark and Jersey City.

The utility of such a special law may well be questioned, for if it be wrong to sell impoverished milk in cities of the first class, why is it not wrong or impolitic to sell it in cities of the second or third class? As an example of this inconsistency, we may state that while the sale of skimmed milk is forbidden in Jersey City, it may be disposed of across the city line in Hoboken.

The law to prevent the sale of impure milk has worked exceedingly well this year, and it is to be hoped that the Legislature will refuse to sanction any attempt to alter or weaken it, especially so, when it is now known that the law has been declared to be constitutional by the Supreme Court, and needs only careful administration to insure justice to all.

The work during the past year has been energetically pushed forward, and, by the appointment of assistants, nearly every portion of the State has been brought under the operation of the law.

The State was divided into sections, and three assistants were appointed.

Dr. Edgar Everhart, of Stevens Institute, Hoboken, has had charge of the work of local inspection in Hoboken and Jersey City, this being his second year, and he has accomplished excellent results. The local supply of these cities is now in a very fair condition.

Seventeen complaints were made by him against persons violating the law. These were disposed of as follows: Six were fined $50 each; one person had his penalty

remitted on account of mitigating circumstances; one paid part of his fine, and then left the State, and nine were fined, but appealed their cases to higher courts.

Dr. Everhart is paid a small salary by the State.

Thomas B. Rogers, D.V.S., of Westville, Gloucester county, has inspected in the southern and western portions of the State, including the seaside resorts therein situated. The milk supply of Camden, Millville, Gloucester, Atlantic City, Cape May, Ocean City, and other places, has received his constant attention. Besides this work, he has visited a large number of dairy farms, noting the condition of the cattle and their surroundings, and making comparisons of the quality of the milk as produced, with that which is sold in our cities and towns. He, being a veterinarian, was able to make valuable investigations into the sanitary condition of milch cows, and, as a result of his experience, expresses the opinion that the work of the inspector should extend beyond the mere testing of milk to detect adulteration, and should embrace the surveillance of the herd. This opinion endorses what I have for a long time claimed, that notice should be taken of the health of the cows from which we obtain milk, and that all milk produced by animals out of health, should be kept out of our markets.

The result of Dr. Rogers' work has been very encouraging in that it has bettered the quality of the milk sold in the southern and western part of the State. Dr. Rogers was paid a small salary, a portion of which was allowed by the State, the remainder and his traveling expenses being paid by me.

Mr. Peter L. Vandegrift, of Burlington, was engaged for the work of inspection in Burlington county and the adjacent dairy sections. He has proved himself a most excellent officer, being always courteous and pleasant, and, furthermore, being possessed of that very commendable virtue, so necessary in this work, namely, reticence. Mr. Vandegrift has inspected the milk shipped from Kinkora, Columbus, Mt. Holly, Burlington and Jobstown, also the milk in the wagons at Bordentown, White Hill, Florence, Mt. Holly and Burlington. He has kept a record of each inspection, noting in a book the temperature and lactometer reading, and, according to instructions, has taken a sample of every can of milk falling below the specific gravity, 1.029, this being done for the purpose of having an analysis made. At first many samples were taken, but as the work of inspection went on the quality of the milk was bettered, so that at a recent inspection he failed to find any below the standard. In one instance, at Kinkora, the total solids went up from 10.50 per cent. to 13.62 per cent. as a result of the watchfulness of the inspector. No expense was incurred to the State by Mr. Vandegrift.

At Newark, Paterson and Vineland the local authorities have had charge of the work of inspection without expense to the State.

In Newark, Mr. Henry Negles, a competent and conscientious inspector, has done well and merits the earnest support of the city government. The complaints in this city have been made under the food adulteration law, as the city attorney did not deem the milk law sufficient for the purpose.

At Vineland we have an example of what can be accomplished, in the way of regulating the milk-supply, by an earnest Health Board. In this town the quality of the milk sold has been kept excellent by the constant surveillance of the members of the Board, and work has not only been well done but without expense.

Personally, I have attended to those portions of the State not embraced in the above statement. The dairy sections in the counties of Sussex, Morris, Essex, Hunterdon, Passaic, Warren and Middlesex have been frequently visited and the milk

there produced tested. It is encouraging to note that never before has the milk produced and sold in the State been of such general excellence, and the work of four years has just begun to bear fruit.

The past year has been an extremely busy one and more efficient work has been done than ever before. Besides the inspection of milk I have collected many samples of pure milk, for the purpose of testing the standard adopted by the State, the result of which work will be stated further on.

After some five years of practical experience in this line of sanitary work, I am able to say that the addition of water and the abstraction of cream comprise about all the methods employed for the purpose of adulterating or impoverishing milk. In some sections of the State, notably Atlantic City and other seaside resorts, a few dealers have been in the habit of adding preservatives, such as boric acid, sodium biborate and akaline carbonates, but this practice has been checked. One case where annatto had been added was reported by Dr. Rogers. From many experimental tests made of milk thus treated we are now able to detect very accurately all such such adulterations.

In my last report I mentioned that some cases, where complaints had been made for violations of the law, remained undecided. Of these I shall refer to three which have been settled by the Supreme Court.

In August, 1882, complaints were made at Camden, against three persons for selling milk adulterated with water. After many delays the trials took place in January, 1883, resulting in a conviction, and a penalty of $50 was imposed in each case. The defendants, feeling aggrieved at the action of the court, and being informed by their lawyer that the law was not constitutional, took their cases on a writ of *certiorari* to the Supreme Court in February of this year. The argument of counsel was heard at the June term and a decision given by the court in November, 1883.

Charles V. D. Joline, Esq., of Camden, appeared as my attorney, prepared the brief and made the argument in my favor. The decision was prepared by Justice Reed, was concurred in by the court and in the main endorses the law. As this decision affects the Public Health Laws of the State, I shall quote the principal features. The Food Adulteration Law, the Milk Adulteration Law and the Health Laws all provide for a method of summary proceedings, for it is argued that if a nuisance, source of foulness, impure food or bad meat, is injurious to the public health, the danger must be removed without loss of time; protracted suits would, in a measure, permit harm to be done, hence rapid action is provided by law.

The reasons presented by the prosecutors of the writ for asking the Supreme Court to decide that the law was not constitutional, are as follows: 1st. That it embraces two objects instead of one. 2d. That it provides for the arbitrary divestiture of the property of the citizen without due process of law. 3d. That it is a judicial act, deciding upon the character and admissibility of testimony. 4th. That it adjudges a forfeiture of the rights and property of the citizen without a judicial hearing and judgment, without due notice, and without a trial by jury.

In regard to the first point, the court says:

"That the design of the Legislature is single, namely, to secure the sale of wholesome milk. The second section of the act provides for the punishment of those who shall sell, or offer for sale, &c., any impure, adulterated or unwholesome milk. It further provides for the punishment of those who shall adulterate milk, or who shall keep cows in a crowded or unhealthy condition, or feed the same on food that produces impure, diseased or unwholesome milk, or shall feed cows on anything of an unwhole-

some nature. * * * The third section declares that the addition of water or any other substance is an adulteration; and milk that is obtained from animals that are fed on unwholesome food, or milk that has been exposed to the emanations from a person sick with any contagious disease, is impure. This is all directed against the production and sale of impure milk. * * * The subsequent sections, fixing the legal standard to which all milk shall be subjected by analysis, fixing the penalties to be imposed, directing the method of procedure in prosecutions for violation, and establishing the duties of the public analyst and of the State Inspector, are details appropriately directed to the execution of the single design intended to be secured by the legislation. Upon inspection of the body of the statute, no incongruous subjects are intermingled within the purview of the constitutional interdiction. * * * There is a difficulty, however, arising from the manner in which the act is entitled. * * * The perplexity springs from the inaccurate particularity by which, in the title, the scope of the legislation is expressed. * * * The constitution does not require a detailed, but a general expression of the scope of the enactment, and the danger of attempting to specialize the minutiæ of the legislation is apparent when, as in this act, there is at least one prohibition, which is clearly beyond the object indicated by the title, while clearly within the general object of the legislation. * * * The title is 'An act to prevent the adulteration and to regulate the sale of milk.' * * *

"Adulteration means to debase by the admixture of foreign materials. This is not only the literary significance of the word, but its meaning, also, is defined by the statute itself. * * * The distinction is drawn with clear lines between adulteration and impure and unwholesome milk. * * *

"The prohibition in the second section of the act is aimed at both the adulteration and the production of unwholesome milk by other methods. * * * It is not limited to the sale of adulterated or impure milk, or the having possession, with intent to sell, but is also directed at the act of adulteration, and the act of producing, by other methods, unwholesome milk. * * * The latter prohibition is, in my judgment, clearly outside of the object of the legislation as expressed by the title. As to the remaining parts of the statute, I think they are covered by the title The regulation of the sale of milk is a general, but a sufficient expression of the enactment of all the guards thrown by this act around the vending of an article of daily consumption. The provision for inspecting it, the prohibition against selling it, if impure or under a certain standard, is within the general notion expressed by the terms regulating its sale. * * *

"And so, also, the having possession of this quality of milk, with an intent to sell, is equally within the power of legislative interdiction under this title. The offensive part of the prohibited act is the intent to sell, the design to perpetrate the act, the regulation of which is the expressed object of the legislation. * * * The presence of the prohibition, already stated as foreign to the title, upon a well-settled rule of constitutional construction, does not vitiate the remaining portion of the act. * * * It can be eliminated from the act, leaving the residue of the act operative; and it is within the valid provisions of the act, that the prohibition upon which these prosecutions are grounded, is found. * * *

"The second branch of the constitutional objection to the statute is grounded upon the provisions of the 9th section, which empowers the milk inspector, in case he shall upon inspection find any milk which has been adulterated, to condemn the same and pour it upon the ground, etc. * * * This portion of the act is not involved in the present proceedings, * * * but as the objection has been elaborately argued it may be of use to remark that this clause does not seem obnoxious to the criticism to which it has been subjected. * * * That the title to all private property is held subject to the paramount consideration of the public health and safety of the entire public, is too well settled for discussion. It is equally well established that the authority inherent in the State under the title of police power, enables the Legislature to fix upon certain kinds of property, or upon the manner in which property is used, the brand of noxiousness to public safety and health. * * * And when the character of a nuisance has been so affixed, it is a frequent exercise of legislative power, in addition to the visitation of a penalty to be recovered by action or imprisonment upon conviction under indictment, to also provide for the abatement of the nuisance itself by means of a seizure and destruction of the property itself. * * * The exercise of the power is illustrated

by the numerous statutes in other States, which have received judicial sanction; among others those providing for the seizure and destruction of liquors, the arrest and sale of straying animals, the impounding and destruction of dogs, and for the seizure and destruction of illegally baked bread. *Sedg. Stat. and Const. Law*, 434 *note*, 455 *note*. * * *

"In the case of *Wells* v. *Snover*, 13 Vr. 341, this court sanctions the act of a fish warden in destroying a fish basket by virtue of the act of 1871 (*Rev. p.* 443), and the sanction is put upon the ground of the right to authorize an officer to abate a nuisance. * * *

"In the section of the act now under inspection, the authority of the officer to destroy rests upon the fact of adulteration or impurity of the milk, and the section further provides that if a subsequent analysis shall disclose the fact that the officer was mistaken in the result of his examination the owner is to be paid the value of the article destroyed. * * *

"The next constitutional objection is leveled at the provisions contained in the 4th and 8th sections of the act."

The 4th section provides that if the milk shall be shown, upon analysis by a member of the Council of Public Analysts or the chemist of the State Experiment Station, to contain less than twelve per cent. of milk solids, it shall be deemed to be adulterated.

The Court goes on to say:

"The objection raised against this section consists in the force which it is alleged is given to the analysis of the analyst. The contention is that the result reached by the chemist is, by force of the act, made conclusive evidence of the guilt of the defendant, and that such an exertion of power is beyond the ability of the Legislature. * * * In interpreting the significance of this clause, I think it is obvious that its design is to include within the kind of prohibited milk such as shall not possess a certain standard of excellence. I think the standard so fixed was not intended to mark the absolute line between pure and diluted milk. The placing of the standard was to set up a mark to indicate where, in the judgment of the Legislature, the salubrity or full commercial value of milk ceased to exist. The section does not mean that the result of the analysis shall be conclusive evidence that the milk has in fact been adulterated, but it does mean that milk below a certain standard shall not be sold; therefore, when analysis discloses that condition, it shall be, for the purposes of that act, considered adulterated, so that by force of the other section it thereby becomes prohibited. * * *

In the State of Massachusetts, their act relative to the inspection of milk contains a clause similar to the one now in question; the difference being that ours provides for an analysis by a State officer, and theirs does not name the persons who make the analysis. The Supreme Court of that State, in the case of *The Commonwealth* v. *Evans*, 132 *Mass.* 11, held that this legislation was constitutional, and belonged to the class of police regulations designed to prevent frauds and protect the health of the people. * * *

"The clause as contained in the Massachusetts statute, is also found in the statutes of Rhode Island. In construing it in the recent case of *The State of Rhode Island* v. *Smith*, it was held that this clause was not intended as a rule of evidence, but defined a new offense. * * * I think the Legislature was not opposed to any fundamental or constitutional restriction."

As to section 8, where it says that the certificate of an analyst shall be taken as *prima facie* evidence, the court holds that this is objectionable, but that as the chemist in the cases under review, was examined in person, no constitutional objection can be urged in this particular case.

The last of the objections is, that the act makes no provision for a trial by jury. The Court says: "The law has so frequently been stated to the effect that the enforcement of regulations of the kind included within the statute by summary proceedings, before a magistrate alone, was not within the constitutional guaranty of trial by jury, that I think further remark would be profitless."

In deciding upon the complaints made in the cases under review, the court decides that they were defective, because no mention was made of the results of the analysis, and says that a valid complaint should include this fact, and the name of the analyst who made such an analysis. It is also held that all that is necessary is to prove that a certain sample of milk failed to come up to the standard fixed by the statute, and a complaint stating this, together with the name of the chemist, would constitute a true complaint of a violation of the law.

REVIEW OF THE FOUR YEARS' WORK.

It will be profitable and interesting to review the work done under the act to prevent the sale of impure milk during the past four years, and to note the results of its enforcement.

We shall note these results under two heads: first, from a commercial standpoint; secondly, from the sanitary bearings of the law.

The commercial relations of the law.—It may be remembered that, primarily, the law to regulate the sale of milk was enacted to protect our farmers from the injurious effects due to the sale of impure and impoverished milk, and was intended to enable them to obtain better prices for their commodity, by reducing the quantity of impure milk put upon the market.

When the question was first agitated, in 1879, the farmers in Sussex, Hunterdon, Morris, Essex and Union counties were only able to obtain extremely low prices, barely equal to the cost of production. Not only was the price kept down, but the market was flooded with skimmed milk by the many creameries in this and New York State, the tendency of which was to maintain a surplus in the market, and reduce the price obtainable for pure milk. It was important, then, to reduce the amount of impure milk offered for sale, and thus to increase the demand for a strictly pure article. For this purpose the law was framed, and we shall now see whether the end sought for has been attained.

It was the custom, heretofore, for the dealers in New York City to dictate to the farmers the price to be paid. This was done from six months to a year in advance, and the producer was rarely consulted as to the terms, the price having little to do with the ratio of supply and demand. Thus, in 1879, a scale of prices was fixed, allowing twenty-eight cents a quart on the yearly basis; that is, when the monthly rates were added together, an annual rate of twenty-eight cents was obtained. This will be explained further on. It was when these low figures prevailed that the attempt was made to get some protection from the State, so that poor milk should be driven from the market, thus increasing the demand for a good article, and establishing a better scale of prices.

The first milk law under which an inspector was appointed, was enacted in the early part of 1880, and when this law took effect and the work of inspection began, thus reducing the quantity of impure milk offered for sale, the yearly rate advanced to thirty-four and one-half cents a quart.

It is easy to calculate the effect of this advance in price upon the receipts obtained by farmers from the sale of milk.

I give in the following table, the monthly and yearly prices, also the amount obtained from the sale of one forty-quart can of milk each year, and the gradual increment will be noticed.

PRICE PAID EACH MONTH, PER QUART.

	1879.	1880.	1881.	1882.	1883.
January	2½ cents.	3 cents.	3½ cents.	4 cents.	4 cents.
February	2½ "	3 "	3 "	4 "	3 "
March	2½ "	3 "	3 "	3 "	3¼ "
April	2 "	2½ "	2¾ "	3 "	3 "
May	2 "	2 "	2 "	2½ "	2½ "
June	2 "	2 "	2 "	2½ "	2½ "
July	2 "	2½ "	2 "	2½ "	3 "
August	2 "	2½ "	2½ "	3 "	3 "
September	2 "	3 "	3 "	3½ "	3½ "
October	2½ "	3 "	4 "	3½ "	3¼ "
November	3 "	4 "	4 "	3½ "	4 "
December	3 "	4 "	4 "	4 "	4 "
Yearly average	28 cents.	34½ cents.	35¾ cents.	39 cents.	39 cents.
Price obtained for each 40-quart can.	$340.60	$419.60	$435 00	$474.80	$474 80

It will be observed that there is a difference between the price obtained for a can of milk in 1879, and that for 1883, of $134.20, in favor of the farmer. The amount of benefit derived by the producers of Sussex, Hunterdon, Essex, Union, Morris and Middlesex counties may be roughly estimated when it is known that not less than 414,000 cans of milk are sold each year by the farmers of these counties. While I do not claim that this increase in value is due wholly to the protection afforded by the law, I do assert that without this law but little would have been accomplished in the way of establishing better prices.

The law has also enabled the producers, in the above-mentioned counties, to effect an organization for the purpose of controlling the trade and compelling dealers in New York city to pay more equitable prices. In the revolt against dictation by dealers (which occurred in the winter of 1882-3, and was popularly known as the "milk strike,") great assistance was rendered by the law, through the inspector, and by the New York inspectors, in the way of keeping impoverished milk off the market. The victory for the farmers which ensued not only gave them control but drove out of business many dishonest and irresponsible men and reduced the sale of impure milk very markedly.

To sum up, I may say that the milk law has been of great value to the producers in northern New Jersey.

As a commercial measure the statute has not affected West Jersey to the same extent, for the reason that prices seem to be based more upon the quality of the milk offered for sale than elsewhere in the State and hence was not so much needed. Prices vary from four and a half to seven and a half cents a quart, wholesale, in this portion of the State, the latter price being paid for very rich Alderney or Jersey milk. The dealers in the cities seem to be benefited, however, for they are protected from fraudulent practices.

The result from a sanitary standpoint.—While we cannot estimate the improved condition of the public health, nor derive much information from the study of vital statistics, in relation to the diminished sale of impure milk, yet probably infantile mortality has been reduced since the quality of the milk sold in our large cities has

been regulated by law. We throw this out as a hint, for of course we cannot bring dollars and cents to bear on the problem as we did in the review of the commercial side of the question.

When the work of inspection was begun in 1880, the amount of adulterated and impoverished milk sold in the State was enormous, and no city or town could be visited without finding the supply more or less impure. The quality of that shipped on the railroads was often impure.

During the four years embraced in this review nearly every city and town of any importance has been visited, and I am in a position to say that to-day cases of flagrant violation of the law are extremely rare, and none but the criminal will run the risk of detection which must sooner or latter overtake him. I can also say that never has the milk-supply of our State been in such an excellent condition.

THE STATE STANDARD.

Section 4 of the milk law requires that milk which shall contain less than twelve per centum of milk solids shall not be sold, and, for the purposes of the act, milk which may fall below this limit shall be deemed to be adulterated.

Probably no one section of the law has been so much questioned. Why was it sanctioned or required? What right has the State to fix an arbitrary standard? Why was twelve per centum settled upon as the limit? These and other questions have been asked, and we may reply that it was required because, as the law demands a chemical analysis, it is absolutely necessary to set up a limit in order to establish a criterion by which to judge milk, and in case of trial at court to have a standard with which the sample in question might be compared. As to the right of the State to fix a limit, it may be said that the State avails itself of an inherent right and requires, for instance, that a gallon measure shall contain so many cubic inches, or that a barrel of flour shall weigh so much, or that, in branding or packing fish or pork, certain arbitrary methods shall be employed, or in the sale of illuminating oils only a certain grade shall be used for house illumination and fixes an arbitrary flash test to be used; without giving any more instances we may state that the grade, weight or other qualities may be and are fixed by statute. It has been decided by the Supreme Court, in the cases previously quoted, that the State has the right to make a standard for milk, and that standard may not only insist on purity, but may demand a certain degree of excellence.

In other States a limit for milk is set up by law; thus, in Rhode Island, twelve per cent. of solids, and two and one half per cent. of fat is called for; in Massachusetts, thirteen per cent. of solids is required. The Society of Public Analysts of Great Britain, also, has fixed upon an arbitrary limit of nine per cent. of solids not fat, which is higher than our standard.

Why was twelve per cent. fixed upon as the limit in this State? It was found, after repeated trials, that pure milk from a healthy cow rarely or never fell below that limit when analyzed by a fair but accurate method of analysis, and I may say that it would be impossible to obtain a sample of the mixed milk of two or more healthy cows that would, upon analysis, yield less total solids than the standard calls for. But, to judge this standard, a method of analysis similar to, and not more rigorous than those used by the analysts of this State must be employed, for it would not be fair to offer other analyses obtained by crude and inaccurate methods. Any method which permits the addition to the milk of any adventitious substances,

such as sand, plaster of Paris, sulphate of barium, etc., must not be employed in testing the standard, for these methods have been proved to be inaccurate, and have been abandoned by all chemists who have had much to do with milk analysis. The chemical side of the question will be discussed further on.

A word here as to the claim that the standard is an average. In answer to this, I shall say that the standard is not an *average*, but is a *limit*, and was not arrived at by averaging, but was adopted when it was conclusively shown that the milk produced in this State never went below a *limit* of twelve per cent. of milk solids.

Persons who object to the standard would usually resist the legalizing of any limit, and the objection is not so much against the limit fixed by law, as it is against any limit whatever.

With the view of testing the State standard to see if any injustice can be done by it, I have had samples collected in nearly all the counties in the State, and have submitted them to the public analysts of this State for analysis, and the results can be seen by reference to the following tables. No attempt was made to select herds or cows, but the only restriction placed on the collection of samples was, that the purity of each one should be undoubted, and none were to be submitted as pure milk, unless the collector actually saw them milked from healthy cows.

All the samples in Tables II. and III. were collected by Dr. Rogers, Mr. Vandegrift or myself, hence, their authenticity can be vouched for.

Besides this series of investigations, the State Board of Health advised a full and fair re-examination to see whether there was any possibility of harm to the rights of producers from the standard. Samples were collected, as in the other case, and were analyzed by Prof. A. R. Leeds, of Stevens Institute; by Prof. H. B. Cornwall, of Princeton, and by Shippen Wallace, of Burlington. As I have not seen the reports I cannot express my opinion, but the full returns will be found in this volume.

In closing this branch of the subject I shall say that the offer made each year for the past three years is now renewed, and any person doubting the accuracy of the State standard, and thinking that any cow in his herd produces milk below the limit, has the privilege and the right to call on the inspector, or any analyst, or on the State Board of Health, for a test analysis to be made. The only restriction placed on this offer is that the sample shall be drawn from the cow in the presence of some authorized person, in order that there shall be no intentional or unintentional mistakes.

Table I. is compiled from reports made by the State Agricultural Experiment Station. The cattle were undoubtedly better fed and cared for than the average herds throughout the State, and hence the solids are perhaps high; but to offset the favorable factors the method of analysis employed at the Station is one calculated to give lower results, as to solids, than any method used by our analysts.

The method of analysis followed at the Station is as follows: Total solids are obtained by drying a weighed quantity of milk, with ignited sand, at 212° F. till constant weight has been reached.

Fat is gotten by taking a weighed quantity of milk, evaporating to dryness with ignited sand, drying thoroughly at 212° F. and then extracting the fat with ether in an extraction apparatus.

The ash in the analyses given in the table was determined by difference, which will probably account for the large percentage. (First Annual Report, page 56.)

TABLE I.

ANALYSES MADE AT THE NEW JERSEY EXPERIMENT STATION.

	Total Solids.	Fat.	Solids not Fat	Ash.	Sp. Gr.	
Corn meal ration; herd of 3 cows; average of 4 daily analyses	13.88	4.16	9.72	.....	1.0344	Bulletin No. XXIV.
Sorghum meal ration; herd of 3 cows; average of 4 daily analyses	14.12	4.29	9.83	.....	1.0348	" " "
20 days feeding trial; herd of 3 cows; average of 5 daily analyses	13.55	4.49	9.06	.....	1.0327	" " XIX.
	14.01	4.42	9.59	.....	1.0343	" " "
	13.55	4.27	9.28	.....	1.0340	" " "
	13.87	4.27	9.60	.....	1.0340	" " "
	13.87	4.58	9.29	.....	1.0330	" " "
	14.51	4.53	9.98	.....	1.0346	" " "
College Farm; mixed milk 6 Jersey cows; average of 13 analyses	14.72	5.21	9.51	.91	1.033	1st An. Rep. of Station
Taylor's Herd; mixed milk 6 Jersey cows; average of 13 analyses	14.72	5.21	9.51	.91	1.033	" " "
College Farm; mixed milk 6 Native cows; average of 13 analyses	13.57	4.49	9.08	.92	1.033	" " "
College Farm; mixed milk 5 Ayrshire cows; average of 13 analyses	12.85	4.33	8.52	.72	1.031	" " "
Kelsey's Herd; mixed milk 6 Jersey cows; average of 13 analyses	14.51	5.19	9.32	.99	1.034	" " "
Dudley's Herd; mixed milk 6 Jersey cows; average of 13 analyses	14.88	5.20	9.68	.98	1.034	" " "

Table II. gives the results obtained by analyzing the milk of *individual* cows, and hence does not represent the milk of commerce, that being almost always the milk of two or more cows thoroughly mixed. The methods of analysis are noted, and will be described further on.

The specific gravity of each sample was taken on the balance. The ash was determined by ignition of the solids not fat.

Samples 10 and 11 were from imported Alderney cows; the small amount of total solids will be noted, and will surprise those who think that this quality of milk is always extremely rich.

Sample 12 was from an Alderney cow, two and one-half years old, belonging to Mr. S. W. Taylor, of Burlington. Sample 13 was from registered Alderney cow No. 5,548, belonging to Mr. Taylor's herd. The analysis is equal to that of cream.

TABLE II.

ANALYSES BY PUBLIC ANALYSTS OF NEW JERSEY—INDIVIDUAL COWS.

No.	Origin of Sample.	Time of Milking.	Breed.	Age.	No. of Calves.	Total Solids.	Fat.	Solids not Fat.	Ash.	Sp. Gr.	Methods of Analysis.	Analyst.
1	Passaic Co.	Night	Holst'n	3	1	14.31	4.76	9.55	.66	1.033	Ritthausen.	A. R. Leeds.
2	" "	"	Native	8	3	12.61	3.30	9.31	.74	1.035	"	"
3	" "	"	¾ Nat.	11	10	13.48	4.46	9.02	.75	1.0315	Cairns	H. B. Cornwall.
4	" "	Morn	"	11	10	13.62	4.36	9.26	.75	1.0325	"	"
5	" "	Ngt	½ Jers. ½ Nat.	6	5	12.51	3.50	9.01	.77	1.0324	"	"
6	" "	Morn	"	6	5	13.19	3.62	9.47	.77	1.0339	"	"
7	" "	Ngt	¾ Jers. ¼ Ald.	6	5	13.84	4.57	9.27	.70	1.0323	"	"
8	" "	Morn	"	6	5	15.07	5.36	9.61	.78	1.0336	"	"
9	Sussex Co.	Night	Ald'rny	4	...	15.18	6.06	9.12	.68	1.032	Ritthausen.	A. R. Leeds.
10	" "	"	"	4	...	12.34	3.56	8.78	.48	1.031	"	"
11	" "	"	"	5½	...	12.89	4.82	8.37	.59	1.030	"	"
12	Burlington Co.	.....	"	2½	...	16.74	7.10	9.64	.62	1.0295	Wanklyn	S. Wallace.
13	" "	.....	"	.....	...	21.73	12.25	9.48	.66	1.0243	"	"

Table III. gives the analyses of *herd milk*, that is commercial milk, the mixed milk of two or more cows. This table represents the milk seen by the inspector and sold to consumers, hence it is more liable to be compared with the standard set up by law; and it is for this reason that so great a number of samples were collected and analyzed.

All these samples, with the exception of a few to be noted further on, were from herds made up of what is known as common cows; that is, none of the cows were of any particular breed. The herds vary from two to eighteen cows, and the ages from two to twelve years. The feed was pasture, bran, meal, ensilage, and in fact nearly everything that is fed to cattle. Some samples were from the sand dunes of the ocean counties, where it is said that the cattle get little but scrub oak and sea air.

With but nine exceptions the analyses represent herds, and, with these exceptions, the milk of the same herd does not appear twice in this table. I mention this for fear that some may think that a few herds were tabulated many times.

The sixty-five analyses represent fifty-eight herds.

As with the results in Table II, the method of analysis is noted. The specific gravity in each case was taken on the balance. The ash was determined by ignition of the solids not fat.

Samples 1, 2, 3, 6, 7, 8, 9, 10 and 11, were obtained in Sussex county and were taken from lots of forty quarts each, thoroughly mixed. Sample 4 was the mixed milk of seven native cows in Passaic county. Sample 5 was from Mercer county, from a twenty-quart can.

Sample 12 to 65, both inclusive, were collected in Burlington, Camden, Gloucester, Cape May and Cumberland counties.

Numbers 32 and 33 were what is called "off shore" milk and the cows were very poorly fed. The samples were collected with the expectation that the analysis would give results lower than the standard.

Samples 57, 58, 59, 60, 61, 62 and 63 were from a herd made up of the following description of cows; one cow, one-half Holstein; one, Guernsey; two, half Jersey, half Holstein; one, short horn; two, three-quarters Guernsey; seven cows; yield forty quarts.

Sample 64 was from the mixed milk of the noted herd of high grade Jersey cattle owned by Mr. C. H. Taylor, of Burlington.

Sample 65 was from the mixed milk of a similar herd, owned by Mr. W. S. Taylor, of the same place. The two latter samples are added to our list to give examples of exceedingly rich milk.

TABLE III.

ANALYSES BY THE PUBLIC ANALYSTS OF NEW JERSEY—HERD MILK.

No.	Total Solids	Fat.	Solids not Fat.	Ash.	Sp. Gr.	Method of Analysis.	Analyst.
1	12 29	3.80	8.49	.63	1 031	Ritthausen.	A. R. Leeds.
2	12.71	4.06	8 65	.73	1.031	"	" "
3	12 97	4.08	8.89	.68	1.030	"	" "
4	13 88	4.49	9.39	.66	1.032	"	" "
5	13.68	3.76	9.92	.71	1.031	Cairns.	H. B. Cornwall.
6	12 67	3.33	9.34	.....	1.029	"	" "
7	13 99	4.13	9.85	.....	1.032	"	" "
8	14.80	4.78	10.01	.....	1.032	"	" "
9	14.21	3.87	10 34	.....	1.032	"	" "
10	14 8:	5.22	9.59	.....	1.030	"	" "
11	13.97	3.85	10.11	.....	1.032	"	" "
12	13.26	3.60	9.66	.64	1.0324	Wanklyn.	Shippen Wallace.
13	13.98	4.34	9.64	.63	1.0319	"	" "
14	13.50	3.94	9.56	.68	1.0319	"	" "
15	12 36	2.92	9.44	.66	1.0319	"	" "
16	13.75	3.85	9.90	.54	1.0324	"	" "
17	13.00	3.52	9.48	.68	1.0319	"	" "
18	12 92	3.44	9.48	.68	1.0319	"	" "
19	14.44	4.15	10.29	.62	1.0336	"	" "
20	14.34	4.22	10 12	.62	1.0330	"	" "
21	14 38	4.34	10.04	.62	1.033(	"	" "
22	13.42	3 52	9.90	.64	1.0321	"	" "
23	13.14	3.71	9.43	.62	1 0313	"	" "
24	14 29	4.93	9.36	.68	1.0330	"	" "
25	12.51	3.20	9.31	.66	1.0313	"	" "
26	13.55	4.55	9.00	.60	1.0301	"	" "
27	13.85	4.15	9.70	.66	1.0324	"	" "
28	13.05	3.67	9 38	.60	1.031 6	"	" "
29	13.67	3.83	9.84	.70	1.0330	"	" "
30	13.63	3.59	10.04	.70	1.0330	"	" "
31	14.51	4.53	9.98	.71	1.0319	"	" "
32	12.16	2.72	9.44	.62	1.0319	"	" "
33	12 73	3.85	8.88	.58	1.0295	"	" "
34	13.37	4.04	9.83	.66	1.0324	"	" "
35	14.61	4.55	10 06	.68	1.0324	"	" "
36	13.38	3.69	9.69	.66	1.0313	"	" "
37	12.53	3.47	9.06	.62	1.0301	"	" "
38	12.60	3.60	9.00	.60	1.0301	"	" "
39	12.76	3 12	9.58	.65	1.0319	"	" "
40	12 55	3.12	9.43	.66	1.0319	"	" "
41	13.50	3 93	9.57	.68	1.0313	"	" "
42	13.13	3.50	9 63	.60	1.0313	"	" "
43	12 71	2.41	10.30	.72	1.0348	"	" "
44	12 92	3.30	9 62	.70	1.0319	"	" "
45	12.56	2.75	9.81	.70	1 0330	"	" "
46	13.36	4.13	9.23	.66	1 0304	"	" "
47	13 38	3.94	9 44	.67	1 0319	"	" "
48	13.91	4.37	9.54	.65	1 0307	"	" "
49	13.00	3.85	9.15	.60	1.0313	"	" "
50	13.48	4.05	9.43	.68	1.0307	"	" "
51	13.76	4.35	9.41	.68	1.0307	"	" "
52	13.88	4.65	9.23	.66	1.0290	"	" "

TABLE III.—*Continued.*

No.	Total Solids	Fat.	Solids not Fat.	Ash.	Sp. Gr.	Method of Analysis.	Analyst.
53	12 76	3.01	9.75	.70	1.0324	Wanklyn.	Shippen Wallace.
54	13.14	3.46	9 68	.70	1.0324	"	" "
55	12.68	3.21	9.47	.64	1.0319	"	" "
56	12.94	3.76	9.18	.60	1.0301	"	" "
57	15.45	6.44	9.01	.68	1.0290	"	" "
58	15.02	5.76	9.26	.64	1.0290	"	" "
59	14.66	5.30	9.36	.66	1.0295	"	" "
60	14.30	4.94	9.36	.66	1.0301	"	" "
61	16 62	6.02	10.60	.68	1.0342	"	" "
62	15.19	4.97	10.22	.68	1.0330	"	" "
63	15.72	5 91	9.81	.67	1.0304	"	" "
64	22.08	12.83	9.24	.56	1.0240	"	" "
65	19.18	9.40	9.78	.60	1.0284	"	" "

METHODS OF MILK ANALYSIS USED BY THE PUBLIC ANALYSTS OF NEW JERSEY.

WANKLYN. *Milk solids.*—The milk is thoroughly mixed, and five grammes weighed out in a platinum dish. The dish is then placed on a water-bath, the water in the bath is made to boil vigorously and maintained boiling for *three hours*. At the expiration of this period, the milk in the dish will have completely dried up. The dish is now removed from the bath, its outside wiped dry, and itself and contents forthwith weighed.

The weight of the dish subtracted from the weight of conjoined dish and contents leaves the weight of the milk solids in the five grammes of milk taken. By multiplying that weight by twenty, the per cent. is arrived at.

Fat.—The residue, milk solids, may be taken for the determination of the fat. Ether is poured into the dish, and heated to the boiling point, and poured out through a small filter. This operation must be repeated at least three times, each time the ethereal solution being poured out through the filter.

The ethereal solution of fat having been obtained, the next point to be attended to is the evaporation of the ether, and the getting of the residue of fat. This is done by evaporating off the ether and weighing as in the case of milk solids, the result being the fat. (Milk Analysis. A Practical Treatise, Etc, by J. Alfred Wanklyn. New York: 1874. Page 19.)

This method was brought out in England by Prof. Wanklyn, in 1870, and by it, during the past thirteen years, he has analyzed many thousands of samples. The method is adopted by the public analysts of Great Britain—who number nearly one hundred—and is the official method used under the Food Adulteration Act of that country.

We shall discuss this method in comparison with the others later on.

The standard of this State was established upon this process, as was also that of Rhode Island.

The following averages were obtained by Wanklyn's method:

Wanklyn, England, town milk	14.06	Total Solids.
" " country milk	12.45	"
J. Carter Bell, England, 181 cows	13 80	"
E. E. Calder, Rhode Island, 440 cows	12.77	"

CAIRNS. *Milk solids.*—The milk is thoroughly mixed, and five grammes weighed into a small platinum dish. Evaporate over a water-bath until the milk solids look dry; then dry in an air-bath at 100° to 105° C., for one hour to one and a half hours; weigh, and dry again, for one-half to three quarters of an hour, and weigh again. Repeat this treatment until the loss is less than five milligrammes. Weight of residue, minus dish, equals milk solids.

Fat.—Pour about 10cc. of ether on the milk solids, allow it to soak into the solids for a few minutes, place the dish on the water-bath and keep it there till the ether boils. Then, after drying the bottom of the dish, pour the ether into a weighed beaker. Repeat this treatment with ether about six times. Cover the beaker with a piece of filter paper, and evaporate off the ether over hot water. When the ether is all gone, dry the beaker in an air-bath at 100° to 105c., for about fifteen minutes. Weigh; the weight minus the weight of the beaker equals the fat.

The residue in the dish may also be weighed; the loss equals the fat. The two weighings of the fat, direct and indirect, should agree within about five milligrammes. (A Manual of Quantitative Chemical Analysis, by Frederick A. Cairns. Revised edition. New York: 1881. Page 204.) This method is taught at the School of Mines, Columbia College, New York, and is used by the New York analysts.

RITTHAUSEN. *Milk solids*—Weigh out five grammes of the milk in a platinum dish, add 5cc. of alcohol and evaporate to dryness on a water-bath. Dry at 100 degrees C. to constant weight.

Fat.—For the determination of the fat, that substance is precipitated with the albuminoids by a solution of cupric sulphate. For this process two solutions are required: (1.) A solution of Cu SO4, 5 H_2O, sixty-five grammes to the liter of water. (2.) A solution of KHO having a specific gravity of 1.048.

Weigh out 10 grammes of the milk in a weighed 150cc. beaker and add about 90cc of water. Stir and add 3cc. of the copper solution, then add 1 2cc. of the solution of potash, being very careful that the re-action of the liquid should not become alkaline.

Allow the precipitate, which contains the albuminoids and all the fat, to settle, decant through a filter dried at 110° and weighed; when as much as possible has been decanted add about 100cc. of water, stir, allow to settle and again decant through the same filter. Finally, transfer the precipitate to the filter and wash until the total of the whole filtrate and washings amounts to just 250cc.

The filter with the precipitate is removed from the funnel and spread on a flat piece of glass and allowed to dry until the greenish mass can be easily cut with a knife-blade without sticking to it. The drying can be facilitated by subdividing the precipitate with a small spatula; still, it must not be carried so far that the mass becomes horn-like, otherwise the fat cannot be easily extracted. When drying has gone far enough, the filter and its contents are transferred to a Gerber's extraction apparatus and the fat extracted into a weighed flask. The ether is distilled from the flask and the fat dried at 100° C., cooled and weighed.

If the per cent. of the albuminoids is desired, proceed as follows: The filter and precipitate, from which the fat has been removed, are dried at 100° C, cooled and weighed; they are then burned completely in a platinum dish, and the ash plus the

CuO are weighed. The difference between the filter and the filter plus the precipitate minus the ash and CuO, gives the total amount of the albuminoids.

The precipitate of the albuminoids is so complete by the copper solution that even Millon's re-agent gives no precipitate in the supernatant fluid. The precipitate of the fat is purely mechanical, but it is perfect, every portion going down with the albuminoids.

A brief account of this method and a description of the extraction apparatus may be found in "Chemical and Physical Analysis of Milk," by N. Gerber, New York, 1882.

Dr. Edgar Everhart, Assistant in the Chemical Laboratory of Stevens Institute, kindly furnished me with notes on the process, which was introduced and is used by Prof. A. R. Leeds, who speaks very highly of its accuracy and the ease with which it is manipulated.

It was my intention to compare these methods, but, as I understand that Prof. Leeds and Prof. Cornwall will treat of this branch of the subject in their reports, I will add only a few brief notes.

It will be well to repeat, at this point, what was said before, that, if we are to judge the standard, or to compare samples of milk with it, a method of analysis equal to and not more rigorous than that by which it was adopted, should be employed. To use a process that will destroy some one of the ingredients, or that will falsify the results, would be unjust. What is required of the method is, that when a sample is submitted to two or more chemists for analysis, the results obtained by each shall be accurate and concordant. If this result can be obtained by each chemist, working by a different method, the problem is easy of solution; but if it is necessary that all shall use the same process, it seems to me very important that some one method should be fixed upon and used, to the exclusion of all others.

Without going into detail I will state that I am fully persuaded that Wanklyn's method of milk analysis is all that can be desired. It is accurate, and two or more analysts working at the same specimen can arrive at concordant results. Any method that requires prolonged evaporation or drying is very apt to get false figures, for the reason that such processes destroy or dehydrate the milk sugar, and thus make the total solids appear lower than they really are. The use of sand or any substance added to increase the bulk of the milk has been abandoned by nearly all chemists for the reason that not only is it impossible to get concordant results, but, as sand is a hygroscopic substance, accurate weighing is impossible or difficult.

As to the fat extraction, it may be said that where an extraction apparatus is used, such as Liebig's, Soxhlet's or Gerber's, where an almost constant circulation of ether is maintained through the milk solids, higher fat determinations will result than by the Wanklyn or Cairns methods. And if the ether be not dry, or if the solids contain much moisture, there is a source of error in the possibility of extracting some of the milk sugar, which result will cause the fat to appear greater than it is. But, with these few hints, I leave this branch of our topic for others to discuss.

In closing I would repeat what I have stated in former reports, that to do the work of inspection in a thorough manner and to accomplish better results, more attention must be given to the subject by local Boards of Health. It is clearly the duty of these Boards to interest themselves in this matter, and while a general oversight should be maintained by the State, the bulk of the work and the burden of expense should rest on local government.

I take this opportunity to thank my assistants and the analysts, for the excellent services rendered the State and the health interests of the people by them, at a very low rate of remuneration, hoping that their efforts will be appreciated.

CIRCULARS AND LAWS.

CIRCULAR No. XXXVII.

SCHOOL AND HEALTH CIRCULAR No. 3, FOR PARENTS, GUARDIANS, CHILDREN, TEACHERS AND TRUSTEES.

HEALTH, CHARACTER, AND INDUSTRY.

These are the three best things to have all through life.

POWER, SUCCESS, AND HAPPINESS

Are their companions. Without health, character may be good, but it has a burden to carry; without health, industry is tied down, or pulls too heavy a load; without health, power, success, and happiness have three of their best friends in trouble. Let us then learn all we can about health; how to have it; how to keep it; what use to make of it, as we go along with thirteen years of school life, between five and eighteen.

That is a poor school which takes away one's health, and to keep health is easier than to find it after it is lost.

TO PARENTS OR GUARDIANS.

See to it that the child goes to school in a proper condition. This means, first of all, cleanliness all over. A child not washed all over at least each week, with warm or cool water, is not fit for school. Some will need a bath oftener. Children need to wash the face and hands, and to comb and brush out the hair at night, as well as morning. Let the mouth be rinsed with water, morning and evening, or the teeth brushed, so as to have a pure breath.

Have clean, thin flannel for clothing, next to the skin, with such additional outside garments as may be necessary for warmth, and shoes and stockings that will protect the feet from dampness. A dry pair of socks and a clean handkerchief are not amiss in the satchel. Let no child start for school with damp clothing; when active, we can bear dampness a while, but to sit in wet clothing is always a risk. Tell the child, if damp or chilly, to let the teacher know it.

A good, plain, unhurried breakfast is always important to the school child. The young are better off without coffee or tea; but some may need a warm drink for breakfast in cold weather, such as sweetened water, sugar and milk, and water or

milk flavored with cocoa. If the child will not be at home and at dinner within five hours after the close of breakfast, have him carry a small and easily digested lunch, to eat at recess, or at an appointed time in school. It should be light bread and butter, with fruit or jelly, and not over-large, if there is to be a meal at home by two o'clock. Have the child chew before swallowing, as it cannot chew after swallowing, as cows do. Let every boy know that tobacco in any form is so injurious to growth and vigor as to make its use by him a breach of school laws and of good sense.

See that the child gets plenty of good sleep, in a well-aired room, and does not go to bed just from the book, so as to be tired and anxious about a lesson.

When the child is really unwell, do not send him to school just for the name of being punctual. The parent should judge and decide wisely, mindful that headache, pain, or weariness in a child always requires rest. If your child is sick, or if there is sickness in the family, have the judgment of your doctor as to the time of staying at home.

TO THE CHILD.

You must learn how to take care of your own health. Others may tell you; but experience and advice should early lead you to feel how important it is not to abuse the body. Read this leaflet and mind it. Help your parents and teachers to keep you clean and neat. Be clean in person, in thought, in word, in action. A child that has clean feet, clean hands, clean nails, clean ears, and combed hair, is generally clean and neat.

To get peevish or worried over a lesson is not wholesome. Get, if need be, a part of your lessons at home. The load is often too heavy because we try to carry too much of it at once, or in too short a time.

In sitting, do not lean over too much, or too constantly. While standing, stand erect. Neither fold the arms in front nor put them behind, but let them hang naturally and easily at the sides. In studying, try to have enough light without a glare; if light or print troubles you, tell the teacher. If you are really unwell, let him know it; a headache that may not require you to go home may be a reason for change of position, or rest from study; only be upright, and do not pretend. In all things seek to take good care of your health, since your happiness and usefulness so much depend upon it.

TO THE TEACHER.

Know that health and habits in reference thereto are important parts of the education you are seeking to conduct In large schools, a steward or janitor should receive each pupil, and know that the child enters on the work of the day healthily; where no such person is provided, the teacher must include this with many other things in his care-taking

Children must not hang damp and sometimes soiled overclothing in a close, unaired room, against other damp or wet garments. Each child's clothing should be kept by itself.

The regulation of heating and ventilation is very important; the thermometer should guide you as to heat. The sensations of those who are well, and who are properly clad, help much to guide as to moisture, warmth, purity of air, draught, etc. Air can often be let in through a sieve of wire, or between the two sashes, with a board strip beneath the lower one, when a direct draught would be hazardous.

Walls often need whitewashing, kalsomining or painting, and all wood-work should be frequently and thoroughly washed. Sweeping carefully under the desks and dusting

are important. The condition of the rooms, the distribution of desks, according to size of persons, light, variation in study and position, exercise, airing of rooms while empty, moderation of competition, assortment of work to the capacity of the child, and quickness to perceive the occasions for temporary variations and adjustments are essential in the skilled oversight of the teacher; he must feel that he has this charge to keep. It is a joy to get school-work out of a well child, and to help rather than to complicate inability and invalidism. Remember that the kind of day has something to do with the capacity for work. While light gymnastics should be practiced daily in all schools at stated periods, on rainy or cloudy days special exercises should be given, during which the room can be more thoroughly ventilated. Give zest and advice as to out-of-door as well as to indoor exercises.

Not only talk to the pupils about health, and enforce its rules, but train them in the practice of it, so that "errors in physical conduct or ideas will be as readily pointed out for amendment, as mistakes in grammar, pronunciation or behavior." Thus make them valid, instead of invalid; promote their well-fare, instead of their ill-fare, and enable them to do their work in life with ease instead of disease. Feebleness of constitution or special ailments, are too often the result of errors in the school discipline. More suffer and die from the frailities of ill health, thus acquired in childhood, than from diseases which are said to be caught.

WHAT SHALL A TEACHER DO ABOUT CONTAGIOUS DISEASES?

Acquaint parents, by this circular, or in some other way, with the fact that it is their duty not to convey, through their children, contagious diseases to others. If a child seems unwell, or you find out there is sickness in the house he lives in, inquire as to it. Ask the attending physician or Board of Health to apprise you of any house from which a pupil should not be received. Hold a physician or Board of Health responsible for the time of return to school. In cities, or during epidemics, a permit should be had. Prudence and judgment, but not systems to excite alarm, are required. Small-pox, scarlet fever and diphtheria, need special precautions.

TO TRUSTEES OR BOARDS OF EDUCATION.

You are in trust of all that relates to the school, having accepted an appointment as a guardian of the children, as well as of the teachers and the property. To you, the teachers and the scholars must look for adaptation of structure and furniture, and as the bond between themselves and the community. You must realize that the care of health is a part of education, and that this means, on your part, actual personal supervision, appeal and service; it means facilities for right administration as well as buildings. All the larger schools should have direct instruction in physical education.

The trustee must feel it to be his duty and his business to help in giving the child a fair chance for health and usefulness. The State seeks this for itself as well as for the child. No one can do more for it than the school trustee who will wisely look after the welfare of the child in the school, and mold the sentiment of the people in favor of proper arrangements.

Prevalent cleanliness inside of the building, on the grounds, and in all outhouses, must be secured; defects must be recognized, both as to their reality and the extent of the evils they cause. Neat and good housekeeping of the school home is indispensable. Often it is wise to have the judgment of ladies as to the care of the school rooms. Teachers need to be fully upheld in enforcing rules as to the personal habits of the pupils.

As New Jersey has free schools, in order to secure men and women with sound bodies, fitted for labor, with good character, and mental acquirements sufficient for some useful vocation in life, the overseers of these schools need so to plan as to insure these results. Thus, alone, can we have good citizens, and happy families, and prosperous industries.

Thus health, character and industry keep together as school friends and life friends, and power, success and happiness join their company. So the public school confers blessings on the people and on the State, securing power not less from sound bodies than from sound minds.

For various other items of advice, see Circular XXVIII. of this Board.

CIRCULAR XXXIX.

TO LOCAL BOARDS OF HEALTH.

All township Health Boards should hold a session at the spring meeting of the township committee, to consider any causes of preventable disease and how they are to be abated. The powers of such a Board are clearly defined in various acts, as enumerated in the Sixth Report (1883) of the State Board of Health (page 255, etc.) See especially chapter 155, laws of 1880; chapter 135, laws of 1881; chapter 155, laws of 1882, and chapter 105, 1883, a supplement to an act entitled "An act relating to Local Boards of Health." Under the law every city and every township *must* have its Board of Health.

The Board in townships consists of the township committee, the assessor and the township physician.

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

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

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

Such a Board has great value as an educator of the public in the avoidance of the causes of ill health. It is in a position to advise and to acquaint the public with the various laws as to the prevention and abatement of evils prejudicial to health. Many bad household and town arrangements are those of ignorance, and are easily corrected when a better way is shown. The Board can also, by its circulars, ordinances and instructions, deter many from infringements which would otherwise occur, and thus act as a preventive of disease. Most Boards should have an executive officer, who should be informed as to the most dangerous nuisances and the best means of riddance. Cities need to have a special sanitary inspector, upon whose good judgment and knowledge they can rely for the correction of many evils as well as for the enforcement of the law when necessary.

IV. It is not necessary, under the general laws of the State, always to prove disobedience of an ordinance, but only that the thing complained of is contrary to the law. Ordinances are valuable as warnings or as defining more closely the scope of the law. It has been a mistake of many cities to promulgate too many ordinances and to enforce too few. A waste of dead letter makes administration less perfect. Neither do health laws or health codes supersede common law. They provide speedy modes of riddance, leaving any question of trespass to be decided afterwards.

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

The duty of discussing and exposing evils, of suggesting relief, of making recommendations, and of giving information is a great one. Boards of cities and townships do very much to prevent and abate evils, by the very facts which are brought out in their discussions, and by turning public attention to existing evils.

In our recent experience with small-pox, new evidence has been furnished how necessary it is to have such Boards in all localities, so that when any case of contagious disease, or any nuisance hazardous to health occurs, there may be no delay. The citizens of each precinct have the right to be able at once to find some authority charged with the duties specified in the law. Forethought is better than afterthought.

While the law requires expenses of over fifty dollars per year to be ordered or approved by the township committee, the township or town committee, or council of a city may authorize further expenditures, and in case of special meetings or service on the part of the Board, may compensate therefor, if the town committee, etc., so direct. In some special investigations the State aids to a limited extent.

When there is no township physician, the State Board of Health has the right to appoint a medical member of the Board.

There must be a report made in October of each year to the State Board, as required by law.

Health Boards have an important duty in co-operating with the city clerks or assessors in securing complete returns of marriages, births and deaths, certified copies of which can be had, by those entitled thereto, on application by letter to the Secretary of State.

With these properly returned, we are able to state from year to year, or through longer periods, the health of any locality. Thus any hearsay as to healthfulness or sickness can be corrected, and if any disease is found to prevail above a general average we detect causes and correct them. The progress of population and the causes

affecting the growth of sections can be studied, not merely for curiosity, but in the interests of political economy and social advancement. It is thus that whole communities have their health interests under supervision. As health is capital and wages, we thus look after a great condition of success. There is no more important census of population. It can only be secured at the time the events it records are occurring. If left to the end of the year, or for semi-decennial record, experience shows that the results are too imperfect for study. The law is now well complied with by ministers, physicians, etc., except when carelessness or postponement as to birth returns annoys town clerks and assessors and delays tabulation.

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

The several reports of this Board clearly indicate the work to be done. Some of these cannot now be furnished, but the last report will aid much in this direction. Local Boards must see to it that all circulars, reports, etc., sent, are not carelessly retained by assessors or others, but passed over to each successive Board. We send such reports, as also all circulars and blanks, to any citizen on receipt of postal.

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

There is now enough law for most cases. What is most desirable is a comprehension of what is needed and proper to be done, and the doing of it by right methods. Those who have power to enforce a law, because of that power have far greater chances for persuasion in securing right action without legal process. But this must not mean delay or tampering with dangers to the health. We ask all Boards to become informed as to their duties, and then to perform them with that prudence, energy and determination which the circumstances of each case may require.

Any letters of inquiry may be addressed to the Secretary of the State Board or Bureau of Vital Statistics, Trenton.

We add a number of suggestive questions indicating what Boards of Health should know or inquire about. Some of these apply only to cities and some only to townships, but all are worthy of thought, according to the needs of each locality.

What is the area of the city or township?
What is the density of population?
What is the character of geological structure and soil?
What the natural drainage?
What the needs of additional drainage arising from structural alterations?
Are there ponds, or stagnant pools, or any other interferences with proper drainage?
Is there a sanitary map, so that the location of all underground pipes or the plan of all underground work and the contour of surface can be easily known?
Are plans devised or executed for proper drainage?
In cities, is foresight had as to public parks?
Are there any free baths?

Are there careful arrangements to *prevent* nuisances, as well as for their abatement?
Are cases of contagious disease reported to you either by the head of the family or by the physician?
Have you plans and provision for dealing with any case of contagion, such as smallpox, typhus fever, etc.?
Is there any sanitary inspection of school houses or other public buildings?
What trades or occupations are injuring the health of operatives?
Have factories any system of ventilation?
Are there factories of which the odor or refuse is a nuisance?
Are there slaughter houses which are a nuisance?
Is there any inspection of city stables, or cow pens or hog pens?
Is there any inquiry into the adulteration of milk, of food, or of drugs?
Is kerosene ever tested, or are there accidents therefrom?
Is a record kept of diseases, or of deaths, and their causes and locality, that you may compare different parts of the same city or township?
Do you aid the assessor or city clerk in securing the returns of marriages, births and deaths, so that the vital and essential conditions of local prosperity may be known?
Is vaccination systematically secured?
Does the assessor or city inspector regularly report to you any condition which he regards as hazardous to the public health?

HOUSES.

What is the condition of cellars and basements?
How are the walls as to dryness and dampness?
What fire-escapes or provisions for fire?
What the condition of tenement houses?
What is the water-supply of each house?
Is there a well or cistern supply? How many use wells instead of the public supply?
Are there any cesspools which have been once used and then filled up?
How near are cesspool, well and out-house?
Is there outside ventilation between the house-pipe system and the cesspool or sewer?
Is there a trap between it and the cesspool or sewer? Any grease trap?
Does the Board of Health know the sanitary condition of each house in those matters which most concern the health of the community?
If there are sewers, is their condition thoroughly known? Are they ventilated?
Are house connections watched and carefully superintended when new buildings are erected or when changes are made?
How is storm-water disposed of?
Give size, location and construction of present cesspool, and how emptied.
How are ashes, garbage, etc., disposed of?
Are there house or outdoor water-closets? If so, how are they constructed, cared for or emptied?

For other questions and suggestions, see the Reports of the State Board of Health.

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

CIRCULAR XL.

AS TO THE HEALTH OF OPERATIVES.

In the work of examination into various industries, with a view to determining their effect on the health and vigor of those employed in them, and upon their families, there are many points of inquiry which must be left to the judgment of the examiner.

The design of this circular is to suggest the outline of the work proposed, which may be added to as the need of each special industry may seem to demand. Where the inquiry is as to classes instead of any specified department, the usual division is—

I. Cultivators of the soil.
II. Active mechanics abroad.
III. Active mechanics in shops.
IV. Inactive mechanics in shops.
V. Laborers—no special trades.

For inquiry into special occupations, the following points are to be thought of:

I. Occupations deleterious by reason of the inhalation of (*a*) Irritating, (*b*) Poisonous, (*c*) Offensive; (*A*) VAPORS AND GASES, or (*B*) DUST, or (*C*) by ABSORPTION through the skin.

II. Occupations that involve exposure to—
(*a*) Elevated or variable temperatures.
(*b*) Over-use of certain organs.
(*c*) Constrained positions.
(*d*) Sedentary life.
(*e*) Exposure to accidents.

The following outline will serve as a guide to observation and inquiry:

I. The sanitary condition of the place of labor; its locality, construction, drainage, facilities for light and air, water, heating, fire-escape, and for the removal of all wastage or material injurious to health; its housekeeping in the interest of cleanliness and comfort; modes of preventing or of reducing to a minimum all effluvium nuisances; of preventing dust, or so removing it by fans or sprinkling as to diminish its inhalation; modes of protecting from accident by machinery, or from irritating material used in the occupation; modes of supplying a sufficient amount of fresh air without draught, both in summer and winter; also arrangements for washing, dusting, etc., and sanitary inspection.

II. The sanitary conditions of the persons employed in each department; their general habits as to sleep, cleanliness, tobacco and alcoholic drinks; the kind of food and arrangement of meals; how far some head covering or some overall is used to protect self and clothing from dust; the evidences of good or ill health, as afforded by appearances and by the personal testimony of the person or of friends; the effect of the work on heredity, as also whether those whose parents or grandparents have pursued the same occupation inherited a reduced physical stamina; the amount of time lost by sickness; what complaints are most incident to the work; tables of mortality

showing the actual deaths of those employed, or of those who had left the employment on account of ill health. Give age, sex and cause of death, etc., as in usual certificate.

III. The mode of pursuing the occupation; specifications of its various departments and the evils special to each, and the best methods of protection therefrom, and those actually used; the period or duration of labor; is it night work alone, or conjoined with day work? are both males and females employed? if so, are all arrangements fitted for proper separation? is there piece work? what portion of the work is proper for children, and for those of what age, sex or strength, and how long should they be employed in it? constrained or injurious positions in work; what arrangements for change of position or to economize strength and avoid waste fatigue; the income of various workers, so as to know how far it is a sufficiency without other extra labor or family help; what proportion of the adult workers, either male or female, are married; what the condition of the houses in which workmen live.

Those who inspect or who prepare statements need to be familiar with the employment in its details, and to prepare an outline as introductory to the study of individuals and of the effect of trades, or parts thereof, as shown by the accurate history of persons. The report on Hatting in our second report (page 68) will serve as a specimen. Inquiries may be addressed to

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

CIRCULAR XLI.

(INDUSTRIAL CIRCULAR NO. 2.)

HEALTH COUNSELS FOR WORKING PEOPLE.

HEALTH, CHARACTER, INDUSTRY AND SKILL

Are the capital on which most must rely for support and happiness. Of these not the least is health. Whether or not we are able to do the work we attempt, largely depends upon whether we provide all needful force-producing, repairing and protective materials and methods for operating this personal machinery we call the body. All those who depend upon labor for support have to inform themselves as to the conditions of health, and the evils which they are especially to avoid.

THE BODY, TO BE HEALTHY, MUST BE KEPT CLEAN.

This means, the washing of the body all over, each week, or oftener, with cool or warm water. No cleansing of face or neck or hair or hands will take the place of this. Many who *mean to be clean, but are not*, neglect this In many industries there is a soiling of the body not perceptible, which stops up the pores, and, besides, the natural secretions of the skin need this mode of removal. Neglect of the hair, the ears and the feet often leaves noxious materials about them. The thorough cleansing of the mouth, the nose and the throat, by washing and rinsing, at least three times a day, is especially important to working people who are so much exposed to dust.

The teeth need good care and brushing, because their preservation is so important for good chewing and digestion.

The body, to be kept healthy, must have proper rest. This means, sleep, in a bed and in a room which have been well aired, which are not damp or so cold as to disturb sleep, and for seven or eight hours. It also means relief from fatigue by change of posture. A noon rest, in horizontal position, is often refreshing. Many kinds of work permit a change of position which rests muscles or parts of the body even while the work continues. Workmen do not always *rest* all they can. How to accomplish the most with the least toil is a study for each one. All work is not exercise in its full sense. If not, the change to moderate open air recreation is important. Exercise those muscles which are the least used in your work. Think what your own particular employment demands, and seek to adjust yourself thereto.

THE BODY MUST BE RIGHTLY FED.

Food and force have relations much better understood than formerly. Foods may be spoken of under two great divisions—such as make body or muscle and such as make heat. Most foods contain materials for each. Heat is mostly derived from fats, from foods having starch in them, as bread, potatoes, rice, etc., and from sugars, which are contained in fruits, vegetables, etc. In digestion, the starches are converted into sugar, and thus about equally aid in producing warmth. The heat-producing power of fat in its natural state is over two and a half times as great as that of starch or sugar. The need of the body for food varies, but a relative idea is given of each. During *idleness* the usual requirement is (*a*) Flesh-producing food, 2.73 ounces. Heat-producing food, 20.60 ounces. (*b*) During regular *work:* Flesh-producing food, 4.48 ounces. Heat-producing food, 26.44 ounces.

Bread, meat, potatoes and milk are valuable foods, because they combine these different kinds of food.

Beans, with pork added to furnish fat, very nearly represent meat.

Indian meal has much of the strength of meat, and is rich in oil. It is a nutritious and economical food. It requires long boiling and to be carefully stirred into the water while being prepared. When fried in slices it makes a hearty food.

Of breadstuffs, wheat bread is the best, if it is rightly made of good flour. Heavy bread, because of its difficult digestion, is bad. Warm, light biscuit, well baked and well chewed, are not indigestible. Brown bread is generally made of bran and inferior grades in flour. Many foods disagree, because they are too rapidly eaten. Hurry in eating must be avoided.

MEATS.—Of these, beef and mutton are the most valued foods. Good veal and good pork, if well cooked and properly chewed, so that the fibers get into the stomach in a cut condition, digest quite readily. Tough fiber of any kind of meat needs to be made tender by keeping or pounding, or to be finely divided by chopping. Soup is a very valuable kind of food, and should be oftener used by laborers as the beginning of a meal.

FISH, as compared with butchers' meat, has about half as much of flesh-forming material. Most kinds lack in oil, but it is a nutritious food.

EGGS AND MILK do not need to be enforced as good foods. Cheese, if made of milk, is good as an addition to a usual meal.

VEGETABLES.—Potatoes are of very different quality. They are so much a dependence that more care should be taken in their selection and cooking, so that when cooked they may not cut like soap.

The tomato—half fruit, half vegetable—is very valuable to the laborer, because it cheaply supplies a juice much like that of some fruits which are more expensive. Cabbage, parsnips, carrots and onions rank high among vegetables as nutrients. Turnips are a relish to some, but not so nutritious. The onion contains 4.5 per cent. of carbon, 0.22 of nitrogen, and its oil stimulates digestion. Parsnips, carrots and beets have much sugar in their juices. All these are most digestible when cooked without grease, and properly oiled or seasoned afterward. As all artificial sugars are expensive, we get them best through our foods. As children convert the starches into sugars less rapidly, they need more molasses or other sweets with food than do adults.

DRINKS.—So far as nutriment is concerned, milk has the preference. Skimmed milk only lacks cream, which is supplied by other oils eaten. Buttermilk, by its acid, often aids digestion. Warm drinks aid digestion independently of their composition. Whatever is palatable and harmless may be added.

Tea is slightly refreshing, but not so valuable as coffee. This is not only invigorating, but the hot infusion is equally serviceable against cold and heat; in the one case the warmth, and in the other the action on the skin, are useful, while the nervous stimulation is desirable.

A warm drink at dinner is often valuable for those who carry a cold dinner with them, and is provided in some factories.

We need not discuss the alcoholic beverages as related to labor. The alcohol in them has no nutritious power, and their stimulus or exhilaration is not needed in healthful life. The matter of cost, as compared with any of the other foods or drinks, shows them to be too expensive to be included in any dietary for the laboring classes. This is conceded even by those who would advocate their use in times of extreme fatigue akin to disease. Beer, as used by the working classes in some localities, is a cutting down of daily wages as real as if a reduction was made by employers, and is not necessary.

The use of TOBACCO is so common that we only speak of its mode of use. It is best after meals. Constant smoking or chewing, when at work, injures many. Irregular heart action, nervousness and imperfect digestion often result. The pipe, when coated with the oil of the tobacco, is itself an evil. Each workman should guard against excessive use of tobacco. Young men and boys should not use it, and those who are older and have not the habit, have no need to acquire it.

As working people suffer much from adulteration of tea, coffee, tobacco, spices, baking powders, cheese and from other inferior foods, all factory cities should have analysts to test such frauds.

All simple, nutritious well-cooked foods should be at the command of those who work, and none should so certainly get the worth of their money, and not waste money on inferior foods. The families of all workmen need to know of the various forms of foods furnished, and to acquire skill in their proper preparation. This home work, done by those who keep the house and provide the supplies, is a part of skillful labor.

COOKERY.—Health depends so much on good cooking that all house and home-keepers should make of it a study. The chief design of cooking is to make foods tender,

or, in some cases, more palatable. "There are but few foods which require to be cooked in boiling water." A heat not over 180 degrees, instead of 212 or the boiling point, is usually enough for meat, milk, eggs and soup. The reason is that the albumen which these contain coagulates at this temperature, as we see it in the white of a cooked egg, and is made hard and less digestible if the heat is that of the boiling point. The cook easily knows when water is boiling, and by custom can regulate this. Vegetables require more heat, although some of these, when just done, are made more tender by steaming or simmering. Meat for boiling is sometimes dropped into boiling water in order to coagulate the surface and retain the juices, and then the temperature reduced by adding water and boiling at a lesser heat. Meat, which is warmed up, as in stews, should never come to a boil. When possible, bones should be removed from meat before roasting, and kept for soups.

Bread requires an even temperature in baking. If it is at all doughy, it is not so easily digested. Yeast and the better kinds of baking powders enable us to have it good, which is very important to all classes.

TIMES OF EATING.—As food is a relative thing, dependent on the demands made upon us, the quality of food and the times of taking it vary somewhat. While regular hours for eating are desirable, and habits of eating without indication undesirable, yet a piecemeal, when there is over-fatigue or when the former meal has been light, is often advantageous. Nuts, cakes, candies and fruits, as a rule, are not useful when the stomach is empty and needs refreshment. At such times light bread or eggs or soup is better, while the former may be taken at or soon after meals. Those at work in preparing foods often suffer from too frequent eating. Labor, sleep, food, all need to be adjusted to each other, and those who observe are apt to find out how to proportion them.

CLOTHING.—Flannel is so valuable to working people, because it is an equalizer between the heat of the body and its surroundings. If it becomes very compact by pressure or long wear, or is soiled, it loses much of its value. Under-clothing of any kind should not be worn too long, as it and the skin are the great means of cleanliness, and so must be kept clean. The blouse and overalls are of great value as a protection to clothing, and should be adopted in most factories. It has been shown that very compact fiber, or that which becomes pressed or greasy by use, is not as warm as that which is looser and frequently aired and cleansed. No part of the clothing should be worn too tightly. Waistbands and suspenders should be elastic. Much harm is done by garters to those who are much on their feet.

Dress serves to protect the breast more than the back. We forget that the lungs are equally near each. The workman's vest should be as thick on the back as the front. In winter or changeable weather a strip of narrow smooth flannel inside the neck-band of the outer shirt is a protection, better than large woolen mufflers about the throat. In changing from hot, close factories to the outer air a closed mouth and covered shoulders protect from many a cold. All workmen who stand or sit at work need especial care as to dryness of feet. If caps are worn at work, they should always be of light and airy material. Not only is the right temperature of the whole body a matter of comfort, but it is related to vital force, to capacity for work and to the demand for food. We crave fats and hearty food more in cold weather, because we consume more heat. While we regulate the supply by internal means, we must also, by artificial protection and adjustment, regulate our demands, and through these have our needs met. Dust, over-heat and imperfect ventilation are the great perils of indoor labor.

As rest and recreation, and even change of activity, refresh and interrupt the wearing routine of daily toil, they are to be provided for. Only they must be such as do not, by any excess of food or drink, of exposure or of fatigue, limit the value of the change.

American workmen have some great advantages for healthy living, and need to study how to avail themselves of those they have, and how to secure such others as they ought to have. It is a common interest of the State, that health, character, industry and skill, which are the four corner-stones on which prosperity is builded, should be secured; that there should be adequate provision for them, and that those who desire and need them should, for themselves, study and practice the conditions and methods most likely to secure them. Therefore, a personal *forethought* and oversight as to the necessary conditions of health, in *yourself*, in your workshop, in your occupation, in your home and for your family, is urged upon your attention.

CIRCULAR XLII.

AS TO PETROLEUM, KEROSENE, ETC.

The law of this State as to the use of illuminating oils, has done much to exclude from the market inferior grades of oil. This Board is now able to secure the co-operation of the wholesale dealers of the State, and with the aid of Local Boards of Health, can protect the people from explosive oils. The last Legislature, by the act, chapter XCVII., laws of 1883, so changed the law as to use only the flash test. Section one is as follows:

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That hereafter, petroleum, or any of the products thereof, may only be sold for use within this State under the following regulations and restrictions, namely, (*a*) benzole, gasoline, naphtha and benzine must be sold under their true names respectively, and such names must be plainly shown upon the barrel, can or vessel in which the same are sold, or offered or exposed for sale, respectively, or upon a label securely fastened thereto; (*b*) petroleum or kerosene which will flash at a less temperature than one hundred degrees Fahrenheit, flash test, must have plainly designated upon the barrel, can, or vessel in which the same is sold, or offered or exposed for sale, or on a label securely fastened thereto, the number of degrees Fahrenheit, flash test, below which the same will not flash; (*c*) only such product of petroleum as will not flash at a less temperature or flash test than one hundred degrees Fahrenheit may be sold for lighting or illuminating purposes, except where the same is to be used in street lamps or open air receptacles, or in gas machines, in which case (as to petroleum or kerosene) there shall be plainly marked on the barrel, can or vessel in which the same is sold, or offered or exposed for sale, or on a label securely fastened thereto, the words, "not for inside light;" *provided*, that this act shall not apply to petroleum or its products sold in tanks used for transportation.

This law takes effect July 4th, 1883.

See also penalty as follows, sec. 2, 1882:

2. *And be enacted*, That if any person shall sell, or offer or expose for sale, for use within this State, except in the manner permitted by this act, any petroleum or product thereof, he shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding five hundred dollars, or imprison-

ment at hard labor or otherwise for a term not exceeding one year, or both; and any sale in quantity less than one barrel shall be presumed to be for use within this State.

As the work of testing can be done better by using a closed tester, we have adopted the same oil tester that is approved by the New York Board: Eimer & Amend, 201 Third Avenue, New York City. The following rules are adopted to govern the use of the tester:

Remove the oil cup and fill the water-bath with cold water up to the mark on the inside. Replace the oil cup and pour in enough oil to fill it to within one-eighth of an inch of the flange joining the cup and the vapor-chamber above. Care must be taken that the oil does not flow over the flange. Remove all air bubbles with a piece of dry paper. Place the glass cover on the oil cup, and so adjust the thermometer that its bulb shall be just covered by the oil.

If an alcohol lamp is employed for heating the water-bath, the wick should be carefully trimmed and adjusted to a small flame. A small Bunsen burner may be used in place of the lamp. The rate of heating should be about two degrees per minute, and in no case exceed three degrees.

As a flash torch, a small gas jet ¼ inch in length, should be employed. When gas is not at hand employ a piece of waxed linen twine. The flame in this case, however, should be small.

When the temperature of the oil has reached 85° F., the testing should commence. To this end insert the torch into the opening in the cover, passing it in at such an angle as to well clear the cover, and to a distance about half way between the oil and the cover. The motion should be steady and uniform, rapid and without any pause. This should be repeated at every two degrees rise of the thermometer until the temperature has reached 95°, when the lamp should be removed and the testing should be made for each degree of temperature until 100° is reached. After this the lamp may be replaced if necessary, and the testings continued for each two degrees.

The appearance of a slight bluish flame shows that the flashing point has been reached.

In every case note the temperature of the oil before introducing the torch. The flame of the torch must not come in contact with the oil.

The water-bath should be filled with cold water for each separate test, and the oil from a previous test carefully wiped from the oil cup.

Not less than one pint of the oil to be tested should be sent to the examiner. It must be accompanied by the name of the person sending it and by the name of the person from whom it was obtained, both of which, if necessary, are confidential. Expressage must be prepaid.

Local Boards are urged to collect samples in their districts, and to impress on all buyers and sellers the importance of this protection from dangerous or hazardous oils. Samples sent by Local Boards will be examined without charge.

For convenience the State is divided into sections.

Testing for Bergen, Morris, Passaic, Sussex and Warren counties will be done by Wm. K. Newton, M. D., of Paterson; for Essex, Hudson, Middlesex and Union counties by Prof. A. R Leeds, of Hoboken; for Hunterdon, Somerset, Mercer, Monmouth and Ocean counties by Prof. H. B. Cornwall, of Princeton, and for Atlantic, Burlington, Camden, Gloucester, Cape May, Cumberland and Salem counties by Shippen Wallace, of Burlington.

In the second report of the Board of Health (1878), pages 16–22, and the fourth report (1880), pages 25–28, and the fifth report, pages 22 and 106, the need of legislation upon the subject is illustrated. These are but items in the records of destruction of human life which has occurred from a substance which is safe and valuable for lighting purposes, if properly prepared. Fire and destruction of property often result from use of kerosene. The law which has been passed is the extreme limit of leniency,

and its value depends on its rigid enforcement. We shall have the co-operation of many of the manufacturers, and only need the aid of Local Health Boards and retail dealers to make it fully operative.

It will be the duty of all Local Boards of Health to see to it that the people in their respective districts are protected in the manner and to the degree which the law provides. Besides the notice given by the State Board of Health and in the newspapers, it will be wise for Local Boards to send copies of this circular, which can be had on application by postal to us, to all venders of or dealers in illuminating oil in their respective districts.

All dealers are held responsible that the oil which they are selling for household illuminating purposes is proper for use by the test and method of testing herewith adopted. Any person who can prove that he has bought oil of a less grade "for inside light" may bring suit. Purchasers of oils to be sold in this State should have the guaranty that the oils purchased are such as will answer the test herein given, and should not, when purchasing from refiners outside the State, rely upon the brand, but ask the written guaranty of the dealer.

In case of any accident occurring from the *actual explosion* of any lamp or can containing oil, the Local Board of Health should at once procure specimen and evidence as to its source and have the same tested by one of the analysts. Even where accident has resulted from the improper use of oil, as in lighting fires, the rapid explosion often results from gas present in the can or the intense inflammability of the oil.

All cities should employ a local inspector, who, if need be, can be duly authenticated by this Board. Besides the oversight of Local Boards we shall use proper methods for discovering the qualities of kerosene offered in the market and the sources from which it comes. It is to the interest of all that a safe kerosene be used. Heretofore, the production of a poor article has made an unfair competition, which it is hoped to overcome since life and health are endangered and fair dealing is prejudiced thereby.

It will be well for all retail dealers, in purchasing at wholesale, to have their bills certify that the oil purchased is up to the grade now required by the laws of New York and New Jersey.

E. M. HUNT, *Secretary.*

CIRCULAR XLIII.

Inclosed herewith please find an outline for the Annual Report for the year ending October 1st, 1883. Under the schedule of subjects for Report, in the case of cities and townships enumerated in the 6th Report (1882), pages 151–154, it will not be necessary to repeat as to *A, B, E, G, I, O,* as most of the facts are on file.

Under *A*, in the case of all cities or incorporated towns, it is desirable to report the number of acres included in the incorporation.

C. State exact source of water-supply. If a public supply, is it by the city or a private company? How many houses take it? Is the water ever discolored? Has it an iron or other taste? Is it hard or soft? Is it bad at any one season of the year? Are reservoirs or water pipes cleansed? Does the source or stream from which it is taken receive any sewage above the point of supply? Any other facts as to source, quantity or quality. How many depend on wells? How many on cisterns?

D. As to drainage, state whether any system of drainage for the ground is used as

distinct from sewerage. Is the usual water level such as to secure dry cellars? If there are swamps near you, or malaria is frequent, give particulars.

As to *sewers*, state their construction, their grade or fall per 100 feet, their size, their outfall, their flushing and ventilation, and whole length.

F. State whether houses generally have basements or cellars. If a city, whether the basements are occupied; if country, whether largely used for storage of vegetables. How many tenement houses of more than two families?

H. State how far sewers are used. If cesspools, state whether they are cemented, or whether built with open bottom and sides. How are they emptied?

J. State any known or prevalent diseases. Does assessor inquire each year as to losses of animals and contagious diseases? If a city, is there a register of all persons keeping horses, cows, hogs, etc.

K. Are slaughter houses inspected so as not to be a nuisance to neighbors?

L. State any new manufactories, and any evil to health therefrom.

Look carefully at each heading and state what you know.

Do not put down a disease a prevalent unless you have personally known of at least ten cases. Often the physician of the Board should make out or aid in the report; add such suggestions as occur to him; but between yourself and him let there be no delay to make return during October. We must trust chiefly to the assessor and the physician to keep the other members of the Board acquainted with health condition, and with the rights and duties of the Board. Any neglects reported to us will be inquired into. Refer to Circular XXXIX., before sent you, for further suggestions. We send also this month list of physicians that you may cross off any deceased or removed, or who have left practice. Add all new ones who have *settled* for practice in your city or township. Give name and *post office address*, etc., *plainly*, and only those who are practitioners and who *reside* within the limits you represent. Mail all to us, in envelope herewith sent, by November 1st.

E. M. HUNT, *Secretary.*

NOTE.—All these and other Circulars can be had in large print on application by postal.

References to Health Laws and Circulars will be found on pp. 31–34 of this Report and pp. 253–260 of 6th Report.

MEDICAL REGISTRY.

This list of physicians living and practicing in the State of New Jersey, is furnished in accord with section 2, of a supplement to an act entitled "An act to regulate the practice of medicine and surgery," approved March 12th, 1881, said supplement having been passed March 22d, 1883:

2. *And be it enacted*, That in order to secure to the State Board of Health a full record of all physicians and surgeons who, under the laws of this State, are required to give certificates of death, it shall be the duty of the county clerk of each county of the State, to furnish to the State Board of Health, a list of the names of all physicians and surgeons who have deposited with him copies of their diplomas, together with the date of their respective diplomas, and the name and place of the institution purporting to confer such diploma, and each county clerk shall yearly furnish to the State Board of Health a similar list of those physicians and surgeons hereafter depositing diplomas with him, and shall include in such list also the names of those physicians and surgeons filing affidavits with him, as mentioned in the second section of this act; and each county clerk shall keep in a suitable book, an index of the names of all physicians and surgeons depositing diplomas or filing affidavits in pursuance of this act or the acts to which this is a supplement; and for every name indexed and furnished to the State Board of Health as hereinbefore provided, the county clerk so indexing and furnishing such name, shall be entitled to receive from the State Board of Health, through its secretary, the sum of six cents.

In addition to the usual information as to laws passed, the Board has sought to acquaint each practitioner in the State with the law. Some had, under a law previous to 1880, filed their diplomas, but as no index had been kept, there was no means of securing a registry except by a refile of all former diplomas, and a filing of all new ones. As the law of 1880 makes no exception as to those who had diplomas on file beforehand, and a subsequent supplement speaks not only of those that commence, but of those who continue to practice without

conforming to the law of 1880, and always says, "shall" file and not "shall have" filed, medical men have, as a rule, so understood it; about 1,800 have filed under the law.

If any physician having a diploma from any chartered medical college, has, by ignorance of the law, failed to record, or if any one having filed a diploma under any former law, has failed to conform to the law of 1880, and the supplements thereto, the oversight should be immediately remedied. The law does not seek to discriminate between practitioners of different sects, or to assume that all who have filed diplomas are competent, but it does assume that any person who offers services requiring education and skill by announcing himself as a physician, shall have such form of attestation as this law provides. While it is the mildest form of restraint upon irregular practice which so often endangers the lives and health of citizens, it warns both those who attempt charlatanry and the people against the penalties and risks involved. We give the lists as furnished by the county clerks, in the order of the counties, and in the order of the names, which are not always alphabetically arranged.

ATLANTIC COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Stille, Samuel	Egg Harbor City	Mar. 12, '75	University of Penna., Phila.
Boysen, Theophilus H	Egg Harbor City	Feb. 24, '74	University of Buffalo, N. Y.
Ingersoll, Denman Bevis	Mays Landing	Mar. 11, '65	University of Penna., Phila.
North, Joseph H.	Hammonton	Sept. 2, '35	University of Bowdoin, Me.
Martin, Richard Allen	Atlantic City	Mar. 12, '79	University of Penna, Phila.
Kirkpatrick, Alexander		Mar. —, '61	University of Penna., Phila.
Wright, Willard	Atlantic City	Mar. 14, '67	University of Penna, Phila.
Crosby, Obed. H.	Atlantic City	Mar. 5, '74	Hahneman College, Phila.
Somers, Job Braddock	Linwood	Mar. 15, '59	Jefferson College, Phila., Pa.
Abbott, Griffith E.	Tuckahoe	Mar. 14, '79	University of Penna., Phila.
Waters, Talcott P.	Absecon	Mar. 13, '69	University of Penna., Phila.
Souder, Charles	Atlantic City	July 10, '52	College of Medicine, Phila.
Harris, George M.	Port Republic	Feb. 19, '75	College of Medicine, Phila.
Edmonds, Samuel C.	Linwood	Mar. 8, '51	Jefferson College, Phila., Pa.
Brown, Louisa (midwife)	Hammonton	Feb. 8, '78	University of Penna., Phila.
Reed, Thomas K	Atlantic City	Mar. 12, '64	University of Penna., Phila.
Reed, William Boardman	Atlantic City	Mar. 15, '78	University of Penna., Phila.
North, James	Atlantic City	Mar. 13, '80	Jefferson College, Phila., Pa.
Nivison, Oziel	Hammonton	Mar. 1, '77	Eclectic Med. College, N. Y.
Armstrong, L. H.	Atlantic City	Mar. 13, '71	Jefferson Med. College, Phila.
Hunter, David	Atlantic City	Mar. 12, '78	Jefferson College, Phila., Pa.
Youngman, Maurice D.	Atlantic City	Mar. 5, '80	Hahneman College, Phila.
Jessop, Samuel A. S.	Atlantic City	Mar. 12, '79	Jefferson College, Phila., Pa.
Hyde, Anna M. (midwife)	Hammonton	Feb. 14, '78	University of Penna., Phila.
Hallowell, Rebecca C.	Atlantic City	Mar. 14, '78	Woman's Med. College, Phila.

ATLANTIC COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Cary, John E.	Lower Bank	Sept. 16, '62	Columbia College, New York.
Fleming, John R.	Absecon	Mar. 14, '82	Hahneman College, Phila.
Bennett, Henry Hudson	Atlantic City	May 13, '81	Columbia College, New York.
Wootton, William	Atlantic City	Mar. 14, '82	Hahneman College, Phila.
Neff, Joseph S	Atlantic City	Mar. 11, '75	Jefferson College, Phila., Pa.
Bennett, William H.	Atlantic City	Mar. 13, '69	University of Penna., Phila.
Kollock, Matthew H.	Atlantic City		Affidavit—20 years' practice.
Murray, James Munro	Atlantic City	Mar. 10, '76	University of Penna., Phila.
Stewart, Henry Knox	Atlantic City	Feb. 27, '69	Hahneman College, Phila.
Bartine, David Wesley	Ocean City	Mar. 11, '72	Hahneman College, Phila.
Crosby, George W.	Atlantic City	Feb. 28, '78	Homœopathic College, N. Y.
Pollard, William	Atlantic City	Mar. 30, '82	Jefferson College, Phila., Pa.
Purcell, John C.	Atlantic City	Mar. 30, '82	Jefferson College, Phila., Pa.
Nichols, Caroline G.	Weeksville	Mar. 10, '76	University of Penna., Phila.
North, William McK	Atlantic City	Apr. 2, '83	Jefferson College, Phila., Pa.
Peebles, J. M.	Hammonton	Oct. 19, '76	University of Penna., Phila.
Hale, William H.	Atlantic City	Mar. 30, '82	Jefferson College, Phila., Pa.
Sheppard, John E.	Atlantic City	Mar. 15, '82	University of Penna, Phila.
Reiley, Edward Anderson	Atlantic City	Mar. 8, '81	University of New York.
Backus, Boardman P.	Atlantic City	Mar. 6, '81	Eclectic Med. College, N. Y.
Gill, Charles	Mays Landing		Affidavit—40 years' practice.

BERGEN COUNTY.

Ayers, Melancthon S.	Fairview	June 2, '71	Long Island Col., Brooklyn.
Badeau, C. W.	Ramsey	Mar. 6, '69	University of New York City.
Crary, Henry A.	Closter	Jan. 9, '66	Albany Med. College, N. Y.
De Mund, John T.	Ridgewood	Mar. 12, '64	University of Penna., Phila.
Francis, William	Ridgewood	Mar. 1, '70	Bellevue College, N. Y. City.
Hunt, Hoit Eben		Mar. 1, '82	Eclectic Med. Col., N. Y. City.
King, Keneth Kirk	Rutherford	Mar. 1, '77	Bellevue College, N. Y. City.
Lowry, Charles	Hackensack	Mar. 3, '63	Homœopathic College, Phila.
Morris, Frederick	Cresskill	Mar. 9, '42	University of New York City.
Neer, Henry C.	Park Ridge	Nov. 20, '60	Berkshire Med. Col., Mass.
Parker, George B.	Ridgewood	Feb. 20, '47	Buffalo University, N. Y.
Richter, Augustus	Carlstadt	Nov. 14, '62	University Liepsic, Germany.
St. John, David	Hackensack	Mar. 1, '75	Bellevue College, N. Y. City.
Turnure, Milton	Closter	Mar. 11, '78	University of New York City.
Van Dyck, Cornelius C.	Ramsey	Mar. 28, '42	Med. Soc. Schoharie Co., N. Y.
Williams, Augustus P.	Rutherford	Sept. 11, '60	Columbia College, N. Y. City.
Zimmerman, Edwin	Ramsey	Mar. 1, '79	University of Maryland, Balt.
Burdett, Abraham S.	Hackensack	Mar. 4, '52	University of New York City.
Casey, James H.	Carlstadt	Mar. 1, '75	Columbia College, N. Y. City.
Demarest, Cornelius L.	Arcola	May 1, '79	Bellevue College, N. Y. City.
Flowers, Millard F.	Ramsey	Mar. 1, '73	University of Maryland, Balt.
Hopper, Henry A.	Hackensack	Mar. 6, '57	Albany University, N. Y.
Luckey, Mrs. Annie		Mar. 1, '65	Med. Col. for Women, N. Y.
McGiffert, William C.	Carlstadt	Mar. 13, '81	Columbia College, N. Y. City.
Phelps, Jeremiah W.	Rutherford	June 18, '46	Caselton College, Vermont.
Reid, Thomas	Closter	Mar. 15, '76	University of New York City.
Soper, Oliver	Lodi	Mar. —, '78	Eclectic College, N. Y. City.
Taylor, William H. O.	Ridgefield	Mar. 8, '81	University of New York City.
Wells, John A.		Feb. 8, '79	Columbia College, N. Y. City.
Zabriskie, Simeon J.	Westwood	Mar. 9, '61	University of New York City.

BERGEN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Baldwin, Theodore H.	Hackensack	Mar. 4, '75	Homœopathic Med. Col., N.Y.
Campbell, George		Mar. 18, '82	University of New York City.
Hollister, Horace H.	Rutherford	June 5, —	Long Island Col., Brooklyn.
Luck, John T	Closter	Feb. 8, '68	Columbia College, N. Y. City.
Phillips, Cyrus B.		Mar. 1, '82	University of Maryland, Balt.
Smith, Benjamin F.	Hackensack	Mar. 4, '80	Eclectic Med. Col., N. Y. City.
Zabriskie, Guilliam A.	Ridgewood	Oct. 11, '81	Columbia College, N. Y. City.
Brown, George E.	Hackensack	Mar. 1, '75	Columbia College, N. Y. City.
Cogswell, William B.	Hackensack	Mar. 10, '81	Bellevue College, N. Y. City.
Hüger, Joseph	Hackensack	Mar. 12, '80	Columbia College, N. Y. City.
Latour, Isidore P.	Fort Lee	Mar. 1, '69	Columbia College, N. Y. City.
Stephens, Jacob J.	Tappantown, N.Y.	Oct. 4, '46	Albany University, N. Y.
Burr, Henry N.		Aug. 25, '63	Albany Med. Society, N. Y.
Clendenen, Alexander	Fort Lee	Mar. 7, '59	University of Maryland, Balt.
Hopper, John W.	Hackensack	Feb. 8, '79	Columbia College, N. Y. City.
Baldwin, D. A.	Englewood	Mar. —, '49	University of New York City.
Currie, Daniel A.	Englewood	Feb. 9, '64	University of Buffalo, N. Y.
Bogert, Albert O.	Pearl River, N. Y.	Mar. 1, '75	Columbia College, N. Y. City.
Badger, Merritt O.	Closter	June 9, '81	University of New York City.
Banks, Hardy M.	Englewood	Mar. 5, '51	University of New York City.

BURLINGTON COUNTY.

Ashurst, Francis	Mount Holly	Mar. 14, '67	University of Penna., Phila.
Bennett, John P.	Mount Holly	Mar. 11, '65	University of Penna., Phila.
Bispham, Charles W.	Mount Holly	Mar. 15, '78	University of Penna., Phila.
Barrington, Richard C.	Mount Holly	Mar. 30, '82	Jefferson Med. College, Phila.
Brown, John C.	Vincentown	Mar. 14, '79	University of Penna., Phila.
Bullock, Lawrence M.	Jacobstown	Mar. 12, '81	Jefferson College, Phila., Pa.
Baker, Charles A.	Florence	Mar. 9, '67	Jefferson College, Phila., Pa.
Chamberlain, Wm. Jr.	Mount Holly	Mar. 12, '77	University of Penna., Phila.
Caley, Samuel	Mount Holly.	Mar. 11, '76	Hahneman Med. Col., Phila.
Calver, George W. H.	Columbus	Dec. 22, '62	Eclectic Med. College, Phila.
Carey, John E.	Lower Bank	Sept. 16, '62	Columbia College, N. Y. City.
Clark, S. G.	Tuckerton	Mar. —, '68	Med. University, N. Y. City.
Clay, George B. L.	Moorestown	Mar. 1, —	Homœopathic College, Phila.
Currie, Joseph J.	Columbus	Mar. 1, '66	Homœopathic College, Phila.
Cox, Newton C.		Apr. 13, '83	University of Penna., Phila.
Downs, Jesse	Marlton	Apr. 12, '75	University of Penna., Phila.
Dey, Charles L.	Crosswicks	Feb. 23, '72	Columbia College, N. Y. City.
Duvall, Augustin W.	Beverly	Mar. 10, '77	Jefferson College, Phila., Pa.
Elwell, Alexander	Vincentown	Apr. 3, '47	University of Penna., Phila.
Febs, Levi Decker	Bordentown	Mar. 10, '73	Hahneman Med. Col., Phila.
Frankish, Joseph		Mar. 13, '80	Jefferson Med. College, Phila.
Frankish, John		Mar. 12, '81	Jefferson Med. College, Phila.
Gauntt, Franklin	Burlington	Apr. 3, '47	University of Penna., Phila.
Grigg, Jacob	Pemberton	Mar. 31, '43	University of Penna., Phila.
Goodell, George	Sykesville	Mar. 26, '35	University of Penna., Phila.
Hyatt, P. Fernando	Bordentown	Mar. 2, '65	(College name not legible).
Hall, G. E.	Riverton	Mar. 12, '78	Jefferson College, Phila., Pa.
Hollingshead, Enoch	Pemberton	Mar. 14, '67	University of Penna., Phila.
Haines, Franklin	Rancocas	Mar. 2, '67	Homœopathic College, Phila.
Hall, Harrison B.	Riverton	Feb. 27, '69	Homœopathic College, Phila.
Helton, John		Feb. 22, '60	Eclectic Med. College, Phila.

BURLINGTON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Jemison, P. L.	Bordentown	Mar. 7, '5[illegible]	University of Penna., Phila.
Janney, Joshua L.	Cinnaminson	June 30, '65	Starling Med. Col., Col., O.
Longstreet, Henry H.	Bordentown	Mar. 29, '42	New York University.
Laning, Elwood S.	Burlington	Mar. 22, '49	New York University.
Melcher, William P.	Pemberton	Mar 10, '76	University of Penna., Phila.
Maines, Elias Q.	Sykesville	Mar. 1, '27	Columbia College, N. Y. City.
Moore, C. Howard	Juliustown	Apr. 27, '67	Eclectic Med. College, Phila.
Moore, John H.	Tuckerton	Mar. 15, '80	University of Penna., Phila.
Martin, William L.	Rancocas	Mar. 6, '52	Jefferson College, Phila., Pa.
Marcy, Alexander Jr.		Mar. 15, '80	University of Penna., Phila.
McNorth, William K.		Apr. 2, '83	Jefferson College, Phila., Pa.
Nichols, Charles G.	Green Bank	Apr. 10, '80	University of Penna., Phila.
Parsons, Richard C.	Mount Holly	June 15, '80	University of Penna., Phila.
Parry, William C.	Mount Holly	Mar. 9, '72	Jefferson College, Phila., Pa.
Patterson, Austin H.	Georgetown	Mar. 1, '73	University of New York City.
Pugh, J. Howard	Burlington	Apr. 3, '52	University of Penna., Phila.
Page, Richard H.	Columbus	Apr. —, '50	University of Penna., Phila.
Price, Theopilus T.	Tuckerton	Mar. 5, '53	Medical College, Phila., Pa.
Parrish, Joseph	Burlington	Apr. 4, '44	University of Penna., Phila.
Pearsall, John C.	Riverside	Mar. 30, '82	Jefferson College, Phila., Pa.
Reeve, Josiah	Medford	Mar. 14, '63	University of Penna., Phila.
Reeves, William M.	Tuckerton	Mar. 12, '70	Jefferson College, Phila., Pa.
Roberts, James B.	Beverly	Mar. 10, '73	Hahneman College, Phila.
Rink, Eugene F.	Burlington	Mar. 8, '77	Hahneman College, Phila.
Sharp, Edgar B.	Tuckerton	Mar. 9, '76	Hahneman College Phila.
Shaw, Amos G.	Jacobstown	Mar. 12, '63	Columbia College, N. Y. City.
Sharp, L. L.	Medford	Mar. 12, '64	University of Penna., Phila.
Shipps, William H.	Bordentown	Mar. 15, '78	University of Penna., Phila.
Stroud, P. VanBuren	Marlton	Mar. 14, '61	University of Penna., Phila.
Stroud, Joseph C.	Moorestown	Mar. 6, '51	Jefferson College, Phila., Pa.
Shreve, Joseph	Burlington	Feb. 21, '66	University of Penna., Phila.
Stokes, N. Newlin	Moorestown	Mar. 14, '61	Jefferson College, Phila., Pa.
Taylor, Addison W.	Beverly	Mar. 14, '71	University of Penna., Phila.
Townsend, Ellis P.	Beverly	Mar. 10, '63	Jefferson College, Phila., Pa.
Thornton, Samuel C.	Moorestown	Apr. 3, '52	University of Penna., Phila.
Towne, Edwin C.	Florence	Mar. 12, '73	Jefferson College, Phila., Pa.
Van Rensselaer, ——	Burlington	Mar. 13, '69	University of Penna., Phila.
Van Mater, Daniel G	Columbus	Mar. 1, '75	(College name not legible).
Vandervere, George W.	Medford	Mar. 10, '73	Hahneman College, Phila.
Warrington, Joseph	Moorestown	Mar. 27, '28	University of Penna., Phila.
Ward, Walter	Mount Holly	Mar. 6, '40	Jefferson College, Phila., Pa.
Woodruff, William L.	Columbus	Mar. 14, '82	Hahneman College, Phila.
Whitehead, John G. L.	Bordentown	Feb. 28, '52	Phila. College of Medicine.
Werner, Mariam B.		Mar. 10, '80	Phila. College of Medicine.
Whitehead, Willett W.	Bordentown	Mar. 10, '81	Hahneman Col. of Medicine.
Wilson, Pusey	Moorestown	Mar. 3, '62	Homœo. College of Medicine.
White, Robert	Beverly	Mar. 15, '80	University of Penna., Phila.
Wheeler, Harry	Delanco	Mar. 13, '83	Hahneman College, Phila.
Young, Irene D.	Bordentown	Mar. 7, '48	(College name not legible).
Yeager, Jacob R.	Burlington	Apr. 15, '69	Hygei's Thera. College, N. Y.
Zeitler, Augustus E.	Jacobstown	Mar. 2, '67	Homœopathic College, Phila.

CAMDEN COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Armstrong, James A.	Camden		University of Pennsylvania.
Andrews, Purnell W.	Camden		Penna. Col. Hom. Medicine.
Ashmead, Albert S.	Camden	Mar. 13, '69	Pennsylvania University.
Aldrich, Herbert E.			Hahneman College.
Bryant, J. Kemper.	Camden	Mar. 1, '56	Penna. Col. Hom. Medicine.
Beall, Philip W.	Camden		Jefferson College.
Bartine, David H.	Merchantville		Pennsylvania University.
Branin, Henry E.	Blackwoodtown		Jefferson College.
Blackwood, Thomas R.	Camden		Hahneman College.
Benjamin, Dowling.	Camden		Pennsylvania University.
Blake, Duncan W.	Gloucester City		Jefferson College.
Boughman, George W.			Jefferson College.
Belden, O. S.	Camden		Pennsylvania University.
Barber, Isaac A.			Hahneman College.
Bethell, John P.			Pennsylvania University.
Browning, Walter C.			Jefferson College.
Bringhurst, William			Jefferson College.
Bean, Samuel T.	Camden	Mar. 30, '82	Jefferson College of Penna.
Barrett, Albert R.			Nashville Univ. of Tennessee.
Backus, B. P.			(College name not legible).
Bell, Edward H.		Mar. 11, '75	Jefferson College.
Cooper, Clark T.	Camden	Feb. 18, '68	Hom. Med. Col. of Penna.
Carles, Samuel	Camden		Hom. Med. Col. of Penna.
Clauson, Jacob E.			Baltimore College.
Collins, Edwin			Pennsylvania University.
Cox, Henry	Camden		Jefferson College.
Davis, William Albert	Camden		Pennsylvania University.
Davis, H. H.	Camden		Jefferson College.
Donges, John W.	Camden		Pennsylvania University.
Du Bois, William G.			Hahneman College.
Dobson, Augustus T.			Pennsylvania University.
Eyre, Frank			Pennsylvania University.
Fortiner, George R.	Camden	——, '79	University of Pennsylvania.
Fortiner, Ida F.	Camden	——, '79	University of Pennsylvania.
Fullmer, John J.		Jan. 30, '58	Pennsylvania Eclectic Col.
Finlaw, J. Parker		June 16, '79	Kansas Eclectic College.
Finlaw, J. B.		May 10, '79	Kansas Eclectic College.
Green, Charles W.	Camden	Oct. 24, '67	Dartmouth College.
Gross, Onan B.	Camden		University of Pennsylvania.
Godfrey, E. L. B.	Camden		Jefferson College.
Griffith, Anna E.			(College name not legible).
Gardner, Richard			Hahneman College.
Gardiner, Thomas U. W.			Hahneman College.
Gassaway, James M.			Columbia College.
Gunter, Guilford H.			Pennsylvania University.
Howard, E. Melville	Camden		Hahneman College.
Hugg, Isaac N.	Camden	Feb. 23, '69	University of Pennsylvania.
Hamilton, William A.	Camden		Baltimore College.
Hatton, Louis			Pennsylvania University.
Hunt, W. H.	Camden		Massachusetts Academy.
Hunt, H. F.	Camden		Providence College.
Haney, J. R.	Camden		Pennsylvania University.
Hurff, Joseph E.			Jefferson College.
Hudders, C.			Jefferson College.
Hoell, Conrad G.	Camden		Pennsylvania University.
Hickman, G. H.			Jefferson College.

CAMDEN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Halton, John	Camden		Pennsylvania Electrial Col.
Irwin, Samuel B.	Camden		Jefferson College.
Iszard, William H.	Camden		Jefferson College.
Ireland, William H.	Camden		Pennsylvania University.
Jennings, Napoleon B.	Haddonfield		Jefferson College.
Johnston, Samuel H.			(College name not legible).
Jones, J. H.			New York University.
Jennings, James		Sept. 12, '40	Medical College, New York.
Kennedy, Samuel		Mar. 9, '70	Hahneman College.
Kitchen, George H.		June 6, '70	Pennsylvania Electrial Col.
Leahy, Michael Morgan.		Sept. 10, '60	University of Glasgow.
Leckner, John Davis	Camden		Hahneman College.
Mecray, Alexander M.	Camden	Oct. 12, '65	University of Pennsylvania.
Mulford, Isaac B.	Camden		University of Pennsylvania.
Middleton, M. F.	Camden		Hahneman College.
Morgan, Randal W.	Camden		University of Pennsylvania.
Otway, David B.			Jefferson College.
Pancoast, D. Parrish	Camden		University of Pennsylvania.
Presley, Sophia		——, '79	Pennsylvania College.
Pfeiffer, G. S. F.	Camden		Penna. Homœopathic Col.
Pratt, Lyndom M.	Camden		Pennsylvania University.
Palm, Howard F.	Camden		Jefferson College.
Peacock, Robert H.			Hahneman College.
Pfeiffer, Frederick P.	Camden		Philadelphia University.
Quint, Silas H.	Camden		Hahneman College.
Rowand, Thomas G.	Camden		University of Pennsylvania.
Ridge, James M.	Camden		University of Pennsylvania.
Rosenstein, Simon			University of Pennsylvania.
Richards, Jennie			University of Pennsylvania.
Robinson, George Taylor	Camden		University of Pennsylvania.
Sheets, John A. J.		Mar. 15, '80	University of Pennsylvania.
Stout, Daniel M.			Jefferson College.
Shivers, C. Hendry			Jefferson College.
Shivers, Bowman H.	Haddonfield		University of Pennsylvania.
Schellinger, Clarence M.	Camden		Jefferson College.
Schenck, J. V.	Camden		University of Pennsylvania.
Sharp, Edgar B.			Hahneman College.
Smith, Henry A. M.			Jefferson College.
Snowden, John W.			University of Pennsylvania.
Snitcher, Elijah J.	Camden		Chicago University.
Simon, Samuel H.			Hahneman College.
Strock, Daniel			Jefferson College.
Smiley, E. R.	Camden	Mar. 12, '81	Jefferson College.
Stanton, James G.	Camden		University of Pennsylvania.
Stanton, James H.	Camden		University of Pennsylvania.
Stevenson, J. R.			Columbia College.
Sutton, John W.			University of Pennsylvania.
Taylor, H. Genet	Camden	Mar. 15, '60	Jefferson College.
Tomlinson, Edwin	Gloucester City		Jefferson College.
Taylor, R. G.			Hahneman College.
Tullis, Eli	Camden		University of Pennsylvania.
Wroth, James H.	Camden		Jefferson College.
Wamsley, James A.	Camden		Penna. Col. Hom. Medicine.
Williams, Theodore S.			University of Pennsylvania.
Walsh, Francis	Camden		University of Pennsylvania.
White, J. Orlando	Camden		

CAMDEN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Williams, Franklin E.	.....	.....	Hahneman College.
Woolston, E. B.	.....	.....	University of Pennsylvania.
Waggoner, John S.	.....	.....	University of Pennsylvania.
Waters, Talcott P.	.....	.....	University of Pennsylvania.
Wescott, William A.	.....	Apr. 2, '83	Jefferson College.
Warnock, William	Camden	Mar. 15, '80	University of Pennsylvania.

CAPE MAY COUNTY.

Abbott, Benjamin T.	Tuckahoe	(In Latin).	Jefferson College, Phila , Pa.
Bartine, David W.	.....	(In Latin).	Hahneman Med. Col., Phila.
Carll, George G.	Dennisville	Mar. 13, '62	University of Penna., Phila.
Downs, Isaac M.	Cape May C. H.	May 16, '64	Phila. Eclectic Medical Col.
Davidson, David	.....	(In Latin).	University of Pennsylvania.
Downs, Isaac M.	Cape May C. H.	(In Latin).	Jefferson College, Phila . Pa.
Gandy, Charles M.	.....	Mar. 12, '79	Jefferson Med. College, Phila.
Hedstrom, William F.	.....	Mar. 1, '74	Hahneman Med. Col ,St. Louis
Hand, John Holmes.	Cape May C. H.	Mar. 24, '70	Eclectic Med. Col. of Penna.
Humphreys, Edward.	South Seaville	(In Latin).	Hahneman Med. Col., Phila.
Ingram, Jacob H.	.....	(In Latin).	University of Penna., Phila.
Kemble, James	.....	(In Latin).	Hahneman Med. Col., Phila.
Kennedy, Henry A.	Cape May City	Mar. 13, '68	University of Penna., Phila.
Leaming, Walter S.	Cape May C. H.	Feb. 26, '76	Pa. Col. Dental Sur., Phila
Leaming, Jonathan F.	Cape May C. H.	Mar. 24, '46	Jefferson College, Phila., Pa.
Leaming, Jonathan F.	Cape May C. H.	Mar. 1, '67	Penna. College Dental Sur.
Leaming, Walter S.	Cape May C. H.	Mar. 30, '82	Jefferson College, Phila., Pa.
Marcy, Milton Sumner	.....	Mar. 5, '78	Chicago Medical College, Ill.
Mecray, James Jr.	Cape May City	Mar. 12, '65	University of Penna., Phila.
Marcy, Virgil M. D.	Cape May City	Mar. 10, '47	University of Maryland, Balt.
Marshall, Randolph	Tuckahoe	Mar. 10, '77	Jefferson College, Phila., Pa.
Marshall, Joseph C.	Tuckahoe	Mar. 11, '70	University of Penna., Phila.
Phillips, E. H.	Cape May City	Mar. 4, '68	Hahneman Med. Col., Phila.
Rosenstein, Simon	.....	May 16, '71	Phila. Univ. Med. and Sur.
Swain, Humphrey	Goshen	(In Latin).	University of Penna., Phila.
Slaughter, James M.	Rio Grande	(In Latin).	Maryland Academy, Balt.
Way, Eugene	Dennisville	Mar. 12, '79	Jefferson Med. College, Phila.
Way, Palmer M	Seaville	Jan. 27, '52	Albany Med. College, N. Y.
Wheaton, Theodore C.	Millville	Mar. 14, '79	University of Penna., Phila.
Wiley, John.	Cape May C. H.	Mar. 11, '37	Jefferson Med. College, Phila.
Waggoner, John S.	.....	(In Latin).	University of Penna.
Wheaton, Joseph C.	South Seaville	Apr. 2, '83	Jefferson Med. College, Phila.
Young, Alexander	Cape May City	Sept. 19, '59	Jefferson Med. College, Phila.

CUMBERLAND COUNTY.

Appelgate, William S.	Fairton	Apr. 2, '83	Jefferson College, Phila.
Bateman, Ephraim	Cedarville	July 4, '51	New Jersey Medical Society.
Bateman, Eli E.	Cedarville	July 6, '32	New Jersey Medical Society
Holton, John	Bridgeton	Jan. 22, '60	Eclectic Med. College, Phila.
Newell, William L.	Millville	Mar. 15, '59	Jefferson College, Phila.
Smith, H. Clay	Millville	Mar. 14, '66	University of Penna., Phila.
Wiley, Charles	Vineland	Mar. 10, '64	Jefferson College, Phila.

CUMBERLAND COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Wade, John W., Jr.	.....	Jan. 1, '76	Phila. Univ. Med. and Sur.*
Baker, Caroline A.	.....	Mar. 9, '67	Jefferson College, Phila.
Backus, Boardman P.	.....	Mar. 6, '81	Eclectic Med. College, N. Y.
Bennett, Jacob E.	Millville	Mar. 12, '81	Jefferson College, Phila.
Bateman, Elliston R.	Cedarville	Mar. 15, '82	University of Penna., Phila.
Bacon, Stetson L.	Port Norris	Mar. 9, '58	Jefferson College, Phila.
Bowen, John B.	Bridgeton	Mar. 14, '61	University of Penna., Phila.
Butcher, Joseph	Mauricetown	Apr. 2, '83	Jefferson College, Phila.
Conover, James V.	.....	June 1, '80	Eclectic Med. Col., Cin., O.
Dare, Charles H.	Shiloh	Mar. 10, '70	University of Penna., Phila.
Decker, Corbin J.	.....	Mar. 13, '70	Jefferson College, Phila.
Elmer, Robert W.	Bridgeton	Apr. 5, '60	Med. Society of New Jersey.
Ewing, Robert P.	Greenwich	Mar. 13, '68	University of Penna., Phila.
Elmer, William	Bridgeton	Sept. 6, '48	Med Society of New Jersey.
Elmer, Henry W.	Bridgeton	Mar. 13, '69	University of Penna , Phila.
Fleming, John R.	.....	Mar. 14, '82	Hahneman College, Phila.
Fithian, Henry C.	Port Norris	Mar. 12, '77	University of Penna., Phila.
Farr, Eleazer D.	Cedarville	Jan. 20, '58	Eclectic Med. Col., Phila.
Foote, Theodore	Vineland	Mar. 5, '74	Hom. Med. College of N. Y.
Glanden, Andrew P.	Newport	Mar. 10, '65	Jefferson College, Phila.
Holmes, Ephraim	Greenwich	Apr. 4, '44	University of Penna., Phila.
Hill, Charles T.	Dividing Creek	Mar. 18, '81	Penna. Med. College, Phila.
Hyde, Anna M.	.....	Feb. 14, '78	Phila. Univ. Med. and Sur.
Haley, George P.	Newport	Mar. 12, '79	Jefferson College, Phila.
Harris, George A.	Bridgeton	Dec. 20, '72	American University, Phila.
Ingram, John	Vineland	Feb. 25, '80	Sterling Med. College, Col., O.
Jones, William S.	Millville	Mar. 12, '78	Jefferson College, Phila.
Jennings, James	.....	Sept. 12, '40	Reformed Med. Soc of N. Y.
Lucas, Mary	.....	June 28, '53	Beach's Refor'd M. Col., Mass.
Lane, Franklin	Vineland	Nov. 11, '46	Berkshire Med. School, Mass.
Moore, Joseph	Bridgeton	Mar. 6, '52	Jefferson College, Phila.
Moore, John H.	Bridgeton	Mar. 15, '80	University of Phila.
McTaggart, Miles F.	.....	Apr. 25, '65	Eclectic Med. College of Pa.
Paullin, George M.	Shiloh	Mar. 14, '61	University of Penna., Phila.
Potter, J. Barron	Bridgeton	June 26, '48	New Jersey Medical Society.
Putnam, Joseph H.	Bridgeton	Mar. 3, '64	Bellevue Col. of Med., N. Y.
Phillips, Charles C.	Deerfield	Feb. 26, '53	Phila. College of Medicine.
Streets, Jacob G.	Bridgeton	June 1, '66	Pa. Col. of Hom. Med., Phila.
Streets, David R.	Bridgeton	Mar. 15, '80	University of Penna., Phila.
Stathem, Thomas E.	Greenwich	Mar. 15, '60	University of Penna., Phila.
Smith, Thomas J.	Bridgeton	Mar. 14, '66	University of Penna., Phila.
Sturdivant, Thomas	Millville	Mar. 1, '60	Penna. Med. Univ., Phila.
Snyder, Sharp M.	Cedarville	Mar. 11, '65	University of Penna., Phila.
Shippard, Joseph	Bridgeton	July 4, '51	New Jersey Medical Society.
Tuller, Emery R.	Vineland	Feb. 7, '62	Western Hom. Col., Cleve., O.
Tuller, Malcom B.	Millville	Mar. 10, '73	Hahneman College, Phila.
Tomlinson, George	Roadstown	June 14, '31	New Jersey Medical Society.
Whitaker, Jonathan S.	Millville	Mar. 20, '45	Jefferson College, Phila.
West, Maxamillian	Millville	Mar. 12, '75	University of Penna., Phila.
Wright, Lucretia Minerva	Bridgeton	Mar. 5, '73	New England Female Col.
Willets, J. Howard	Port Elizabeth	Mar. 9, '58	Jefferson College, Phila.
Wilson, Stacy M.	Leesburg	Mar. 13, '69	University of Penna., Phila.
Wheaton, Theodore C.	Millville	Mar. 14, '79	University of Penna., Phila.
Woodruff, William L	.....	Mar. 14, '82	Hahneman College, Phila.

*Matriculate Jefferson Medical College.

ESSEX COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Anderson, H. J.		Mar. 4, '75	Hom. Med. College of N. Y.
Andrews, William J.		Mar. 2, '65	Medical College of Ohio.
Alba, F. T.		July 11, '46	Norwich University.
Annin, Jonathan		May 20, '29	Med. Society of New Jersey.
Ah, Poter Van			Sanitary Board.
Bailey, Charles H.		Mar. 1, '69	Columbia College.
Bradin, Edward DeL.		Mar. 12, '77	University of Pennsylvania.
Barnett, S. Amelia		Mar. 1, '65	N. Y. Med. Col for Females.
Bayles, George		Mar. 8, '59	University of State of N. Y.
Bennett, Frederick W.		Feb. 27, '78	Columbia College.
Bruyere, Walter Reeve		Mar. 1, '78	Columbia College.
Brundage, A. H.		Mar. 7, '55	University of City of N. Y.
Berry, William B.		Mar. 1, '76	Columbia College.
Baker, Walter S.		Mar. 4, '63	Hom. Med. College of N. Y.
Brumley, John D.		Mar. 2, '58	Med. College of New York.
Ball, Albert		Nov. 27, '72	University Wirzburg.
Burrage, Robert Lowell		Mar. 1, '78	Med. Col. of Bellevue Hosp.
Bleyle, Herman Conrad		Mar. 1, '68	Med. Col. of Bellevue Hosp.
Bradfield, Thomas R.		Feb. 28, '70	Columbia College.
Burnett, Jacob B.		Mar. 2, '66	Univ. of the City of N. Y.
Belmer, Randolph		Feb. 18, '78	Univ. of the City of N. Y.
Burdge, Paul Wesley		Mar. 26, '78	American Univ. of Phila.
Burling, John		Feb. 11, '74	Hosp. Col. of Hom, Cleve., O.
Baldwin, Aaron K.		Feb. 26, '61	Univ. of the City of N. Y.
Buttner, Charles		May 26, '75	Med. Soc. of New Jersey.
Borts, Isaac		Mar. 1, '74	Med. Col. of Bellevue Hosp.
Blackelock, G. Clinton		Feb. 28, '78	N. Y. Hom. Med. College.
Bell, Wilson F.		Mar. 10, '46	Univ. of the City of N. Y.
Baldwin, Milton		May 12, '46	Med. Soc. of New Jersey.
Buob, Eva		Aug. 18, '78	St. Em. Hosp., W. Is. (License).
Bergman, Mrs.		Feb. 20, '74	C. of E. of M., Berlin (License).
Butler, Clarence W.		Feb. 29, '72	N. Y. Med. Hom. Col.
Bruen, Julia M.		Feb. 23, '81	N. Y. Eclectic Med. Col.
Boskowitz, George W.		Oct. 7, '77	N. Y. Eclectic Med. Col.
Bachmann, Carl, (certif.)		June 7, '80	Soc. Hom. Hahne., Stuttgart.
Bennett, Charles D.		May 13, '81	Columbia College.
Barrett, Albert R.		Mar. 1, '77	University of Tennessee.
Baker, Frank Edwin		May 16, '82	Columbia College.
Bailey, Isaiah W.		Aug. 20, '81	Electropathic Inst. of Phila.
Baldwin, T. H.			N. Y. College of Hom. Med.
Chandler, William J.		Feb. 28, '68	Columbia College.
Cusack, Thomas G.		Feb. 16, '80	Univ. of the City of N. Y.
Cross, Jeremiah A.		Mar. 10, '56	Albany Medical College.
Coursen, John W.		Feb. 23, '42	Albany Medical College.
Christian, M. Osborne		Mar. 2, '78	Howard University.
Corwin, Joseph		Mar. 6, '35	Yale College.
Clark, Robert W.		Mar. 11, '61	Univ. of the City of N. Y.
Corwin, Theodore W.		Feb. 28, '76	Columbia College.
Clark, Augustus M.		Mar. 27, '58	Univ. of the State of N. Y.
Campbell, Wellingt'n, Jr.		Mar. 1, '77	Columbia College.
Casey, James H.		Mar. 1, '75	Columbia College.
Clark, Jacob Henry		May 13, '81	Columbia College.
Currie, Margaret C.		Mar. 1, '81	U. S. Med. Col. of N. Y.
Chambers, Talbot R.		Mar. 1, '78	Columbia College.
Corrigan, Joseph		Mar. 1, '71	Columbia College.
Clarke, Margaret E.		Aug. 23, '71	Med. Col. of N. Y. for Females.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Crane, Henry Bedell		Apr. 13, '83	University of Pennsylvania.
Cort, Henry L.		May 25, '83	Columbia College.
Dill, Daniel M.		June 26, '67	University of Michigan.
Day, Fanny M.		Apr. 1, '80	Med. Acad of N. Y. for Fem.
Davis, Joseph A.		June 26, '40	Med. Soc. of New Jersey.
Darlington, Thomas		Mar. 12, '80	Columbia College.
Duncker, Frederick W.		Mar. 1, '66	Med Col. of Bellevue Hosp.
Dunker, John F.		Mar. 5, '57	Medical College of New York.
Dennis, Laban		Mar. 8, '66	Columbia College.
Duryee, John L.		Feb. 28, '66	Columbia College.
Dutcher, Benjamin C.		Sept. 25, '32	Med. Soc. of New Jersey.
Duffenbach, Rich'd G. P.		Mar. 3, '74	Columbia College.
Dougherty, Alexander N.		Mar. 6, '45	Univ. of the State of N. Y.
Dorn, Louise			Inst. Mid. of Jena (License).
Dressler, Anna F.		June 27, '78	Univ. of Leipzig (License).
Dougherty, Arthur C.		May 6, '82	Columbia College.
Delcourt, Adolph			Certificate.
Duncker, Charles Henry			U. S. Medical College.
English, Thomas D.		Apr. 5, '39	University of Pennsylvania.
Elliott, Jacob		Mar. 7, '50	Univ. of the City of N. Y.
Eyen, Anna Maria		Jan. 15, '75	N. Y. German Priv. Inst. of Midwifery (Certificate).
Elsasser, Wilhemine		Jan. 28, '63	Certif. of Dr. Jos. Kammerer.
Elliott, Daniel		Nov. 9, '8-	Columbia College
Eaton, Samuel L.		Feb. 9, '82	Hahneman Medical College.
Franklin, Benjamin		Mar. 2, '6-	Univ. of the City of N. Y.
Friess, Frederick		Mar. 8, '75	Hom. Med. College of N. Y.
Freeborn, Georgius C.		Feb. 27, '73	Columbia College.
Frazer, Samuel H.		Mar. 7, '70	Eclectic Med. Col. of N. Y.
Fewsmith, Joseph		Mar. 2, '74	Columbia College.
Fowler, Almira L.		Jan. 27, '53	Med. Col. of Pa. for Females.
Fonda, Edward S.		Mar. 5, '79	U. S. Medical College.
Falken, Alexander E. E.		——, '81	U. S. Medical College.
Forbes, Lucy S.		Mar. 29, '81	N. Y. Med. Col. for Women.
Falk, Barbara			G. D. School of Midwifery.
Francsovits, Theska			University of Vienna.
Gray, Thomas N.		Feb. 28, '79	Columbia College.
Gray, William R.		July 1, '67	Univ. of the City of N. Y.
Gillin, Robert F.		Feb. 17, '7-	Univ. of the City of N. Y.
Grover, William B.		May 12, '45	Medical Soc. of New Jersey.
Gile, Francis A.		Mar. 4, '75	N. Y. Hom. Medical College.
Gill, Mrs. Rosa		Oct. 11, '81	G. O. M. I., N. Y., (Certif.).
Gedicke, Herman W.		Feb. 27, '82	Med. College of Evansville.
Graves, William B.		Feb. 17, '80	University of New York.
Garlner, Susanna		Aug. 29, '70	Certificate by A. Kriecher.
Guenther, Emil Ernest			Univ. of the City of N. Y.
Gerbert, H. P.			Col. Physicians and Surgeons.
Gray, Richardson			Columbia College.
Hester, Jacob		Apr. 1, '60	Penn Med. Univ. of Phila.
Howe, Edward J.		Feb. 27, '73	Columbia College.
Harvey, Thomas W.		Mar. 1, '78	Columbia College.
Haight, Trevonian		July 30, '64	Hosp. Col. of Long Island.
Holden, Edgar		Mar. 14, '61	Columbia College.
Hinds, Harriette C. Z.		Mar. —, '77	Eclectic M. C. of City of N. Y.
Hickey, Daniel C.		May 1, '64	Med. Soc. of the State of N. Y.
Herold, Herman C. H.		Mar. 1, '78	Med. Col. of Bellevue Hosp.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Holloway, Henry D.		Feb. 26, '80	Eclectic Med. College of N. Y.
Hagar, John F.		Feb. 27, '73	Columbia College.
Hewlett, P. V. P.		Mar. 2, '68	Univ. of the City of N. Y.
Hollister, L. Eugene		Mar. 26, '73	University of Michigan.
Hagen, Charles W.		Feb. 22, '61	Med. College of St. Louis.
Haydon, J. H.		Feb. 20, '72	Univ. of the City of N. Y.
Hedges, Joseph		Mar. 8, '60	Univ. of the State of N. Y.
Haines, Ella		Mar. 15, '71	Med. Col. of Penna. for Fem.
Hunter, C. H.		Mar. 3, '57	Univ. of the City of N. Y.
Hitchcock, Wm. Edwin		Jan. 10, '66	Yale College.
Holmes, William H.		Mar. 3, '59	Medical College of New York.
Heinrich, Johanna		Aug. 17, '65	Dr. J. T. Van Herder (License).
Hathaway, Maria Haring		Feb. 18, '70	New York Med. Eclectic Col.
Helf, Maria Ann		May 21, '40	I. of M., Trier, Ger. (License).
Hendry, Hugh Campbell		Mar. 1, '72	Bellevue Hosp. Med. College.
Hussey, Mary Dudley		Mar. 27, '77	Women's Med. Col., N. Y. Inf.
Hayward, Anna		Mar. 17, —	Med. Col. of Penna. for Fem.
Hess, Louise		Dec. 10, '72	Royal State Midwife School Wurtemberg, Ger. (Certif)
Hedden, John H.		July 26, '82	University of Vermont.
Hemsel, Rosalea			University Budapest, Hung.
Hudnut, Frank Parker		Oct. 1, '83	Bellevue Hosp. Med. Col.
Ill, Edward J.		Mar. 1, '75	Columbia College.
Ill, Fredolin		July 10, '55	Medical Soc. of New Jersey.
Iliff, Elias P.		June 21, '77	Long Island Hosp. College.
Jones, S. Wasson		July 26, '72	Long Island Hospital Col.
Janes, John E.		May 1, '76	Med. Col. of Bellevue Hosp.
Johnson, William M.		June 30, '81	University of Michigan.
Johnson, Frank Walter		June 29, '70	Univ. (American) of Phila.
Kipp, Charles J.		Mar. 14, '61	Columbia College.
Kent, George R.		Mar. 1, '67	Med. Col of Bellevue Hosp.
Korneman, Henry A.		Feb. 28, '72	Columbia College.
Küchler, Maximilian		Apr. 16, '60	Med. Soc. of New Jersey.
Krämer, Gertruth		May —, '70	Dr. H. Hessler's Institute.
Kiersted, Christopher		Dec. 30, '80	Med. Soc of State of N. Y.
King, Joseph Henry		June 10, '71	American Univ. of Phila.
King, Joseph Henry		June 25, —	Eclectic College of Penna.
Kurz, Richard E.			(College name not legible).
Lyon, Ernest M.		Mar. —, —	Med. Col. of Bellevue Hosp.
Lyon, Selvan Smith		Feb. 13, '76	Eclec. Med. Col., City of N. Y.
Laine, Edmund R		Mar. 1, '68	Hom. Med. Col. of N. Y.
Lehlbach, Charles F. J.		Mar. 6, '56	Univ. of the State of N. Y.
Love, J. J. H.		Mar. 7, '55	Univ. of the City of N. Y.
Lehmacher, Francis		Feb. 15, '64	University Greifswald.
Lauterborn, William F.		Feb. 13, '80	Univ. of the City of N. Y.
Loweree, Thomas W.		May 9, '65	Columbia College.
Little, Herbert W.		June 27, '78	Yale College.
Lounz, Maria		—— —, '62	Univ. Vienna (Certificate).
Lawrence, Elijah W.		Apr. 28, '63	Eclectic Med. Col. of Phila.
Lippa, John Jacob		July 9, '81	Univ. of the City of N. Y.
Maxwell, Thomas M.		Feb. 15, '75	Univ. of the City of N. Y.
Morgan, John C.		Feb. 14, '75	Univ. of the City of N. Y.
Munn, Charles W.		Mar. 10, '66	Jefferson College of Penna.
Martland, William H.		Mar. 6, '73	University of Michigan.
Mercer, Archibald		Mar. 6, '71	Columbia College.
Miller, John F.		July 27, '65	Long Island Hospital Col.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Mandeville, Fred'k B.		Mar. 4, '63	Hom. Med. Col of N. Y.
Mun, Mary F.		Mar. 21, '72	Med. Acad. of N. Y. for Fem.
Mershon, R. B.		Mar. 5, '39	Jefferson College of Penna.
Mershon, Stacy B.		Mar. 1, '74	Med. Col. of Bellevue Hosp.
Mills, Andrew M.		June 7, '59	University of Vermont.
Mahr, Henry		Aug. 14, '40	University of Munich
Meeker, George F.		Jan. 25, '76	Eclectic Col. of New York.
McDermott, John R.		Feb. 19, '77	Univ. of the City of N. Y.
Mulcahy, Dennis D.		Feb. 28, '72	Columbia College.
Muhlfeld, Henry		Oct. 1, '76	Med. Col. of Bellevue Hosp.
Mergott, Mrs. Hedwig		Aug. —, '79	Dr. Heinrich Hester (License).
Merz, Mrs. Henriette		Nov. 28, '60	City of Hanau, Ger. (License).
Marsh, Stewart C.		June 8, '37	Medical Soc. of New Jersey.
Murphy, Jane H.		Nov. 1, '80	C. S. Lozier, M D. (Certificate).
Mead, Isaac		Apr. 1, '28	Geneva College of New York.
Miller, Charles H.		Mar. 2, '76	N. Y. Hom. Medical College.
Metcalf, Jewett		Mar. 10, '75	Hahneman Medical College.
Mitchell, Charles P.		Nov. 12, '78	Royal Col. of Sur. of England.
Morris, Florillo B.		Mar. 11, '65	University of Pennsylvania.
Mead, Sarah Rebecca		June —, '83	Med. Col., City of New York.
Mueller, Louis E.			(College name not legible).
Nichols, Edward P.		Mar. 4, '52	Univ. of the State of N. Y.
Northrup, Emerson S.		Mar. 12, '79	N. Y. Med. of Hom. College.
Nimson, Anna T.		Mar. 23, '68	N. Y. Med. Col. for Women.
Newgeon, Mary F.		Mar. 1, '81	U. S. Medical College.
Noger, Vincento		May 24, '82	N. J. Med. Soc. (Certificate).
Norton, Arthur B.			Homœopathic Medical Col.
Osborne, Charles H.		Mar. 17, '79	Univ. of the City of N. Y.
Osborne, Edward A.		Mar. 29, '48	Jefferson College of Penna.
Osborne, Joseph D		Mar. 8, '59	Univ. of the State of N. Y.
O'Gorman, William		Jan. 17, '54	Royal College of Surgeons.
Pinkham, John Warren		—— —, '66	Bellevue Hosp. Med. Col.
Peck, Edward E.		Mar. 1, '79	Bellevue Hosp. Med. Col.
Pierson, W., Jr.		Mar. 9, '52	Univ. of the City of N. Y.
Pett, Jesse B.		Mar. 1, '70	Homœopathic Col. of N. Y.
Pindell, William N.		Mar. 7, '48	Academy of Maryland.
Phelps, Eliza B.		Apr. 2, '70	N. Y. Med. Col. for Females.
Poiner, Frances, *nee* Stanner		Aug. 30, '67	Karl Ferdinand University Prag. Austria (License).
Pfeiffer, Nicholas		Feb. 1, '63	Penn. Medical College.
Pennington, Samuel H.		May 1, '80	Medical Soc. of New Jersey.
Paine, Howard S.		Mar. 3, '81	Albany Medical College.
Pilkin, Leonard F.		June 19, '78	Univ. of the City of N. Y.
Pease, Charles E.		Mar. 15, —	University of Pennsylvania.
Pyrum, Mrs. Elizabeth			(College name not legible).
Rankin, William		Mar. 1, '71	Columbia College.
Robinson, Manning N.		Feb. 20, '60	University of Art of N. Y.
Rand, John M.		Nov. 10, '58	Dartmouth College.
Ricord, Philip		Feb. 28, '68	Columbia College.
Robinson, Morton		—— —, '54	Metropolitan Med. College.
Robinson, W. R.		Mar. 5, '57	Univ. of the City of N. Y.
Ransom, A. A		Mar. 1, '67	Univ. of the City of N. Y.
Reed, Joshua W.		June 1, '67	Bellevue Hospital College.
Reul, Elizab'th, *nee* Held		Dec. 21, '59	Governm't Nassau (License).
Robinson, George W.		Mar. 14, '67	Columbia College.
Reuss, Margaretta		Oct. 31, '75	M. I. Marburg, Ger. (License).

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Richards, George W.	.....	Mar. 4, '53	Univ. of the State of N. Y.
Rau, Jacob	.....	Apr. 20, '49	Governm't Wurtemberg (Cer).
Roden, Hugh P.	.....	Mar. 10, '70	Missouri Medical College.
Roche, Gulielmus	.....	Feb. 22, '81	N. Y. Eclectic Med. College.
Rolle, Eliza	.....	Feb. 18, '81	{ Drs. Gengenbacher & others (License).
Richert, Edward T.	.....	Mar. 14, '79	University of Pennsylvania.
Robinson, William D.	.....	Mar. 1, '59	Bellevue Hosp. Med. College.
Smith, William A.	.....	Jan. 26, '47	Geneva College.
Schureman, C. A.	.....	Mar. 1, '71	Univ. of the City of N. Y.
Schureman, A. J.	.....	Feb. 20, '72	Univ. of the City of N. Y.
Stickney, Charles W.	.....	Mar. 27, '58	University of Pennsylvania.
Smith, D. W.	.....	Mar. 7, '56	Univ. of the City of N. Y.
Stevens, Frederick H.	.....	June 18, '51	Medical College of Castleton.
Smith, D. S.	.....	Mar. 7, '55	Univ. of the City of N. Y.
Southard, Lott	.....	June 22, '52	Geneva College.
Sutphin, Theron Y.	.....	Mar. 1, '73	Bellevue Hosp. Med. College.
Sutphin, R. M.	.....	Mar. 9, '47	Univ. of the City of N. Y.
Smith, E. Fayette	.....	Mar. 1, '76	Columbia College.
Stiles, Anna M.	.....	Mar. 20, '73	Med. Acad of N. Y. for Fem.
Staehlin, Robert	.....	Feb. 27, '73	Columbia College.
Spreng, Justus J.	.....	Mar. 7, '64	Medical College of N. Y.
Skinner, D. M.	.....	Mar. 10, '58	Univ. of the City of N. Y.
Schœffler, Ernest	.....	July 22, '69	Fred'k Wilhelm Univ., Prus.
Seward, John L.	.....	Mar. 14, '67	University of Pennsylvania.
Sweet, Jonathan R.	.....	——— —, '54	Metropolitan Medical Col.
Schilling, William	.....	May 7, —	New Jersey Hom. Med. Soc.
Stachle, Mrs. Louis	.....	Oct. 17, '68	Dr. K. Jost, N. Y. (License).
Swords, George P.	.....	May 13, '81	Columbia College.
Schrewsbury, William J.	.....	Mar. 3, '81	Hom. College of New York.
Stickler, Joseph W.	.....	Feb. 28, '79	Columbia College.
Stillwell, John A.	.....	Mar. 9, '82	Howard University.
Simpson, James Y.	.....	May 16, '82	Columbia College.
Sweeny, D.	.....	Feb. 28, '82	Keokuk Medical College.
Schmitz, Caroline	.....	Nov. 3, '76	Univ. of Giessen, Ger. (Certif.)
Sterling, Charles Fred'k.	.....	May 24, '79	Public Medical Col., Cin., O.
Stanwood, Robert Given.	.....	July 5, '78	Bowdoin College.
Shelton, Charles H.	.....	.....	New York Hom. Med. Col.
Taft, Amanda W.	.....	May 15, '76	Eclec. Med. Col., City of N. Y.
Taft, Simon P.	.....	Feb. 3, '74	Eclec. Med. Col., City of N. Y.
Titus, William	.....	Jan. 25, '66	Eclec. Med. Col. of Penna.
Taylor, Samuel W.	.....	Mar. 1, '62	Hom. Med. Col. of N. Y.
Thompson, Edwin B.	.....	Feb. 24, '57	Univ. of the City of N. Y.
Tichenor, H. H.	.....	Mar. 11, '54	Univ. of the City of N. Y.
Taylor, Elizabeth J.	.....	Mar. 25, '73	College of N. Y. Infirmary.
Thompson, David	.....	Mar. 1, '69	Columbia College.
Tetreault, Francis J. E.	.....	Apr. 7, '80	Univ. of Bish. Col., Canada.
Treptow, Carl F. W.	.....	Feb. 22, '81	N. Y. Eclec. Medical College.
Taylor, John L.	.....	Mar. 1, '80	Bellevue Hosp. Med. College.
Thomas, B. Franklyn	.....	Jan. 29, '78	Eclectic Med. Col. of N. Y.
Tompkins, Abraham W.	.....	.....	Eclectic Med. Col. of N. Y.
Underwood, Charles F.	.....	Oct. 1, '74	Bellevue Hosp. Med. Col.
Van Duyn, S. W.	.....	Mar. 10, '65	Univ. of the City of N. Y.
Van Wagener, Geo. A.	.....	Mar. 1, '71	Columbia College.
Vail, M. H. C.	.....	June 22, '51	Castleton Medical College.
Vogler, Charles	.....	May 25, '81	Med. Soc. of New Jersey.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Wickes, Stephen	.....	Mar. 27, '34	University of Pennsylvania.
Wyeth, Malborough C.	.....	Mar. 1, '78	Columbia College.
Wright, Joseph R.	.....	Feb. 17, '79	Univ. of the City of N. Y.
Ward, Edwin M.	.....	May 9, '62	Columbia College.
Ward, Emma C.	.....	June 15, '70	N. Y. Hosp. Med. Col. for Fem.
Ward, William S.	.....	May 7, '49	Med. Soc. of New Jersey.
Whittingham, Edward T.	.....	Mar. 9, '52	Academy of Maryland.
Wrightson, James T.	.....	Mar. 1, '78	Academy of Maryland.
White, William H.	.....	Mar. 3, '60	Pennsylvania College.
Ward, Arthur	.....	May 9, '48	Med. Soc. of New Jersey.
Ward, George Smith	.....	Mar. 22, '49	Univ. of the State of N. Y.
Wynans, Henry D.	.....	Mar, 7, '50	Univ. of the City of N. Y.
Whitehome, Henry B.	.....	Jan. 20, '74	Albany Medical College.
Wilmarth, Francis	.....	Feb. 28, '68	Columbia College.
Wade, Joseph L.	.....	Mar. 7, '50	Univ. of the City of N. Y.
Ward, Leslie D.	.....	Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Whitehead, Ira C.	.....	Nov. 20, '45	Berker Medical School.
Wallace, David L.	.....	Mar. 1, '75	Bellevue Hosp. Med. Col.
Wright, Alfred S.	.....	Mar. 1, '78	Columbia College.
Whitehead, Isaac P.	.....	May 27, '74	N. Y. Med. Eclectic College.
Wilder, Alexander	.....	Jan. 5, '81	U. S. Medical College.
Ward, Joseph B.	.....	Feb. 27, '57	Med. Hom. Col. of Penna.
Walton, Alfred	.....	June 25, '79	Harvard University.
Ward, Jacob H.	.....	Apr. —, '79	Victoria College.
Wilson, John Eastman	.....	Mar. 15, '83	N. Y. Hom. Medical College.
Wallace, Daniel	.....	Apr. 30, '83	Affidavit—40 years' practice.
Young, Charles	.....	Mar. 8, '66	Columbia College.
Young, J. Coddington Jr.	.....	Feb. 27, '73	Columbia College.
Yarnall, James H.	.....	.....	Eclectic Medical College.
Zeh, Charles M.	.....	June 14, '48	Castleton Med. Col., Vt.

GLOUCESTER COUNTY.

Abbott, Clarence G.	Woodbury	Mar. 10, '79	Hahneman College, Phila
Ashcraft, John H.	Mullica Hill	Mar. 10, '55	Jefferson Med. College, Phila.
Backus, Boardman P.	.....	Mar. 6, '81	Eclec. M. Col., Novi Chorari.
Baker, C. A.	.....	Mar. 9, '67	Jefferson Med. College, Phila.
Beckett, Albert T.	Salem	Mar. 10, '73	Hahneman College, Phila.
Buckingham, Henry G.	Clayton	Mar. 3, '75	Columbia College, Phila.
Buzby, Benjamin F.	Swedesboro	Mar. 12, '77	University of Penna., Phila.
Carter, Reuben	.....	Feb. 11, '79	University of Penna., Phila.
Chew, Edmund	Mantua	Mar. 9, '76	University of Phila., Pa.
Clark, Henry C.	Woodbury	Apr. 5, '53	University of Penna., Phila.
De Groff, Eugene E.	Mullica Hill	Mar. 12, '75	Jefferson Med. College, Phila.
Duffell, Charles	Clayton	Mar. 8, '62	Jefferson Med. College, Phila.
Edwards, J. Gaunt	Williamstown	Mar. 1, '78	Bellevue H. M. Dept., N. Y.
Finch, Lemuel E.	Wenonah	Mar. 10, '79	Hahneman College, Phila.
Glover, William A.	Woodbury	Mar. 9, '76	Hahneman Med. Col., Phila.
Garrison, Charles F.	Camden	Mar. 12, '72	University of Penna., Phila.
Gardiner, Daniel R.	Woodbury	Mar. 15, '49	Hom. Med. Col., Phila.
Halsey, Luther M.	Swedesboro	Mar. 13, '80	Jefferson Med. College, Phila.
Heritage, J. Down	Glassboro	Mar. 14, '63	University of Penna., Phila.
Heritage, Paul S.	Mantua	Mar. 12, '72	University of Penna., Phila.
Iszard, Jacob	Harrisonville	Mar. 9, '70	Hahneman Med. Col., Phila.

GLOUCESTER COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Jackson, Winslow	Bridgeport	Mar. 8, '51	University of Penna., Phila.
Keasbey, John B.	Woodbury	Apr. 1, '54	University of Penna., Phila.
Laws, George C.	Paulsboro	Mar. 14, '71	University of Penna., Phila.
Lee, Thomas	Glassboro	Mar. 10, '76	University of Penna., Phila.
Lippincott, Joshua	Harrisonville	Feb. 9, '75	University of Phila, Pa.
Longacre, Joseph S.	Bridgeport	Mar. 27, '79	Eclectic Med. Col. of Penna. (Buchanan).
Miller, Samuel T.	Paulsboro	Apr. 8, '50	University of Penna., Phila.
Musgrave, John F.	Swedesboro	Mar. 6, '83	Hahneman College, Phila.
McGeorge, Wallace	Woodbury	Feb. 28, '68	Hahneman College, Phila.
McKelvey, Alexander J.	Williamstown	Mar. 4, '35	Jefferson Med. College, Phila.
Oliphant, Eugene T.	Bridgeport	Mar. 12, '73	University of Penna., Phila.
Porch, Albert	Clayton	Mar. 9, '67	Jefferson Med. College, Phila.
Reeves, Edward L.	Paulsboro	Mar. 5, '59	Med. Col. of Penna., Phila.
Reeves, Robert	Paulsboro	Apr. 2, '83	Jefferson Med/Col. of Penna.
Smith, Asa A.	Franklinville	Mar. 12, '64	University of Penna., Phila.
Stamback, Henry L.	Mullica Hill	Mar. 10, '79	Hahneman College, Phila.
Stanger, Samuel F.	Harrisonville	Mar. 12, '70	Jefferson College, Phila.
Trenchard Albert	Mantua	Mar. 12, '70	Jefferson Med. College, Phila.
Turner, Thomas B.	Glassboro	Mar. 12, '75	University of Penna., Phila.
Ware, John D.	Woodbury	Mar. 10, '76	University of Penna., Phila.
Weatherby, Joseph C.	Clarksboro	Mar. 31, '37	University of Penna., Phila.
Westcott, E. Seymour		Apr. 2, '83	Jefferson Med. College Phila.

HUDSON COUNTY.

Abercrombie, William H.		Feb. 29, '72	Hom. Med. Col., New York.
Allen, Ulamor		Mar. 13, '80	Univ. of the City of N. Y.
Andrews, B. A.		Mar. 1, '69	Bellevue Hosp. M Col., N. Y.
Adams, Hugh T.		Oct. 14, '69	Queen's Univ, Ireland (Surg.)
Adams, Hugh T.		Oct. 14, '69	Queen's University, Ireland (Med. and Midwifery).
Allers, Henry		Mar. 8, '81	Univ. of the City of N. Y.
Bucher, John B.		Mar. 1, '73	Bellevue Hosp. M. Col., N. Y.
Bell, Henry		Mar. 19, '74	Georgiopolitan College.
Bier, Sophie		Aug. 19, '78	Midwifery Inst., N. Y. City.
Bridgeford, Mrs.		June 11, '69	M. S., R. C. S., Edinburgh.
Bresgleb, William		Mar. 6, '81	U. S. Med. Col., N. Y.
Brickner, M. F.		Mar. 6, '54	Ec. Med. Col. of Pa., Phila.
Belmer, Randolph		Feb. 28, '78	Univ. of the City of N. Y.
Bradford, George A.		Mar. 1, '82	Eclectic Med. Col. of N. Y.
Bidwell, Horace Gilbert.		Mar. 1, '72	Bellevue Hosp. M. Col., N. Y.
Brush, H. Mortimer.		Mar. 1, '62	Univ. of the City of N. Y.
Backus, Boardman P.		Mar. 6, '81	New York Eclectic Med. Col.
Buffett, Edward P.		Oct. 8, '57	Col. of Phys. and Surg., N. Y.
Crosby, Henry L.		—— —, '54	Metropolitan Medical College.
Clawson, S. W.		Mar. —, '67	Univ. of the City of N. Y.
Cropper, Charles W.		Mar. 1, '76	Bellevue Hosp. M. Col., N. Y.
Culver, Daniel W.		Nov. 2, '43	Med. Col. of Castleton, Vt.
Cadmus, W. J.		Feb. 28, '70	Univ. of the City of N. Y.
Clark, Samuel W., Jr.		Mar. 3, '81	Hom. Med. Col., N. Y. City.
Craig, James		Mar. 4, '61	Univ. of the City of N. Y.
Cahill, Hugo H.		Feb. 19, '73	Med. Eclectic Col of N. Y.
Chabert, Romeo F.		Mar. 9, '56	University of New York.

HUDSON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Dickinson, G. K.		Mar. 1, '77	Bellevue Hosp. M. Col., N. Y.
Derby, Nelson R.		Apr. 18, '49	University of Buffalo, N. Y.
DeHart, Sarah E.		Mar. 23, '70	Female Med. College, N. Y.
DeLamater, Chas. H., Jr.		Feb. 23, '81	New York Col. of Dentistry.
Durrie, William A.		Feb. 28, '77	Hom. Med. Col., N. Y. City.
Dallas, Alexander		Mar. 11, '78	Univ. of the City of N. Y.
Dewey, Raphael P.		June 20, '70	Eclectic Med. Col. of Penna.
Deraismes, Edward J.		July 10, '82	Univ. of the City of N. Y.
Darlington, William L.		Mar. 11, '75	Jefferson Med. College, Phila.
Exton, J. A.		Mar. 8, '66	Col. of Phys. and Surg., N. Y.
Eddy, H. McC.		Mar. 9, '72	Univ. of the City of N. Y.
Elder, Lorenzo W.		—— —, '47	Col. of Phys. and Surg., N. Y.
Everitt, John R.		May 26, '72	Col. Hospital of Long Island.
Fry, Richard Watson		June 27, '72	University of Virginia.
Faber, John		Mar. 2, '75	Col. Fredk. & Alex., Bavaria.
Fisher, William R.		Mar. 12, '67	Columbia College, N. Y. City.
Fuller, Madana B.		Mar. 23, '68	Female Med. Acad., N. Y.
Fonda, Edward S.		Mar. 5, '79	U. S. Medical College, N. Y.
Glassford, Robert W.		Mar. 1, '78	Col. of Phys and Surg., N. Y.
Golding, J. Frederick		Mar. 1, '75	Columbia College, N. Y. City.
Gordon, Leonard J.		Mar. 1, '75	Bellevue M. Col. Hosp., N.Y.
Giovanne, Marini E.		—— —, '78	University Geneva.
Gedicke, Herman W.		Feb. 27, '82	Med. Col. of Evansville, Ind.
Henke, Adelheid		Dec. 9, '79	Midwife Institute, N. Y. City.
Hoffman, A. C.		Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Hinchman, Meljssa		Feb. 3, '78	Eclectic Med Col., N. Y. City.
Heppenheimer, Fred'k C.		Mar. 18, '80	University, Bavaria.
Hornblower, Josiah		Mar. 9, '60	Univ. of the City of N. Y.
Helfer, Samuel Alexander		Mar. 14, '75	Univ. of the City of N. Y.
Haase, Henry W. A.		Mar. 8, '76	Univ. of the City of N. Y.
Henry, John P.		May 13, '81	Col. of Phys. and Surg., N. Y.
Hardenberg, D. S.		May 28, '63	Albany Medical College.
Hoffman, Peter		July 9, '81	Univ. of the City of N. Y.
Hoff, J. A.		Mar. 9, '69	Univ. of the City of N. Y.
Hammell, Philemon		Sept. 26, '82	Col. of Phys. and Surg., N. Y.
Hunt, Hart Eben		Mar. 1, '82	Eclectic Med. Col., N. Y. City.
Hillegas, Willard		Mar. 4, '81	Albany Medical College.
Hetzel, Charles J.		Mar. 6, '80	Eclectic Med Col., N. Y. City.
Hunt, John W.		—— —, '59	Univ of the City of N. Y.
Julian, John M.		June 23, '80	Long Is. Col., Brooklyn, N. Y.
Johnson, William M.		June 30, '81	Univ. of the State of Mich.
Kudlich, William Tell		Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Keating, John		Mar. 1, '77	Bellevue Hosp. M Col., N. Y.
Kitchen, George H.		June 6, '70	Eclec. Med Col. of Pa., Phila.
Kyte, C. F.		Mar. 8, '81	Univ. of the City of N. Y.
Kirk, Thomas Morris		Mar. 3, '83	Univ. of the City of N. Y.
Kreckler, Fredericka		Sept. 28, '69	I. L. I. & M In., of Hanover.
Kopetchny, Otticar. E.		Mar. 11, '76	Jefferson College, Penna.
Leaybron, Anna A.		Apr. 5, '76	N. Y. Free M. Col. for Women.
Lutkins, William C.		Mar. 15, '76	Univ. of the City of N. Y.
Lutkins, Alfred A.		Mar. 15, '78	Univ. of the City of N. Y.
Linneburner, Charles A.		Feb. 28, '79	Col. of Phys. and Surg., N. Y.
Lampson, Mortimer		Mar. 8, '66	Col. of Phys. and Surg, N. Y.
Lignot, Charles A. J.		Mar. 15, '76	Univ. of the City of N. Y.
Lynch, Henry H.		Mar. 11, '78	Univ. of the City of N. Y.
Laidlaw, Alexander H.		Mar. 1, '51	Hom. Med. Col. of Pa., Phila.

HUDSON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Long, Horace A		Mar. 10, '81	Bellevue Hosp. M. Col., N. Y.
Lindorme, Charles A. F.		Mar. 2, '81	U. S. Med. Col., N. Y. City.
La Rue, Frank E.		July 9, '80	Univ. of the City of N. Y.
Lawrence, Elijah W.		Sept. 28, '63	Philadelphia Medical College.
Lynch, Thomas		Mar. 1, '79	Bellevue Hosp. M. Col., N. Y.
Lockwood, Hilliard L.		Mar. 12, '79	Hom. Med. Col., N. Y. City.
Lester, Frank W.		Mar. 1, '78	Col. of Phys. and Surg., N. Y.
Lesser, Adolphus M.		Mar. 1, '82	Eclectic Medical Col., N. Y.
Lutze, Frederick H.		Mar. 16, '72	Hom Med. Col., N. Y. City.
Mölling Peter Augustus		Mar. 11, '78	Univ. of the City of N. Y.
Mallalieu, A. W.		Mar. 1, '75	Col. of Phys. and Surg., N. Y.
Manaton, J. P.		June 23, '80	Brooklyn Medical Col., N. Y.
McBride, Lewis A.		Mar. 1, '81	Bellevue Hosp. M. Col., N. Y.
McCallum, George B.		July 1, '80	Univ. of the State of Mich.
McClellan, David		Mar. 14, '80	Hahneman M. Col., Chicago.
Meyer, George Irving		Mar. 1. '78	Col. of Phys. and Surg., N. Y.
McLean, Henrietta		Apr. 14, '77	Hygei's Therapeutic Col., Florence Heights, N. J.
Morris Stephen V		Nov. 1, '77	Bellevue Hosp. M. Col., N. Y.
Mabon, William		Aug. 1, '81	Bellevue Hosp. M. Col., N. Y.
McDowell, William J.		Mar. 3, '74	University of Maryland, Balt.
Metcalf, George R.		Mar. 3, '74	Col. of Phys. and Surg., N. Y.
Means, V. C. B.		July 9, '81	Univ. of the City of N. Y.
Moorehouse, Elias W.		Mar. —, '82	Univ. of the City of N. Y.
Moir, Henry C.		Mar. —, '72	Univ. of the City of N. Y.
McNeil, C. Holmes		Feb. 29, '72	Hom. Med. Col., N. Y. City.
Newell, William H.		Mar. 17, '59	M. D. Univ. of Pa, Phila.
Nichols, Francis		Mar. 1, '61	Pa. Hom. Med. Col., Phila.
Nast, Hugo		Mar. 9, '75	Jefferson Col., Phila, Pa.
Norris, H. Lee, Jr.		Aug. 9, '70	Royal College, Edinburgh.
Ossa, Louis Philip		Feb. 24, '76	Wash. M. U., Baltimore, Md,
Olds, Edward		Feb. 28, '56	West. Hom. Col., Cleve., O.
Olsen, Grenada P.		Mar. 3, '83	(College name not legible).
Pyle, Edwin W.		Mar. 13, '73	University of Penna, Phila.
Paul, James		Apr. 30, '69	University of Glasgow.
Pape, Gotthold		Mar. 17, '80	Univ. of the City of N. Y.
Pitts, George Frederick		Mar. 10, '72	Univ. of the City of N. Y
Peterson, Anna		Mar. 28, '76	Midwifery Inst., N. Y. City.
Parker, William J.		Mar. 1, '79	Bellevue Hosp. M. Col., N. Y.
Pettigrew, F. W.		Jan. 30, '45	Roy. Col of Surg., England.
Pryum, Elizabeth Gordon		Mar. 1, '82	Eclectic M. Col, New Jersey.
Payn, F. G.			Jefferson College, Penna.
Pendergast, John J.		Feb. 28, '68	Col. of Phys. and Surg., also Columbia Col., N. Y.
Peacock, Rufus W		June 15, '75	Univ. of the City of N. Y.
Rothe, Charles G. H.		Mar. 4, '80	Eclectic Med. College, N. Y.
Rae, Gualterum		Mar. 15, '76	Univ. of the City of N. Y.
Rue, Henry Bergen		Mar. 15, '80	University of Penna., Phila.
Reeve, Daniel L		Apr. 14, '45	Univ. of the City of N. Y.
Rein, Louis		May 24, '70	Med. Soc. State of NewJersey.
Roth, Edward		Mar. 1, '80	Bellevue Hosp. M. Col, N. Y.
Roe, Carrie L		Apr. 1, '74	N. Y. Med. Col. for Women.
Rector, Pierson		May 28, '63	Albany Med. College, N. Y.
Squier, M Frederick		Feb. —, '72	Col. of Phys and Surg., N. Y.
Shelton, Charles H.		Mar. 5, '80	Hom. Med. Col., N. Y. City.
Straughn, Frederick		Mar. 1, '70	Maryland Academy, Balt.

HUDSON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Streubel, Julius		Mar. 4, '80	N. Y. Eclectic Med. College.
Smith, Henry M.		Mar. 1, '71	Col. of Phys. and Surg., N. Y.
Stout, Stephen V. W.		Feb. 28, '68	Col of Phys. and Surg., N. Y.
Salter, Joseph Ely		Mar. 10, '81	Bellevue Hosp. M. Col., N. Y.
Simmons, Harris R.		Mar. 8, '77	N. Y. Col. of Hom. Medicine.
Somerville, John Alex.		Mar. 9, '82	Univ. of the City of N. Y.
Sherwood, Henry De L.		May 16, '82	Col. of Phys. and Surg., N. Y.
Schul, Charles A. G.		May 24, '82	Med. Soc. State of NewJersey.
Sommer, Ida.		Oct. 23, '82	Midwife Institute, N. Y. City.
Sacchi, Angelo		Nov. 15, '76	University of Naples.
Saltonstall, G. D.		Mar. 6, '82	University of New York.
Seuftleben, Hugo H. E.		Nov. 11, '64	Albertine Acad., Bradenburg.
Stoddard Freeman		Mar. 10, '64	Col. of Phys. and Surg., N. Y.
Smith, Fenimore Cooper		July —, '83	Univ. of the City of N. Y.
Toepper, Albert		Mar. 13, '74	Univ. of the City of N. Y.
Taylor, Paul I.		Mar. 14, '75	Univ. of the City of N. Y.
Taylor, William H. O.		Mar. 8, '81	Univ. of the City of N. Y.
Thomsen, James W.		Mar. 10, '75	Hahneman Med. Col., Phila.
Van Vorst, John, Jr.		Mar. 1, '74	Bellevue Hosp. M. Col., N. Y.
Vondy, Joseph H.		Mar. 5, '51	Univ. of the City of N. Y.
Varick, William W.		June 1, '76	Bellevue Hosp M Col., N. Y.
Van Mater, John H.		Mar. 15, '80	University of Penna., Phila.
Van Saun, John D.		Mar. 1, '73	Bellevue Hosp Med. College.
Viers, Charles Otho		Mar. 1, '67	Bellevue Hosp. Med. College.
Van Houten, Hard'nb'gh		Mar. 6, '83	U. S. Med. Col., N. Y. City.
Varick, Theodore R.		May 8, '49	Med. Soc. of New Jersey.
Wright, William G.		Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Waldmeyer, Joseph R.		May 26, '75	Med. Soc of New Jersey.
Wigg, Cuthbert		Mar. 1, '80	Bellevue Hosp. Med. Col.
Watson, William P.		Mar. 1, '78	Col. of Phys. and Surg., N. Y.
Watson, B. A.		Mar. 4, '61	Univ. of the City of N. Y.
Wolfe, Theodore F.		Feb. 28, '68	Col. of Phys. and Surg, N. Y.
Warner, William B.		Mar. 9, '82	Univ. of the City of N. Y.
Ware, William Powell		Mar. 1, '83	Eclectic Med. Col of N. Y.
Williams, John		Mar. 1, '77	Col. of Phys. and Surg., N. Y.
Zabriskie, William A.		Oct. 11, '81	Col. of Phys. and Surg., N. Y.

HUNTERDON COUNTY.

A'Heron, T. M.	Junction	Apr. 7, '74	Lying-in Hospital of Coombe.
A'Heron, T. M.	Junction	Mar. 10, '73	Univ. of the City of N. Y.
Brown, Robert S. P.		Mar. 12, '81	Jefferson College, Phila.
Berkaw, Willard E.		Mar. 15, '81	University of Penna., Phila.
Best, George N.	Stockton	Mar. 12, '75	University of Penna., Phila.
Burd, Thos. B. J.	Flemington	Mar. 10, '71	Hahneman Med. Col., Phila.
Bartow, George W.	Clover Hill	Feb. 28, '72	Col. of Phys. and Surg., N. Y.
Burd, Thos. B. J.	Flemington	Mar. 10, '71	Hahneman Med. Col, Phila.
Blane John	Perryville	Apr. 30, '27	Med Soc. State of NewJersey.
Closson, A. L.		Mar. 21, '63	College of Medicine, Phila.
Creveling, W. S.	Bloomsbury	Mar. 3, '51	Univ. of the City of N. Y.
Ewing, John H.	Flemington	Mar. 1, '77	Jefferson Med. College, Phila.
Frace, J. McCormick		Mar. 12, '77	University of Penna, Phila.
Grandin, John F.	Clinton	Apr. 3, '52	University of Penna., Phila.
Hart, A. M.	Ringoes		Affidavit—Filed April 25, '83.

HUNTERDON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Hoff, J. O.	Bloomsbury	Mar. 6, '69	Univ. of the City of N. Y.
Hunt, Thos. E.	Glen Gardner	Mar. 9, '47	Univ. of the City of N. Y.
Hunt, Thos. E.	Glen Gardner	Mar. 1, '78	Bellevue Medical College.
Harrison Samuel		June 12, '77	Univ. of the City of N. Y.
Jackson, David P.		Mar. 2, '74	College of Miami, Cin., Ohio.
Knight, Moses D.	Little York	Mar. 24, '61	University of Pennsylvania.
Leavitt, John F.	Baptisttown	June 21, '81	Univ. of the City of N. Y.
Lowe, John N.		Mar. 6, '62	Univ. of the City of N. Y.
Little, W. R.	Bloomsbury	Mar. 15, '78	University of Penna., Phila.
Lawrence, B. M.		Dec. 25, '65	N. Y. Hygeio Thera. College.
Larison, George H.	Lambertville	Mar. 27, '58	University of Penna., Phila.
Miller, Frank W.		Feb. 28, '73	University of Buffalo, N. Y.
Miller, Henry H.		Mar. 7, '81	Univ. of the City of N. Y.
Miller, Theodore		Feb. 18, '73	Univ. of the City of N. Y.
McCaully, J. D.		Mar. 15, '59	University of Penna., Phila.
Oliphant, Nelson B.		Mar. 15, '80	University of Penna., Phila.
Pursel, W. W.		Mar. 11. '74	Jefferson College, Phila.
Pittenger, A. S.		Jan. 25, '70	Geneva Med. College, N. Y.
Pilkington, Horatio		Mar. 14, '79	University of Penna., Phila.
Ribble, George T.	Milford	Mar. 1, '66	Bellevue Med. College, N. Y.
Reiley, Asher		Mar. 14, '49	Univ. of the City of N. Y.
Race, Henry		Mar. 31, '43	University of Pennsylvania.
Romine, George D.	Lambertville	Mar. 15, '80	University of Pennsylvania.
Robbins, J. V.	Ringoes	Mar. 4, '59	University City of N. Y.
Reading, Miller K.		Feb. 10, '76	Col. of Phys. and Surg., N. Y.
Rowland, George	Flemington	Mar. 5, '53	College of Penna., Phila.
Reed, Rufus	Lambertville	Mar. 10, '70	Hahneman Med. Col., Phila.
Schuyler, Richard W.	Schooley's Mt.	Mar. 3, '81	Hom. Med. Col., N. Y.
Snyder, Q. Emanuel		Mar. 1, '68	Med. Col. of Bellevue, N. Y.
Skillman, Thomas A	Quakertown	Feb. 17, '78	Univ. of the City of N. Y.
Smith, A. Carpenter	Bloomsbury	Apr. 5, '50	University of Penna., Phila.
Servis, Howard	Junction	—— —, '58	University of Pennsylvania.
Stiles, James E.		May 10, '65	Med. and Sur. Univ., Phila.
Shannon, Albert		Mar. 12, '72	University of Penna, Phila.
Williams, William C.		Mar. 8, '77	Hahneman Med. Col., Phila.
Wells, Joseph M.		Mar. 12, '78	Jefferson College, Phila., Pa.
Wetherell, Horace G.		Mar. 15, '78	University of Penna., Phila.
Young, Peter C.	Ringoes	Mar. 13, '73	University of Penna., Phila.

MERCER COUNTY.

Brown, Charles C.		Mar. 2, '59	College of Medicine, Phila.
Brock, Harry D.		Mar. 20, '72	University of Penna., Phila.
Bodine, Joseph L.		Mar. 10, '65	University of Penna., Phila.
Barwis, Elmer		Mar. 10, '73	University of Penna., Phila.
Bayles, John G.		July 18, '47	Univ. of the City of N. Y.
Brigleb, William		Apr. 8, '41	Hessian Ludwig's Univ. of Giessen, Germany.
Burton, Jacob W.		Mar. 10, '77	Univ. of the City of N. Y.
Baker, Elias C.		Jan. 7, '53	Medical School of Yale Col.
Boardman, Joseph C.		July 4, '51	Med. Soc. of New Jersey.
Bergen, Elston H.		Mar. 1, '77	Col. of Med. and Surg., N. Y.
Bartine, Oliver H.		Mar. 5, '49	Med. Col. of Penna., Phila.
Britton, Charles P.		Mar. 10, '73	University of Penna., Phila.

MERCER COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Coleman, H. Waldburg		Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Cooper, Isaac		Mar. 4, '80	Hahneman Med. Col., Phila.
Compton, Charles B.		Mar. 1, '54	Hahneman Med. Col., Phila.
Christine, William B.		Mar. 12, '77	University of Penna, Phila.
Clark, William A.		Mar. 14, '79	University of Penna., Phila.
Doud, Edward J.		Mar. 3, '80	Col. of Med. and Surg, Balt.
Dewitt, Edmund		Mar. 9, '62	Univ. of the City of N. Y.
Dey, Addison H.		Mar. 15, '81	University of Penna., Phila.
Davis, Irenaus S.		Mar. 1, '71	Bellevue Hosp. M. Col., N. Y.
Dunham, Charles H.		Mar. 12, '64	University of Penna., Phila.
Delaney, Alfred		—— —, '06	Mondingo Herb College.
Elmer, William		Oct. 7, '64	University of Penna., Phila.
Freese, Jacob R.		July —, '51	Phila. Med. College, Pa.
Franklin, George H.		Feb. 8, '74	Columbia Med. Col., N. Y.
Gerry, Charles W.		Oct. —, '78	University Boston, Mass.
Griffeth, W. H. G.			Hahneman Med. Col., Phila.
Green, William		Mar. 15, '60	University of Penna, Phila.
Gallagher, Patrick J.		Mar. 6, '78	State University of Iowa.
Hutchinson, Robert C.		Mar. 15, '78	University of Penna., Phila.
Hart, Israel		Mar. 4, '53	University of Penna., Phila.
Hart, Edgar		Mar. 14, '79	University of Penna., Phila.
Holman, H. R.		Mar. 16, '72	Col. of Hom. Med., N. Y.
James, Jacob B.		Apr. 30, —	Col. of Geneva, Switzerland.
Jackson, Moses J.		Jan. 1, '80	Eclectic Med. Col. of Penna.
Johnson, J. P.		Mar. 2, '67	Hom. Med. Col., Phila, Pa.
Kirk, Enos L.		Mar. 10, '80	Hahneman Med. Col., Phila.
Kirby, John		Apr. 3, '52	University of Penna., Phila.
Laning, J. T.		Jan. 21, '63	Col. of Medicine of Phila.
Lalor, William S.		Mar. 12, '72	University of Penna., Phila.
Lawrence, B. M.		Dec. 25, '65	N. Y. Therapeutic College.
Laning, Joseph S.		Feb. 21, '71	University of Buffalo, N. Y.
Lytle, William J.		Mar. 8, '48	Univ. of the City of N. Y.
Lewis, Smith H.		Mar. 15, '81	University of Penna., Phila.
Leavitt, Lyman		Mar. 6, '57	University of Penna., Phila.
Leavitt, Charles B.		Mar. 15, '82	University of Penna, Phila.
Lloyd, Henry C.		July 3, '48	University of Penna, Phila.
Maul, J. M.		July 3, '76	Phila. Electropathic Inst.
Miller, John A.		Feb. 22, '64	Eclectic Med. Col, Phila.
Mackenzie, Thomas H.		Mar. 8, '71	Harvard Med. School, Mass.
MacDonald, Arthur K.		Mar. 12, '75	University of Penna., Phila.
McCullough, William G.		Mar. 11, '78	Hahneman Med. Col., Phila.
Moke, J. A.		Mar. 9, '70	Hahneman Med. Col., Phila.
Nelson, Adonis			University of Penna., Phila.
Neil, Henry A. P.		Mar. 12, '77	University of Penna., Phila.
Newell, William A		Mar. 12, '77	University of Penna., Phila.
Palmer, George M.		Mar. 4, '80	Eclectic Col. of New York.
Paul, Sarah E		Mar. 13, '61	Female Med. Col. of Penna.
Phillips, W. W. L.		Mar. 8, '55	Jefferson College of Penna
Rue, Henry B.		Mar. 15, '80	University of Penna., Phila.
Reese, L.		Mar. 14, '82	Medico Surgical Col., Phila.
Rankin, Robert M.		Mar. —, '77	Univ. of the City of N. Y.
Rogers, Richard R.		Mar. 13, '62	University of Penna., Phila.
Rogers, Richard Runyan		Mar. 15, '82	University of Penna., Phila.
Rice, William		—— 15, '60	University of Penna., Phila.
Rhinehart, T. F. A.		—— —, '49	Wurtzburg College, Germany.
Ribble, J. I. B.		Mar. 3, '54	Col. of Phys. and Surg., N. Y.

MERCER COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Robbins, George R.		Mar. 12, '70	Jefferson Med. Col., Phila
Shafer, Herman		Mar. 13, '69	University of Penna., Phila.
Skellenger, Edward B.		Mar. 1, '75	Col of Phys. and Surg., N. Y.
Stokes, Alfred C		Mar. 13, '69	University of Penna., Phila.
Shepherd, Cornelius		Mar. 15, '61	University of Penna., Phila.
Sackett, Edward W.		Mar. 14, '82	Hahneman Med. Col., Phila.
Steen, Alexander M.		Mar. 15, '82	University of Penna , Phila.
Struble, Hugo Mc.		Mar. 12, '75	University of Penna., Phila.
Satterthwaite, Joseph H.		Mar. 13, '83	Hahneman Med. Col., Phila.
Schenck, J. Stillwell		Mar. 31, '43	University of Penna., Phila.
Titus, George E.		Aug. 1, '77	Bellevue Medical College.
Tantum, James D.		Mar. 15, '78	University of Penna., Phila.
Taylor, Sewell O. B.		Mar. 12, '72	University of Penna., Phila.
Turner, Joseph		Mar. 12, '78	Jefferson College, Phila
Van Duyn, William B.		Mar. 12, '66	Univ. of City of New York.
Wikoff, J. H.		Mar. 4, '54	Univ. of City of New York.
Welling, E. Livingston		Mar. 15, '60	University of Penna., Phila.
Wyckoff, W. W.		May 14, '64	Eclectic Med. Col. of Phila.
Williams, Frank H.		Mar. 12, '74	University of Penna., Phila.
Ward, John W.		Mar. 14, '66	University of Penna , Phila.
Williamson, Alexander		Mar. 25, '78	University of Penna , Phila.
Weeks, Henry M.		Mar. 10, '73	University City of N. Y.
Woolverton, John		Apr. 7, '49	University of Penna.. Phila.
Warman, David		Mar. 10, '62	Bellevue Med Col., N. Y.
Wilbur, Lloyd		Mar. 11, '54	Jefferson Med. Col., Phila.
Worthington, Anthony		Mar. 1, '60	Penna. Hom. Med. College.
Wilson, William V.		July 11, '67	Yale Med. School, Conn.
Young, James R.		Mar. 13, '83	University of Penna., Phila.

MIDDLESEX COUNTY.

Andrus, C. H.	Metuchen	Mar. 6, '45	Col. Phys. and Surg., N. Y.
Baldwin, Henry R.	New Brunswick	Mar. 4, '53	Col. Phys. and Surg., N. Y.
Barber, Edmund H.	New Brunswick	Mar. 8, '77	Hom. Med. College, N. Y.
Blackwell, Lewis S.	Perth Amboy	Mar. 8, '57	University of Pennsylvania.
Bissett, Frederick W.	Washington	Mar. 1, '76	Col. Phys. and Surg., N. Y.
Bissett, John J.	Washington	Mar. 12, '80	Col. Phys. and Surg., N. Y.
Baldwin, J. M.	Dayton	Mar. 13, '80	Jefferson Med. Col., Penna.
Bertolet, E. B.		Mar. 10, '76	University of Pennsylvania.
Barchet, Stephen P.	China	Mar. 4, '75	N. Y. Col. of Homœopathy.
Berhans, W. M.		Feb. 18, '75	University of Pennsylvania.
Bates, Cornelius S.		Jan. 3, '81	Eclectic Med. Col. of Penna.
Barber, Adelia B.	New Brunswick	Apr. 3, '83	N. Y. Female Med. Academy.
Clark, Staats V. D.	New Brunswick	Mar. 2, '70	Col. of Phys. and Surg , N. Y.
Clark, George G.	New Brunswick	July 8, '79	Univ. of the City of N. Y.
Carman, J. H.	South Amboy	Mar. 1, '81	Col. Phys. and Surg., Balt.
Disbrow, Stephen M.	Old Bridge	Mar. —, '77	Bellevue Medical College.
Decker, Dayton E.	Woodbridge	Jan. 15, '74	Long Is. College Hospital.
Donahue, Francis M.	New Brunswick	Mar. 8, '81	Univ. of the City of N. Y.
English, David C.	New Brunswick	Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Everitt Edward	Woodbridge	Mar. —, '79	Hom. Med. College, N. Y.
Fuchs, Maria	Milltown	May 1, '50	Heidelberg College.
Freeman, Alonzo	South Amboy	Mar. 1, '69	Col. of Phys. and Surg., N. Y.
Follett, William M.	New Brunswick	Mar. 1, '83	Eclectic Med. College, N. Y.

MIDDLESEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Geis, Rosalie	Woodbridge	May 31, '72	Royal School for Midwives, Weizburg, Bavaria
Garner, Henry B.	Spotswood	Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Howard, Thomas T., Jr.	South Amboy	Mar. 5, '80	Hom. Med. College, N. Y.
Helm, John, Jr.	New Brunswick	July 11, '60	Univ. of the City of N. Y.
Hunt, Ezra M.	Trenton	Mar. 4, '52	Col. of Phys. and Surg. N. Y.
Hubbard William H.	Perth Amboy	Mar. —, '73	Bellevue Med. College.
Haight, Alfred M.		Mar. 7, '79	Hom. Med. College, N. Y.
Holmes, John C.	Cranbury	Mar. 10, '64	Col. of Phys. and Surg., N. Y.
Hamilton, Ezra W.		Mar. 3, '81	Hom. Med. College, N. Y.
Hunt, Alonzo C.	Metuchen	Mar. 13, '81	Col. of Phys. and Surg., N. Y.
Janeway, George J.	New Brunswick	Oct. 4, '39	Med. Soc. of New Jersey.
Keep, Caroline J.	Middlebush	Mar. 1, '67	Hom. Med. College, N Y.
King, Joseph H.		June 25, '67	Eclectic Med. Col. of Penna.
King, Joseph H.		June 10, '71	American Univ. of Phila.
Long, Samuel	New Brunswick	Mar. 10, '73	Hahneman Med. Col . Phila.
Lawrence, B. M		Dec. 25, '65	Hygei's Thera Col., N. Y.
Lewis, William C., Jr.	South Amboy	Mar. 5, '80	University of Pennsylvania.
Morgan, Lawrence O.	South Amboy	Mar. 9, '65	Col. of Phys. and Surg., N. Y.
Mabon, William	New Brunswick	Mar. 1, '81	Bellevue Med. Col., N. Y.
Norton, Horace G.		Mar. 15, '80	University of Pennsylvania.
Nelson, William J.	Dunellen	Mar. 12, '80	Col. of Phys. and Surg , N. Y.
Norton, Frank B.	Metuchen	Mar. 13, '74	Univ. of the City of N. Y.
Platt, Joseph H.	Dunellen	Mar. 1, '56	Penna. Hom. Med. College.
Rice, J. Warren	New Brunswick	Mar. 1, '75	Col. of Phys. and Surg., N. Y.
Reiley, Edward A.	Atlantic City.	Mar. 8, '81	Univ. of the City of N. Y.
Reed, Rufus	New Brunswick	Mar. 10, —	Hahneman Med. Col., Phila.
Stephens, David	New Brunswick	Nov. 24, '63	Berkshire Med. Col , Mass.
Skullman, Thomas A.	Quakertown	Mar. 11, '78	Univ. of the City of N. Y.
Slack, Clarence M.	New Brunswick	Mar. 10, '65	Jefferson Med. Col., Penna.
Sleeper, Thomas D.	Camden	June 6, '70	Eclectic Med. College, Penna.
Symmes, Henry C.	Cranbury	Mar. 14, '80	University of Pennsylvania.
Smith, John F		Mar. 6, '67	Georgetown College.
Suydam, John L.	Jamesburg	Mar. 9, '82	Univ. of the City of N. Y.
Thompson, John C.	Washington	Mar. 6, '56	Col Phys. and Surg , N. Y.
Treganowan, Ambrose	South Amboy	July 1, '54	Phila. College of Medicine.
Vail, Duncan P.	Dunellen	June 2, '53	Vermont Medical College.
Van Marter, John S	New Brunswick	Feb 21, '66	Med. and Surg Univ. of Pa.
Voorhees, Charles H.	New Brunswick	Mar. 9, '50	Jefferson Med Col. of Penna.
Verdi, Ciro S.	New Brunswick	Feb. 28, '61	N. Y. Col. of Homœopathy
Van Deventer, John L.	New Brunswick	May 13, '81	Col. of Phys. and Surg., N. Y.
Wainwright, J. B.	Milltown	Mar. 1, '77	Col. of Phys and Surg , N. Y.
Wilson, J. G.	Perth Amboy	Mar. 10, '76	University of Pennsylvania.
Williamson, Nicholas	New Brunswick	Mar. 9, '71	Univ. of the City of N. Y.
Walton, Alfred	South Amboy	June 25, '79	Harvard University.
White, J. Leon	South Amboy	Mar. 12, '81	Jefferson Med College, Pa.
Wilson, G. V.	Monmouth Junc'n	July 18, '67	Yale College.
Zandt, H. D.	Jamesburg	Mar. 14, '81	University of Pennsylvania.

MONMOUTH COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Alday, John H.	Ocean Grove	Mar. 1, '56	Col. Med. Hom., Phila., Pa.
Applegate, Asher T.	Englishtown	Mar. 13, '69	University of Penna., Phila.
Arrowsmith, Joseph E.	Keyport	Mar. —, '42	University of City of N. Y.
Archer, Hannah E.		Feb. 4, '60	Eclectic, New York.
Archer, William		Feb. 4, '60	Eclectic, New York.
Allen, Charles W.		Mar. 1, '78	Columbia College, N. Y.
Alba, F. T.		July 9, '46	Norwich University, now Lewis College.
Alday, Henry B.	Ocean Grove	June 15, '82	University of Penna., Phila.
Amony, Joseph D.		Mar. 1, '75	Columbia College, N. Y.
Beegle, I. Newton F.	Ocean Grove	Mar. 1, '70	Col. of Med. Bellevue Hosp.
Burhans, Laura M.		Feb. 19, '75	University of Med., Phila.
Burnett, William W.	Freehold	Mar. 1, '70	College Med. Hom., N. Y.
Bailey, Thomas H.		Mar. 1, '70	Col. of Med. Bellevue Hosp.
Brown, George W.		Feb. 28, '79	Columbia College, N. Y.
Buchanan, Alexander		July 10, '60	Med. and Surg., Glasgow.
Bennett, Henry Hudson.		Mar. 13, '81	Columbia College, N. Y.
Beach, William B.	Eatontown	Mar. 1, '75	Univ. of Maryland Med. Col.
Beck, J. Howard.		Mar. 15, '82	University of Penna., Phila.
Bissett, John J.		Mar. 12, '80	Columbia College, N. Y.
Burnett, D. Walton.		Mar. 4, '83	College Med. Hom., N. Y.
Chittenden, Daniel J.	Fair Haven	Mar. —, '59	Univ. City of New York.
Cheesman, Joseph K.	Red Bank	June 13, '43	Onondaga Soc. State of N. Y.
Crater, Elias Wolcott	Oceanport	Mar. 1, '78	Columbia College, N. Y.
Chattle, Thos. G.	Long Branch	July 1, '54	Phila. Col. Med. State of Pa.
Clark, Isaac J.		Mar. 9, '58	Jefferson College, Phila., Pa.
Cook, Henry G.	Holmdel	Mar. 5, '57	Col. Med. and Surg., N. Y.
Curry, George H.		Mar. 10, '80	Hahneman Med. Col., Phila.
Costell, Henry B.	Rocky Hill	Mar. 15, '82	University of Pennsylvania.
Coe, Henry Clark.		Mar. 16, '82	Columbia College, N. Y.
Conover, Robert R.	Red Bank	Mar. 6, '47	University of City of N. Y.
Conover, James T.	Freehold	Mar. 1, '57	Col. of Med. Bellevue Hosp.
Chasey, Jacob.	Long Branch	Mar. 1, '75	Columbia College, N. Y.
Desbrin, Vanderhoof M.	Farmingdale	July —, '80	Col. of Ag Univ. of Vermont.
Davison, J. Franklin.		—— —, '80	Univ. City of New York.
Des Angeles, Henry F.	Asbury Park	Jan. 4, '64	Med. Soc. of New Jersey.
Davis, Josephine G.		Mar. 15, '77	College of Medicine, Penna.
Desbrin, F. A	Farmingdale	Mar. 1, '81	Col. of Med. and Surg, Md.
Dearborn, Henry M.		July 15, '69	Bowdoin College, Maine.
Duryee, Charles C.		Mar. 4, '81	Albany Medical College.
Davis, Edwin T.		Mar. 14, '82	Hahneman Med. Col., Phila.
Dessau, T. Henry.		Mar. 7, '68	Jefferson College, Penna.
Ellison, Ozias.		Mar. 4, '80	U. S. Medical College.
Evans, Mariam D. L.	Asbury Park	Mar. 1, '82	Eclectic Med. College, N. Y.
Evans, Samuel D.	Asbury Park.	Mar. 1, '82	Eclectic Med. College. N. Y.
Field, Edwin.	Red Bank	Feb. 27, '73	Columbia College, N. Y.
Forman, D. McLean.	Freehold	Mar. 8, '66	Columbia College, N. Y.
Fay, George D.		Mar. 10, '81	Hahneman Med. Col, Phila.
Garrison, Henry W.	Asbury Park	Feb. 28, '78	College Med. Hom, N. Y.
Goodenough, Josephus B.	Long Branch	Mar. 4, '52	College of Med., City of N. Y.
Gardiner, Richard, Jr.		Dec. 6, '80	Hahneman Med. Col., Phila.
Green, James O.	Long Branch	Mar. 1, '66	Col. of Med. Bellevue Hosp.
Hetrick, Jacobus A. W.	Asbury Park	Mar. 9, '76	Hahneman Med. Col., Phila.
Howell, Alexander A.	Allentown	Mar. 1, '41	Jefferson Med. Col., Phila.
Hustis, C.	Ocean Grove	Mar. 5, '65	Univ. City of New York.
Hickson, Charles S.		Feb. 21, '50	Medical Col., Syracuse, N. Y.

MONMOUTH COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Humphreys, Frederick.		Mar. 2, '50	Col. Med. Hom., Phila., Pa.
Hendrickson, Daniel D.	Middletown	Mar. 15, '80	University of Pennsylvania.
Hunt, Sylvester H.	Long Branch	Mar. 10, '65	Jefferson Col. of Penna.
Hills Arthur T.		Mar. 4, '75	College Med. Hom., N. Y.
Hunter, Jacobus B.		Mar. 8, '66	Columbia College, N. Y.
Hughes, Henry.	Long Branch	Feb. 27, '73	Columbia College, N. Y.
Hodgson, Wilmer.		Mar. 5, '67	College, Richmond, Va.
Hubbard, William H.	Red Bank	Aug. 1, '34	Med. Soc. of New Jersey.
Herbert, Ralph Willis.		Mar. 3, '81	N. Y. Medical College Hom.
Hutchinson, George H.	Englishtown	Mar. 15, '80	University of Pennsylvania.
Hanks, Horace T.		Dec. 23, '61	Albany Medical College.
Henry, Nelson H.		Feb. 28, '79	Columbia College, N. Y.
Ingham, Harvey Alanson		Feb. 28, '82	Ec. Med. Col. City of N. Y.
Jones, Mariam A. D.		Mar. 11, '75	College of Medicine, Penna.
Jackson, Andrew.	Matawan	Feb. 25, '73	University of Buffalo, N. Y.
Janeway, Edward G.		Mar. 10, '64	Columbia College, N. Y.
James, Jacobus B.		Apr. —, '29	Geneva College. N. Y.
Janney, Thomsin.		Apr. 9, '77	Medical Academy, N. Y.
Judson, Edward Allen.		July —, '79	Univ. City of New York.
Johnson, Harris P.	Allentown	Apr. 2, '83	Jefferson College of Penna.
Karsner, Charles.		Mar. 15, '59	Jefferson Med. Col., Phila.
Kinmouth, William R.	Farmingdale	Feb. 12, '72	Columbia College, N. Y.
Kimball, Walter S.	Eatontown	Mar. 4, '63	College Med. Hom., N. Y.
Kinmouth, William R. S.	Manasquan	Mar. 25, '79	American University, Phila.
Kinmouth, Hugh S.	Asbury Park	Mar. 2, '70	Columbia College, N. Y.
Kimball, Revel B.	Seabright	Mar. 12, '80	Columbia College. N. Y.
Kinmouth, William L.		Mar. —, '81	U. S. Med. College, N. Y.
Kennedy, Robert.		Mar. 10, '81	Hahneman Medical College.
Keator, Bruce S.	Asbury Park	Mar. 3, '81	College Med. Hom., N. Y.
Karsner, Charles W.		Mar. 12, '78	Jefferson Col. of Pa., Phila.
Karsner, Charles W.		Mar. 10, '75	Hahneman Med. Col., Phila.
La Baw, David.	Navesink	Mar. 12, '80	Columbia College, N. Y.
Long, Isaac S.	Freehold	Mar. 14, '66	University of Pennsylvania.
Lewis, Smith Haines.		Mar. 14, '81	University of Pennsylvania.
Mitchell, Henry.	Asbury Park	Oct. 1, '66	M. Col. Bellevue Hosp., N. Y.
Marsden, George F.	Red Bank	Mar. 1, '66	Col. Med. Hom., Phila., Pa.
Mackenzie, C.		Feb. 21, '60	College of East Hudson, O.
Mackintosh, Sarah F.		Oct. 1, '72	Col Med. Fem. Hosp., N. Y.
Marren, Rosemond W.		Mar. 1, '78	Col. M. Bellevue Hosp., N. Y.
Morgan, John C.		Mar. 5, '52	Medical College of Penna.
Moore, Charles H.		Feb. 27, '73	Columbia College. N. Y.
Mosely, Nathaniel R.		Mar. 6, '49	Col. of Med., Phila., Pa.
Morton, Francis Knox.		Mar. 7, '82	Jefferson Col. of Pa., Phila.
Merriman, Elisha Smith.		Mar. 27, '56	University of Michigan.
Neafie, Harry.	Turkey	Apr. 1, '80	Col. M. Bellevue Hosp., N. Y.
Norton, Horace Greeley.	Imlaystown	Mar. 15, '80	University of Pennsylvania.
Nobles, Milton A.		June 9, '81	Col. of Med. and Surg., N. Y.
Ostrom, H. I.		Mar. 3, '73	Hom. College Med., N. Y.
Offenbach, Robert.		Feb. 17, '79	University City of N. Y.
Odell, Frank M.		Mar. —, '75	University City of N. Y.
Palmer, George M.		Mar. 4, '80	Eclectic Col Med., N. Y.
Pemberton, Harry H.	Long Branch	Mar. 9, '72	Jefferson College of Penna.
Parrish, Joseph.		Apr. 4, '44	University of Pennsylvania.
Pemberton, John B.		Mar. 12, '64	Columbia College, N. Y.
Patterson, William F.		Dec. 23, '75	Albany Medical College.
Pomeroy, Mary A. G.		Mar. 3, '70	Boston University, Mass.

MONMOUTH COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Pemberton, Charles	Asbury Park	Mar. 9, '82	Jefferson College of Penna.
Pierson, Samuel		Mar. 13, '81	Columbia College, N. Y.
Ridgeway, Thomas E.	Red Bank	Mar. 10, '64	Jefferson College of Penna.
Rogers, Ricardum R.		Mar. 30, '62	University of Pennsylvania.
Rhodes. Robert D.	Keyport	Feb. 28, '56	Western Hom. Col., Cleve., O.
Roth. Edward		Mar. 1, '80	Col. Med. Bellevue Hosp.
Rockwell. Philomen G.		July 2, '46	Berkshire School Med., Mass.
Roberts, Daniel E.	Keyport	Mar. 3, '83	University of City of N. Y.
Rhein, Meyer L		Mar. 5, '80	Albany Medical College.
Robinson, George F.		Mar. 12, '81	Jefferson Medical Col., Phila.
Swan, Benjamin I.		Mar. 1, '70	Bellevue Medical Col., N. Y.
Sanders, C. Walton		Mar. 1, '78	Columbia College, N. Y.
Still, Emma R.		May 23, '57	Ecl. Col. Med , Cincinnati, O.
Shaw, E. D.		Mar. —, '80	University of City of N. Y.
Smith, Andrew H.		Oct. 4, '80	Col. Med. Surg. City of N. Y.
Starks, W. H. L.		June 9, '53	Col. Med., Castleton, Vt.
Seward, Benjamin I.		Mar. 1, '70	Col. M. Bellevue Hosp., N. Y.
Stryker, Edward V.		Sept. 12, '72	Col. Medicine, Albany, N Y.
Street, David Reese		Mar. 15, '80	University of Pennsylvania.
Simmons, Charles E.		Mar. 10, '64	Columbia College, N Y.
Smith, Charles S.		Mar. 12, '79	Jefferson College of Penna.
Sayrs, Jeremiah E.		Apr. 2, '83	Jefferson College of Penna.
Sackett, Edgar Wayne		Mar. 14, '82	Hahneman Med. Col., Phila
Trafford, Alfred F.	Red Bank	Mar. 8, '77	Hahneman Med. Col., Phila.
Trask, Frederick M.		June 1, '75	Bellevue Col Med , N. Y.
Tusting. Robert	Asbury Park	Jan. 22, '62	Eclec. Col. Med., Phila., Pa.
Tantum, J. R.	Ocean Grove	Mar. 4, '65	Col. Med. Hom., Phila., Pa.
Taylor, Edward F.	Middletown	Apr. 9, '53	University of Pennsylvania.
Thropp. Augustus P.		Mar. 4, '62	Col. Med. Hom., N Y.
Thirrcelin, Eticune H.		June 1, '40	Un. of France, Acad. of Paris.
Todd. Alphonso R.		Mar. 13, '80	Jefferson College of Penna
Vandyke, C. D. W.	Perrinsville		Albany Med. College, N. Y.
Van Mater, I. H.	Atlantic Highl'ds.	Mar. 15, '80	University of Pennsylvania.
Vanderbeck, Cornelius C.		Mar. 9, '72	Jefferson College of Penna.
Wildes, Thomas		Mar. 2, '76	Col. Med. Hom., N. Y.
Welch, George T.	Keyport	Mar. 13, '68	University of Pennsylvania.
Woolley, George W.		Mar. 1, '36	Ohio College of Medicine.
Watkins, William B.		Mar. 1, '79	Bellevue Hosp. Col. M., N. Y.
Williams, J. A.		Jan. 27, '64	Rush Medical College, Ill.
Wilber, George F. F.		Mar. 15, '82	University of Pennsylvania.
Warner, G. Bray		Mar. 9, '82	University of City of N. Y.
Youlin, I. I		Mar. 1, '54	Col. Med. Hom., Cleve , O.
Yelvington, Alfred Pearce		Feb. 26, '80	Eclec Med. Col. City of N. Y.
Yelvington, Charles H.		Feb. 24, '81	Eclec. Med. Col City of N. Y.

MORRIS COUNTY.

Anderson, Calvin		Mar. 9, '65	Columbia College, N. Y.
Andrews, H. B.	Morristown	Nov. 11, '78	New York City University.
Barker, Phanett C.	Morristown	Mar. 1, '60	University of State of N. Y.
Buttolph, H. A.	Morris Plains	Dec. 2, '35	Williams College, Mass.
Becker, G. A.	Whippany	—— —, '80	Columbia College, N. Y.
Byram, John	Mine Hill	Mar. —, '81	Baltimore College.
Booth, A. C.		June 27, '77	Harvard University, Mass.

MORRIS COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Cooper, E. P.	Parsippany	Feb. 20, '71	New York University
Case, Levi W.		Mar. 12, '80	Columbia College N. Y.
Carpenter, A. E.	Boonton.	May 12, '74	Pennsylvania University.
Condict, Arthur W.	Dover	June —, '82	Michigan University.
Condict, Isaiah W.	Dover	May 11, '47	Med. Soc of New Jersey.
DeHart, John N.	Madison	June 21, '65	New York University.
Derry, W. E.	Dover	—— —, '80	Columbia College, N. Y.
Douglass, James	Morristown	Mar. 13, '80	New York University.
De Groot, George		—— —, '80	Columbia College, N. Y.
Day, Harry V.		July 11, '76	New York University.
Dreher, George W.	Bloomingdale	—— —, '23	Jefferson College of Penna.
Farrow, Levi		Mar. 9, '65	Columbia College, N. Y.
Flagler, Thomas B.		June 13, '54	Albany Med. College, N. Y.
Fonda, Edward S.		Mar. 5, '79	U. S. Med. Col. of N. Y.
Ford, Mary C.	Dover	Mar. 31, '75	Female College, N. Y.
Glenn, Irenaeus R.		Mar. 12, '64	University of Pennsylvania.
Hulshizer, Henry	Port Oram	Feb. 28, '56	Philadelphia Col. of Penna.
Hunter, John M.		—— —, '54	New York University.
Hedges, Smith E.	Chester	Mar. 6, '52	New York University.
Hoffman, Joseph	Morristown	Mar. 15, '83	Hom. Med. College of N. Y.
Hann, P. S.	German Valley	Mar. 15, '83	Hom. Med. College of N. Y.
Iliff, Elias P.		June 21, '77	Long Island Col. Hosp.
King, Joseph D	Dover	June 26, '67	Long Island Col. Hosp.
Lindsley, James C.		Mar. 1, '69	Columbia College, N. Y.
Lewis, A. A.		—— —, '68	University of New York.
Lloyd, T. M.		—— —, '76	University of Pennsylvania.
Lumsden, R. C.	Rockaway	—— —, '81	Columbia College, N. Y.
Lawrence, B. M.		Dec. 25, '65	Hygieo Thera. College, N. Y.
Macwithey, A. A.		Nov. 20, '53	University of New York.
Owen, Frederick W.	Morristown	Mar. 5, '57	Georgetown College.
Platt, Joseph H.		—— —, '56	Med. Hom. College Penna.
Pierson, Samuel	Morristown	—— —, '81	Columbia College, N. Y.
Pierson, Stephen		Mar. 1, '69	Columbia College, N. Y.
Ryerson, John G.	Boonton	Mar. 4, '59	New York University.
Romondt, C. D. V.		Feb. 22, '72	Columbia College, N. Y.
Rossi, E.	Dover	May 4, '36	University of France.
Stiger, J. Henry	Mendham	Mar. 4, '57	New York University.
Stiger, John S.	Mendham	Mar. 17, '50	New York University.
Swan, Charles Y.	Morristown	Jan. 22, '56	New York University.
Swain, George M.		—— —, '70	Columbia College, N. Y.
Smith, Edwin E.		June 22, '71	Long Island Col. Hosp.
Webelacker, Armin.	Morristown	Mar. 6, '71	Hom. Med. Col. of N. Y.
Wadsworth, Sarah J.		Apr. 5, '76	N.Y. Free M. Col. for Women.
Wiggins, Henry C.		Jan. 22, '74	Albany College, N. Y.
Wood, J. Walter		Mar. 30, '81	Columbia College, N. Y.
Wigg Cuthbert	Boonton	Mar. 1, '80	Bellevue Hosp. Med. Col.

OCEAN COUNTY.

Ashhurst, Samuel	Beach Haven	—— —, '61	University of Pennsylvania.
Bean, J. M.	New Egypt	Apr. 1, '54	University of Pennsylvania.
Blake, I. A. D.	Manchester	—— —, '61	Med. Univ. of Phila., Pa.
Buckingham, F. S.	Lakewood	Mar. 1, '71	Columbia College, N. Y.
Burnett, J. P.	Island Heights	Mar. 11, '65	University of Pennsylvania.

OCEAN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Clayton, Wm. G.	Metedeconk	Mar. 15, '82	Bellevue Hosp. Med. Col
Cobb, B. S.	Waretown	Feb. 20, '51	Cen. M. Col., Rochester, N. Y.
Disbrow, E. Clarence, Jr.	Toms River	——, '81	Surg. and Phys. Col., N. Y.
Disbrow, Rem. L.	Toms River	——, '62	Columbia College, N. Y.
Gordon, Chas. O.	Lakewood	Oct. 24, '67	Dartmouth College.
Hill, Mary H.	Manchester	Sept. —, '63	Med. Univ. of Phila., Pa.
Irwin, Samuel B.	Island Heights	——, '55	Jefferson College.
Kenyon, Marcum	Forked River	——, '83	Columbia College, N. Y.
Mattison, J. B.		——, '67	Bellevue Hosp. Med. Col.
Mixsell, Joseph	Manchester		University of Pennsylvania.
Reed, H. W.	Manchester	June 20, '73	American University, Phila.
Tunis, Geo. S.	Metedeconk	——, '69	Bellevue Hosp. Med. Col.
Warren, A. D	New Egypt	Feb. 22, '47	Botanic Med. Col. of Ohio.
Webb, John W.	Toms River	——, '64	Jefferson Med. College, Phila.
Youngman, Maurice	Manchester	Mar. 5, '80	N. Y. Hom. Col. of Medicine.

PASSAIC COUNTY.

Amiraur, James C.	Paterson	June 26, '72	Long Island Hosp. College.
Archer, Charles H.	West Milford	May 6, '67	Eclectic M. Col. of Med., N. Y.
Ayres, Morgan W.		Mar. 1, '75	Col. Phys. and Surg., N. Y.
Bibby, James S.	Paterson	Mar. 1, '75	Bellevue Hosp. Med. Col.
Barden, L. H.	Paterson	Feb. 15, '72	Eclectic Med. Col., N. Y.
Blackwell, Enos T.	Paterson	June 14, '48	Vermont Med. College.
		Mar. 13, '69	University of Pennsylvania.
Balleray, George H.	Paterson	Mar. 1, '69	Col. Phys. and Surg., N. Y.
Banta, John H.	Paterson	June 1, '79	Bellevue Hosp. Med. Col.
Borden, Davis P.	Paterson	Feb. 19, '73	Eclectic Med. Col. of N. Y.
Busse, William	Paterson	Feb. 28, '72	Col. Phys. and Surg., N. Y.
Blundell, William	Paterson	Mar. 24, '61	Col. Phys. and Surg., N. Y.
Bradsworth, John H.	Paterson	Mar. 3, '81	N. Y. Homœopathic Med. Col.
Coursen, Whitfield S.	Oak Ridge	Mar. 1, '48	Col. of Phys. and Surg., N. Y.
Coursen, Theodore D.	Oak Ridge	Mar. 1, '8(	Bellevue Hosp. Med. Col.
Carr, Ada	Paterson	Mar. 28, '82	N. Y. Woman's Med. Col.
Collins, James W.	Passaic	Mar. 5, '63	Bellevue Hosp. Med. Col.
Church, Charles A.		Mar. 6, '71	N. Y. Hom. Med. College.
Campbell, George		Mar. 9, '82	Univ. of the City of N. Y.
Day, Harry V.		July 1, '76	Univ. of the City of N. Y.
Dewey, Raphael P.		June 20, '70	Eclectic Med. College, Phila.
Delatour, Arthur	Paterson	Mar. 8, '82	United States Med. Col.
Decker, William F.	Paterson	Mar. 2, '76	N. Y. Hom. Med. Col.
De Yeo, Charles P.		Mar. 15, —	Maryland Academy, Balt.
Ferleman, L. M. B.		Nov. 3, '80	Middleburgh M.Sch., Zealand.
Furbeck, Henry L.	Little Falls	Mar. 4, '81	Albany Medical College.
Friedrich, Gustav L.	Paterson	Dec. 22, '52	University of Berlin, Prussia.
Garnett, O. V.	Paterson	Mar. 10, '55	Jefferson College, Phila.
Gedney, Jacob M. R.	Little Falls	Mar. 1, '69	N. Y. Homœopathic Med Col.
Gillson, Michael W.	Paterson	Mar. 1, '81	New York University.
Hengeler, Jacob	Paterson	Mar. 5, '57	N. Y. Med. College.
Harris, Philander A.	Paterson	Mar. 27, '72	University of Michigan.
		Feb. 27, '73	Col. of Phys. and Surg., N. Y.
Herrick, John C.	Passaic	June 29, '69	Long Island Col. Hosp.
Howe, John M.	Passaic	June 19, '44	Castleton Med. Col., Vermont.
Hepworth, Frederick J.	Paterson	June 14, '81	Long Island Hosp. Col.

PASSAIC COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Hill, William Dudley	Paterson	July 6, '69	Vt. Univ. and Agric. Col.
Hurd, William S.	Paterson	Mar. 10, '77	New York University.
Holman, Henry R.		Mar. 7, '71	Kans. City Col. Phys. & Surg.
Johnson, Walter B.	Paterson	Mar. 1, '78	Col. of Phys. and Surg., N. Y.
Kent, William	Paterson	June 26, '73	Long Island Hosp. Col
Korschina, Theodore	Paterson	Jan. 2, '77	Bd. of Exam., Griefwald, Ger.
Kip, Henry	Paterson	Mar. 1, '77	Col. of Phys. and Surg., N. Y.
Kane, Thomas J.	Paterson	June 26, '72	Long Island Hosp. Col.
Kehrer, Augustus B.		Mar. 15, '80	Hahneman Med Col., Phila.
Keeler, Edgar A.	Little Falls	Mar. 3, '80	Maryland Col. Phys. & Surg.
Kinne, Porter S.	Paterson	Mar. —, '72	N. Y. Hom. Med. Col.
Kinne, Theodore Y.	Paterson	Dec. 23, '62	Albany Medical College.
Kinne, E. Alin	Paterson	June 27, '78	Michigan University.
Knowles, Rollin H.	Paterson	Feb. 25, '81	Starling Med. Col., Col., O.
King, Joseph H.	Paterson	June 10, '71	American Univ. of Phila.
		June 25, '69	Penna. Eclectic Med. Col.
Liggett, Samuel J.	Passaic	Mar. 12, '28	Jefferson College, Phila., Pa.
Lawrence, B. M.		Dec. 25, '65	N. Y. Hygieo Thera. Col.
Lindenhovins, F. H.	Paterson	July 28, '73	Utrecht.
Leal, John L.	Paterson	Oct. 2, '83	Col. of Phys. and Surg., N. Y.
Maines, Robert G.	West Milford	Mar. 10, '63	Jefferson Med. Col., Phila.
Myers, Charles F. W.	Paterson	Mar. 3, '74	Col. of Phys. and Surg., N. Y.
Moorehouse, Elias W.	Paterson	Mar. 9, '82	N. Y. Univ. Med. Col.
Marsh, Elias J.	Paterson	Mar. 8, '58	Col. of Phys. and Surg., N. Y.
Mackintosh, James H.	Paterson	Mar. 1, '72	Bellevue Hosp. Med. Col.
Mackintosh, Sarah F.	Paterson	Oct. 1, '72	N. Y. Hp. M. Col. for Women.
Merrill, J. Randolph	Paterson	Mar. 11, '54	Jefferson College, Phila., Pa.
Montague, Harriet	Paterson	June 4, '74	N. Y. Med. Col. for Women.
Maginnis, Bryan Charles	Paterson	Mar. 3, '83	Univ. of the City of N. Y.
Neer, Rush	Paterson	June 23, '80	Long Island College Hosp.
Newton, William K.	Paterson	Mar. 1, '78	Col. of Phys. and Surg., N. Y.
Newcomb, George F.	Paterson	Mar. 1, '77	Col. of Phys. and Surg., N. Y.
O'Grady, Thomas F.	Paterson	Mar. 1, '80	Bellevue Hosp. Med. Col.
Ossa, Luis F.		Feb. 4, '76	Washingtonian M. U., Balt.
Paxton, John P.	Paterson	June 26, '72	Long Island Hosp. Col.
Parke, Henry	Paterson	Mar. 1, '82	Col. of Phys. and Surg., N. Y.
Quin, John	Paterson	May 16, '50	Med. Society of New Jersey.
Rogers, Alexander W.	Paterson	Mar. 29, '36	Col. of Phys. and Surg., N. Y.
		Apr. 23, '45	Med. Soc. of New Jersey.
Ricardo, Norton C.	Passaic	Mar. 1, '69	Hom. Med. College, N. Y.
Rice, Frank H.	Passaic	June 21, '54	Vermont State Med. School.
Russell, William H., Jr.		Mar. 10, '77	Univ. of the City of N. Y.
Stewart, James M.	Paterson	Mar. 13, '80	Jefferson Med. Col., Phila.
Solatinow, Joseph	Paterson	Mar. 1, '82	Eclectic Med. Col., N. Y.
Smith, James William	Paterson	Mar. 15, '82	Bellevue Hosp. Med Col.
Silver, George A.	Bloomingdale	Mar. 8, '81	New York University.
Searls, Wellington B.		Feb. 28, '72	Col of Phys and Surg., N. Y.
Schrebinzuber, Anthony		Mar. 12, '70	University of Graecus, Styria.
Seward, Benjamin S.		Mar. 1, '70	Bellevue Hosp. Med. Col.
Terriberry, George W.	Paterson	Mar. 1, '66	Bellevue Hosp. M. Col., N. Y.
Terriberry, Calvin	Paterson	Oct. 1, '72	Bellevue Hosp. M. Col., N. Y.
Terhune, Richard A.	Passaic	Mar. 8, '50	Col. of Phys. and Surg., N. Y.
Terhune Garret	Passaic	June 21, '34	N. J. State Medical Society.
Townsend, Samuel C.	Paterson	Mar. 1, '79	Bellevue Hosp. Med. Col.
Van Dalsen, Spencer	Paterson	Mar. 3, '76	Col. of Phys. and Surg., N. Y.
Van Giesen, Henry C.	Paterson	Feb. 8, '66	Col. of Phys. and Surg., N. Y.

PASSAIC COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Vreeland, Frank D.	Paterson	Mar. 12, '79	N. Y. Hom. Med. Col.
Van Den Bylardt, J. Ed.	Paterson	June 6, '45	Medical Soc. of New Jersey.
Van Winkle, Mark	Little Falls	Oct. 12, '55	Col. of Phys. and Surg., N. Y.
Van Riper, Cornelius S.	Paterson	Mar. 8, '66	Col. of Phys. and Surg., N. Y.
Whitley, William H.	Paterson	Mar. 6, '66	Georgetown College
Wright, Joseph B.	Paterson	Mar. 12, '79	New York City University.
Warner, Oswald.	Paterson	Oct. 12, '54	Col. of Phys. and Surg, N. Y.
Wolfe, Aaron Robert	Paterson	Mar. 9, '82	Univ. of the City of N. Y.
Was, J. W.		Mar. 27, '78	Michigan University.
Withers, H. D.	Paterson	Mar. 15, '83	Maryland Academy.

SALEM COUNTY.

Abbott, Clarence G.		Mar. 10, '79	Hahneman Med. Col., Phila.
Atkinson, Charles P.	Palatine	Feb. 21, '66	University of Med., Phila.
Allen, Lefferson A. D.	Woodstown	Mar. 14, '67	University of Pennsylvania.
Bilderback, Frank	Salem	Mar. 11, '70	University of Pennsylvania.
Beckett, Albert T.	Salem	Mar. 10, '73	Hahneman Med. Col., Phila.
Backus, Boardman P.		Mar. 4, '81	Eclectic Med. Col, Phila.
Cook, Joseph	Daretown	Apr. 3, '47	University of Pennsylvania.
Cheeseman, P.	Elmer	Mar. 10, '79	Hahneman Med. Col, Phila.
Conover, James V.	Elmer	June 1, '80	Eclectic Med. Col., Pa.
Ewing, Warren L.	Alloway	Mar. 30, '82	Jefferson Med. Col., Phila.
English, Felix S.	Elmer		Affidavit—20 years' practice.
Foster, Naomi B.	Woodstown	Mar. 9, '65	Pennsylvania Med. Univ.
Flanigan, Henry M.	Pennsgrove	Apr. 27, '65	Eclectic Med. Col., Penna.
Gibbon, Quinton	Salem	Mar. 28, '33	University of Pennsylvania.
Gilman, Uriah	Woodstown	Mar. 23, '61	Jefferson Med. Col., Phila.
Glover, Lawrence L.	Hancock's Bridge	Mar. 30, '82	Jefferson Med. Col., Phila.
Garrison, Daniel	Pennsville	Mar. 13, '80	University of Pennsylvania.
Johnson, Mayhew	Pennsgrove	July 3, '50	University of Pennsylvania.
Johnson, Henry T.	Pedricktown	Mar. 15, '78	University of Pennsylvania.
Jackson, Henry	Salem	Mar. 14, '82	Hahneman Med. Col, Phila.
Moore, David	Pennsgrove	Apr. 29, '65	Eclectic Med. College, Phila.
McPherson, Andrew G.	Quinton	Mar. 14, '76	University of Pennsylvania.
Newton, Charles	Sharpstown	May 26, '62	Hahneman Med. Col, Phila.
Presson, John E	Salem	Apr. 7, '49	University of Pennsylvania.
Patterson, Theophilus	Salem	Mar. 9, '48	Jefferson Med. Col., Phila.
Patterson, James A.	Salem	Mar. 30, '82	Jefferson Med Col., Phila.
Paulding, Moses J.	Daretown	Mar. 11, '65	University of Pennsylvania.
Reed, Lewis W.	Woodstown	Mar. 12, '77	University of Pennsylvania.
Robinson, Mary Emma	Salem	Mar. 16, '76	Women's Med. Co., Penna.
Summerill, John M.	Pennsgrove	Mar. 13, '75	University of Pennsylvania.
Sharp, Edward S.	Salem	Apr. 1, '54	University of Pennsylvania.
Sherron, Clifford M.	Salem	Mar. 14, '79	University of Pennsylvania.
Souder, Philip G.	Woodstown	Mar. 10, '75	Hahneman Med. Col., Phila.
Stitt, William F.	Salem	June 26, '58	Eclectic Med. Col., Phila.
Thompson, Joseph H.	Salem	Mar. 31, '37	University of Pennsylvania.
Ware, James B.	Pedricktown	Apr. 1, '54	University of Pennsylvania.
Waddington, Benj. A.	Salem	Mar. 11, '65	University of Pennsylvania.
Wiley David	Salem	Mar. 11, '70	University of Pennsylvania.
Woodruff Alpheus B.	Elmer	Mar. 12, '74	University of Pennsylvania.
Wallace, Lemuel	Alloway	Mar. 14, '72	Eclectic Med. Col., Penna.

SOMERSET COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Beekman, John B.	North Branch	June 23, '81	University of New York.
Berg, J. Fred., Jr.	North Branch	Mar. 8, '62	Jefferson College, Phila.
Badger, Merritt O.		June 9, '81	University of New York.
Compton, Isaac L.	Bound Brook	Feb. 28, '79	Columbia Med. College, N. Y.
Cornell, Jacob B.	Somerville	Mar. 1, '78	Columbia Med. College, N. Y.
Countin, G. H. B.		Mar. 12, —	New York Medical College.
Craig, Lewis	Plainfield	May 8, '32	Med. Society of New Jersey.
Crater, Henry	Somerville	Mar. 11, '72	Hahneman Med. Col., Phila.
Dayton, John	Basking Ridge	June 9, '37	Med. Society of New Jersey.
De Hart, Sarah E.		Mar. 23, '70	Medical Academy, New York.
Edwards, John F.	Raritan	Mar. 8, '48	New York University.
Field, Chauncey M.	Plainfield	Mar. 1, '75	New York Medical College.
Fisher, Claudius R. P.	Bound Brook	Mar. 10, '75	Jefferson College, Phila.
Fisher, Farley		Jan. 1, '68	Hobert College, Geneva, N. Y.
Harper, Henry	Findern	Dec. 14, '62	Eclectic Med. College, Phila.
Hawk, Edward P.		Mar. —, '58	University of Pennsylvania.
Hecht, John P.	Raritan	Mar. 13, '80	Jefferson College, Phila.
Hunt, Azariah P.	Somerville	May 9, '48	Med. Society of New Jersey.
Jones, Fred. C.		Mar. 1, '77	Columbia Med. College, N. Y.
Keep, Caroline J. Y.		Mar. 1, '57	N. Y. Homœopathic Med. Col.
Matthews, Benj. B.	Bound Brook	Mar. 27, '58	University of Pennsylvania
Mattison, Wm. E.	Plainfield	Mar. 4, '52	Columbia Med. College, N. Y.
Maynard, James G.		Mar. 9, '56	University of Pennsylvania.
Merrell, Wm. H.	South Branch	Mar. 1, '69	Bellevue Hosp. Med. Col. N. Y.
Mosher, Abram B.		Mar. 12, '79	University of New York.
Mount, David H.		Feb. 23, '72	Columbia Med. College, N. Y.
Nelson, Adonis	Neshanic	Mar. 10, '79	University of Pennsylvania.
Pennington, Wm.	Basking Ridge	Mar. 5, '66	University of New York.
Perry, Edward	Peapack	Nov. 23, '47	Med. Society of New Jersey.
Quint, Silas H.		Mar. 10, '73	Hahneman Med. Col., Phila.
Ribble, Wm. B.	Millstone	Apr. 24, '52	Med. Society of New Jersey.
Ribble, Jesse S. B.		Mar. 3, '54	Col. of Phys. and Surg. N. Y.
Skillman, Geo. M.	Bound Brook	Mar. 10, '81	Hahneman Med. Col., Phila.
Swinton, Wm. J.	Somerville	Mar. 1, '73	Bellevue Hosp. Med. Col. N. Y.
Taylor, S. O. B.	Millstone	Mar. 12, '72	University of Pennsylvania.
Thornton, Byron	Peapack	Apr. 1, '54	University of Pennsylvania.
Troutman, Seymour C.	Somerville	Mar. 3, '54	Univ. of N. Y., C. of Ph. & Sur.
Tompkins, Lucius D.	Harlingen	Mar. 12, '77	University of Pennsylvania.
Van Derveer, Henry F.	Somerville	Jan. 27, '52	Med. Society of New Jersey.
Van Derveer, James D.	North Branch	Mar. 8, '66	Columbia Med. College, N. Y.
Van Deventer, Jno. L.		Mar. 13, '81	Columbia Med. College, N. Y.
Van Nest, Geo. V.	Weston	Apr. 2, '83	Jefferson College of Phila.
Wagoner, Henry G.	Somerville	Apr. 28, '52	Med. Society of New Jersey.
Wilson, Abram S.		Mar. 12, '81	Jefferson College of Phila.
Zeglie, Peter J.	Warrenville	May 16, '82	Columbia Med. College, N. Y.

SUSSEX COUNTY.

Strader, John C.	Lafayette	Dec. 26, '71	Albany Medical Col., N. Y.
Potter, Emerson B.	Ogdensburg	Feb. 28, '79	Col. of Phys. and Surg., N. Y.
Cochran, Clarance F.	Stanhope	Mar. 26, '73	University of Michigan.
Fithian, Henry C.	Late of Andover	Mar. 12, '77	University of Penna, Phila.
Allen, Carlos	Newton	May 9, '48	Medical Soc. of New Jersey.
Miller, Levi D.	Newton	Mar. 8, '55	Univ. of the State of N. Y.
Ferguson, Benjamin W.	Beemerville	Mar. 1, '78	Bellevue Hospital.
Cannon, Frederick M.	Deckertown	Mar. 1, '67	University of New York.

SUSSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Davison, Calvin R.	Stanhope	Mar. 31, '69	University of Michigan.
Potts, Edgar	Coleville	Mar. 15, '76	Univ. of the City of N. Y.
Morrison, Ephraim	Newton	Mar. 1, '75	Bellevue Hospital.
Couse, Joseph P	Hamburgh	Mar. 30, '70	University of Michigan.
Morrison, Joseph	Late of Deckert'n	Mar. 1, '78	Bellevue Hospital.
Jacobus, Peter	Newton	Jan. 20, '58	Eclectic Med. Col., Phila.
Nelden, Charles R.	Stanhope	Mar. 3, '64	Bellevue Hosp., N. Y. City.
Cooper, D. W.	Unionville	Mar. 9, '55	Univ. of the City of N. Y
Lewis, William Henry	Newton	Mar. 1, '65	Bellevue Hospital.
VanGaasbeck, Harvey D.	Deckertown	Mar. 11, '78	Univ. of the City of N. Y.
Douglas, William H.	Ogdensburg	Mar. 1, '79	University of Pennsylvania.
Williamson, Alexander		Mar. 14, '78	University of Penna., Phila
Rohe, Frederick G.	Late of Newton	Mar. 15, '83	New York College.
Jacobus, Peter N.	Newton	June 13, '83	Medical Soc of New Jersey.
Drake, Charles F.	Newton	Mar. 9, '82	Univ. of the City of N. Y.
Condict, Arthur W.	Andover	June 29, '82	University of Michigan.
Beers, Francis	Flatbrookville	Mar. 12, '81	Jefferson College of Phila.

UNION COUNTY.

Burlingham, Harvey D.	Plainfield	——, '57	N. Y. Col. Phys. and Surg.
Brown, Louis R	Elizabeth	——, '64	Pa. Hom. Med. Col., Phila.
Bailey, George W.	Elizabeth	——, '62	Pa. Hom. Med Col., Phila.
Bradner, Wesley K.		——, '75	Bellevue Hosp. M. Col., N. Y.
Bowen, Robert J.	Elizabeth	Feb. 19, '53	American Med. Col., Cin., O.
Boone, William C.	Plainfield	Mar. 4, '72	Maryland Academy, Balt.
Burhans, W. M.			Univ. of Med and Sur., Phila.
Bates, Cornelius S.		Jan. 3, '81	Eclectic M. Col. of Pa., Phila.
Browne, Clifford J.	Linden	——, '63	University of New York.
Braun, Rudolph	Elizabeth	——, '83	N. Y. Col. Phys. and Surg.
Coutin, Gustavus H. B.			New York Medical College.
Crane, Job S.	Elizabeth	Mar.—, '49	N. Y. Col. Phys. and Surg.
Cowan, Isaac F.	Cranford		University of Pennsylvania.
Coles, Jonathan A.		Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Cladek, Walter B.	Rahway	——, '77	University of New York.
Crouthers, Anna J.		Mar. 28, '82	N. Y. Med. Col. for Women.
Dart, James M.	Cranford	——, '75	N. Y. Hom. Med. Col.
Daly, John J.	Rahway	——, '73	Univ. of the City of N. Y.
Drake Lewis			University of Pennsylvania.
Del Risco, J., Jr.		——, '79	N. Y. Col. Phys. and Surg.
Endicott, George W.	Plainfield	——, '75	Jefferson College, Phila., Pa.
Easton, Thomas S.	New York City	Apr. 1, '54	University of Pennsylvania.
Friedrich, Gustavus L.		Dec. 22, '52	Royal U. Fred. William, Prus.
Fritts, John Thomas	Plainfield	Mar. 1, '66	Bellevue Hosp. Med Col.
Field, Chauncey M.	Bound Brook	——, '75	N. Y. Col. Phys. and Surg.
Fortune, David J.	Elizabeth	——, '83	Univ. of the City of N. Y.
Gray, Mrs. E. M.		Feb. 8, '77	Cin. Lit. and Scien. Inst. and Physio-Med. Col.
Green, James S.	Elizabeth	Apr. 5, '51	University of Pennsylvania.
Grier, Joseph H.	Elizabeth	——, '61	University of Pennsylvania.
Grier, Philip H.	Elizabeth	——, '53	University of Pennsylvania.
Grant, Frank S	Plainfield	——, '75	N. Y. Col. Phys. and Surg.
Glen, Irenaeus R.		——, '64	University of Pennsylvania.
Harrison, Joseph B.	Westfield	Mar. 1, '76	N. Y. Col. of Phys. and Surg.

UNION COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Hart, Charles A.	Plainfield	——, '65	New York Medical College.
Holmes, Charles B.	Rahway	——, '74	N. Y. Hom. Med. College.
Hough, H. Page	Rahway		Jefferson College Penna.
Hough, DeWitt Clinton	Rahway	——, '40	Jefferson College Penna.
Hough, Thomas L.	Elizabeth	——, '56	Jefferson College Penna.
Johnson, Phebe R.		——, '80	N. Y. Eclectic Med. Col.
James, Hiram H.	Rahway	——, '63	University of Penna., Phila.
Jobs, Nicholas C.	Springfield	Mar. 3, '74	Columbia College, N. Y.
Johnson, William M.			University of Michigan.
Keeney, Sarah Danforth	Plainfield	Apr. 1, '74	N. Y. Free Med. C. for Wom.
Kirk, Richmond M.		——, '65	Jefferson College Penna.
Kinch, Frederick A.	Westfield	May 13, '51	Med. Soc. of New Jersey.
Kinch, Frederick A., Jr.	Westfield	——, '82	N. Y. Col. of Phys. and Surg.
King, Joseph H.		Jan. 25, '67	Eclec. College Penna., Phila.
King, Joseph H.		June 10, '71	American Univ., Phila., Pa.
Lowrie, Henry H.	Plainfield	——, '63	Georgetown College.
Lawrence, William H.	Summit	——, '77	University City New Orleans.
Long, Monroe B.	Plainfield	Mar. 1, '75	N. Y. College Phys. and Surg.
Larew, Charles		——, '75	Eclectic Med. College, N. Y.
Lukens, Israel	Rahway	Apr. 27, '54	Eclectic Med. College Penna.
Lawrence, B. M.		Dec. 25, '65	N. Y. Hygieo Thera. College.
Morton, Joseph B.	Elizabeth	——, '49	N. Y. College Phys. and Surg.
Mack, William A. M.	Elizabethport	Mar.—, '78	Bellevue Hosp. Med. College.
McLean, Thomas N.	Elizabeth	——, '71	Yale College, New Haven.
Mravlag, Victor	Elizabeth	June 21, '72	University of Vienna, Aust'a.
Martin, Robert G.	Elizabeth	——, '65	Hom. Med. College, Penna.
Mravlag, Lucy A. G.	Elizabeth	Apr. 9, '77	N. Y. Med. College for Wom.
McConnell, Joseph K.		Feb. 25, '68	Starling M. C., Columbus, O.
Miller, William H.			Univ. Vict Col., Coburg, Can.
McKnight, Charles S.		——, '77	N. Y. Col. of Phys. and Surg.
Moorehouse, Elias W.	New Providence		University City of New York.
Morris, James A.		——, '67	Eclectic Med. College, N. Y.
Muller, Dorothea		Apr. 16, '75	Medical Col., Stuttgart, Ger.
Oakley, Lewis W.	Elizabeth	Mar.—, '52	Col. of Phys. and Surg., N. Y.
Oliver, Frederick W.	Rahway	——, '78	Jefferson College Penna.
O'Reilly, Edward R.		Mar. 7, '82	Univ. of the City of N. Y.
Pettit, Alonzo	Elizabeth	Feb.—, '67	University of Buffalo, N. Y.
Pickett, John H.		——, '60	University of Buffalo, N. Y.
Pinneo, Joseph Otis	Elizabeth	——, '65	Col. of Phys. and Surg., N. Y.
Probasco, John B.	Plainfield	Mar. 13, '69	Univ. of Pa. Med. Dept.
Pardee, Howard A.		——, '80	Univ. of the City of N. Y.
Page, Rebecca P.		——, '69	N. Y. Med. Col. for Women.
Pierson, Henry C.		——, '68	M. Dept. of Georgetown Col.
Platt, Joseph H.		——, '56	Hom. Med. Col. Penna.
Risk, William H.	Summit	Mar.—, '66	University of Penna., Phila.
Rushmore, Edward		——, '72	Jefferson College, Penna.
Reed, Rufus		——, '70	Hahneman Med. Col., Phila.
South, Ephraim W.	Plainfield	Feb. 27, '69	Hom. Med. Col., Phila., Pa.
Schleimer, David	Elizabethport	——, '73	Georgetown College.
Stillman, Charles F.	New York City	Mar. 1, '67	Col. of Phys. and Surg., N. Y.
Smith, Theodore V.		——, '73	New York Hom. Col.
Shotwell, John H.	Rahway	Mar. 8, '77	Hom. Col. of Med., N. Y.
Selover, W. U.	Rahway	——, '64	Univ. of the City of N. Y.
Silvers, Elihu B.	Rahway	——, '52	N. Y. Col. Phys. and Surg.
Sprague, Charles G.	Elizabeth	——, '75	New York Hom. Col.
Strong, George W.			(College name not legible).

UNION COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Terrill, Thomas, Jr.	Elizabeth	Mar. —, '67	N. Y. Col. Phys. and Surg.
Tomlinson, Thomas H.	Plainfield	———	University of Penna., Phila.
Taylor, John L.		—— —, '80	Bellevue Hosp. M. Col., N. Y.
Thoenges, Maria		Mar. 10, '47	(College name not legible).
Talmage, Thomas G		—— —, '80	Univ. of the City of N. Y.
Turner, William F.	Elizabeth	—— —, '79	University of Pennsylvania.
Titsworth, Randolph		—— —, '53	Hom. Med. Col., Phila., Pa.
Utter, Albert	Plainfield	—— —, '47	Univ. of the State of N. Y.
Wescott, Robert	Elizabeth	Apr. —, '53	University of Penna., Phila.
Westcott, Francis W.		—— —, '80	Jefferson Med Col., Phila.
Winans, J. Edward		Mar. 4, '75	N. Y. Hom. Col. of Med.
Westlake, W. C.	Rahway	—— —, '72	N. Y. Hom. Col. of Med.
Younglove, John, Jr.	Elizabeth	Mar. 1, '61	Missouri H. M. Col., St. Louis.

WARREN COUNTY.

Brakeley, P. F.	Belvidere	—— —, '42	University of Pennsylvania.
Bieber, E. H.	Phillipsburg	—— —, '48	University of Pennsylvania.
Bieber, L. D.	Phillipsburg	———	University of Pennsylvania.
Baird, William M.	Washington	—— —, '77	Bellevue Medical College.
Barber, Isaac	Phillipsburg	—— —, '79	University of Pennsylvania.
Bartholomew, Cornelius	Stewartsville	—— —, '78	Jefferson College Penna.
Clark, Sam'l G.	Belvidere	—— —, '48	University of New York.
Cline, Charles H.	Polkville	—— —, '80	Jefferson College Penna.
Cline, Garner H.	Harmony	—— —, '51	Med. Soc. of New Jersey.
Cooke, Jno. S.	Hackettstown	—— —, '50	University of Pennsylvania.
Creveling, Philip G.	Broadway	—— —, '58	College of Pennsylvania
Crane, Theodore	Hackettstown	—— —, '55	Col. of Med. and Surg., N. Y.
Cooke, Joseph S.	Washington	—— —, '56	University of Pennsylvania.
Case, Nathan	Reigelsville	—— —, '69	University of New York.
Cox, Henry M.	Port Murray	—— —, '68	University of Michigan.
Crispin, Sam'l D.		—— —, '81	Jefferson College Penna.
Cole, William	Port Colden	—— —, '29	Med. Soc. of New Jersey.
Cook, Frank M.		—— —, '83	Med. and Surg. Col., Md.
Curtis, Joseph W.		—— —, '83	University of Maryland.
Dalrymple, Jos. W.	Bloomsbury	—— —, '77	Columbia College, N. Y.
Dearborne, Geo. S.	Oxford Furnace	—— —, '57	Med. College, Albany, N. Y.
Detweller, Henry	Easton, Pa.	—— —, '36	Friberg College.
Detweller, Jno. J.	Easton, Pa.	—— —, '54	University of Pennsylvania.
Dowd, Edward J.		—— —, '80	Medical College of Baltimore.
Funk, Henry S.	Port Murray	—— —, '78	Jefferson College of Penna.
Gibbs, Aaron L.	Hope	—— —, '79	University of Philadelphia.
Griffith, John H.	Phillipsburg	—— —, '70	Jefferson College of Penna.
Gale, Alfred	Asbury	—— —, '33	Middlebury, Vermont.
Gibbs, Aaron Luce	Hope	—— —, '81	Eclectic Med. Col. of N. Y.
Green, William F.	Hainesburg	—— —, '78	Columbia Med. Col., N. Y.
Herrich, Wm. A.	Washington	—— —, '59	Albany Medical College.
Hartpence, Wm. M.	Oxford Furnace	—— —, '65	Bowdoin College, Maryland.
Hoffman, Ludwic A.		—— —, '80	Hahneman Med. Col., Phila.
Hulshizer, Philip T.	Stewartsville	—— —, '51	Medical College of Penna.
Hoagland, L. B.	Oxford Furnace	—— —, '80	University of Pennsylvania.
Jones, George H.	Phillipsburg	—— —, '70	University of New York.
Johnson, John C.	Blairstown	—— —, '50	Col. of Phys. and Surg., N. Y.
Johnston, Frank	Washington	—— —, '83	Col. of Phys. and Surg., Md.

WARREN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
King, Joseph Henry		—— —, '67	Eclectic Med. College, Penna.
King, Joseph Henry		—— —, '71	University of Philadelphia.
Lee, A. H.	Phillipsburg	—— —, '65	University of Pennsylvania.
Logan, John	Easton, Pa.	—— —, '77	Eclectic Med. Col. of N. Y.
McGee, Wm. H.	Belvidere	—— —, '72	Bellevue Med. Col., N. Y.
McCosh, Samuel A.	Stewartsville	—— —, '74	Jefferson Med College, Pa.
Martin, Alden E.	Hackettstown	—— —, '76	Hahneman Med. Col., Phila.
McKinstry, Frank P.	Washington	—— —, '78	Hahneman Med. Col., Phila.
Mortimore, Samuel E.		———	Eclectic Med. Col. of N. Y.
Osmun, L. M.	Phillipsburg	—— —, '60	Columbia College, D. C.
Osmun, L. C.	Delaware Station	—— —, '60	Columbia College, D. C.
Paul, J. Marshall, Jr.	Belvidere	—— —, '68	University of Pennsylvania.
Power, Edward	Oxford Furnace	—— —, '72	Eclec. Med. Col. of Penna.
Pursel, Peter H.	Phillipsburg	—— —, '64	University of Pennsylvania.
Roe, Jacob I.	Vienna	—— —, '75	Col. of Phys. and Surg., N. Y.
Roe, Wm. I.	Vienna	—— —, '46	Medical Soc. of New Jersey.
Rohrback, Frederich	Johnsonburg	—— —, '67	Bellevue Med. Col., N. Y.
Roseberry, Chas. J.		———	University of Pennsylvania.
Reese, James Mitchell	Phillipsburg	—— —, '83	Bellevue Med. Col., N. Y.
Stewart, Robert A.	Hope	—— —, '78	University of New York.
Shepperd, F. P.	Phillipsburg	—— —, '66	University of New York.
Stites, William	Washington	—— —, '68	University of Pennsylvania.
Swartsweller, Peter E.	Polkville	—— —, '72	University of Pennsylvania.
Sowerby, Joseph John	Washington	—— —, '61	University of Pennsylvania.
Young, G. Cursen	Roxburg	—— —, '76	Eclectic Med. Soc., N. Y.

If any omission is discovered in these lists as sent to us by County Clerks, or any corrections are desired, they should be sent to the Clerks of the respective counties and will be noted in the next report. County Societies should now keep a list of all practitioners, and each year the County Clerks should note changes that they may be certified to this Board. It is to the interest of public health that search should be made as to the validity of all doubtful diplomas, and that all good citizens should see to it that none use the title of "Doctor of Medicine" who are prohibited by law therefrom.

REPORT

OF THE

BUREAU OF VITAL STATISTICS

OF THE

STATE OF NEW JERSEY

FOR THE

Statistical Year from July 1st, 1882, to July 1st, 1883,

WITH ADDITIONAL QUINQUENNIAL TABLES.

DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

By EZRA M. HUNT, M.D., Sc.D.,

Medical Superintendent of Vital Statistics.

INTRODUCTION TO THE REPORT ON VITAL STATISTICS.

The statistics of a nation form the ledger by which it keeps account with itself as to all matters that relate to its solvency, its capital, its progress, its material resources and the condition of its constituency. "No inquiry can assume a scientific form unless it has a numerical basis to work upon." It is equally true that in order to study the social basis of a people in its most practical, social, educational and industrial interests, we must inform ourselves as to those conditions which the facts of figures can alone reveal. An English authority, recently speaking on this subject, says: "The question was taken up more and more enthusiastically by enlightened men, until at last the Government Statistical Department was formed, and that remarkable series of reports begun, which will immortalize the name of William Farr. * * * Those reports disclosed a state of things little dreamt of, and the statistical returns, compiled by Dr. Farr, showed how much the life and the health of the nation were dependent upon the conditions in which its individual members were placed."

Statistics which record the "movement of population" even excel in importance those as to (*a*) territory, (*b*) political, (*c*) agricultural, (*d*) industrial, (*e*) commercial and the intellectual, moral and religious condition. Quintelet has well expressed it when he says: "Population is the statistical element *par excellence;* it necessarily rules all the others since it relates above all to the people and the appreciation of their welfare and their wants. * * * The other data have no real value, except so far as they relate to the number of the population. * * * The classification, according to age, allows of the establishment of tables of population, of forming correct ideas on mortality, on the forces at the disposal of the State in case of necessity and of fixing the ratio between the useful fraction which contributes to the general well-being and the fraction which yet requires assistance and support to become in its time useful. The classification by

professions indicates the means by which the population provides for its subsistence and tends to augment its prosperity; it allows the legislator more particularly to fix his attention on the principal wheels which work in the machine confided to his care. The classification by civil condition, by origin, by education, furnishes the administration with no less precious information to assure internal good order and to facilitate the execution of the laws. All questions which are connected with population deserve in general the greatest attention on the part of the government." This has come to be more and more recognized with each succeeding year. The school system which takes cognizance of all those between the ages of five and eighteen, looks after education not as a charity, but because this care of the population is in the interests of the State. Even to make such a census more valuable we need to know how many are born and what proportion of these reach the age of five years, as well as what causes have been operative in reducing the vigor of those now about to enter on school life. If only the feeble died, there might be an incidental advantage in the preservation of a hardier stock. But unfortunately it is found that the infantile deaths are a measure of the enfeeblement of the surviving young population, so that a low sustained death-rate is the best guaranty for the survival of the fittest and the best assurance that those who do survive will be of such strength as to secure abundance for support. In such a land as this there is far more danger of limiting the means of subsistence by lack of vigor in the population than by lack of vigor in the soil or in the demands of productive industries.

The number of marriages is a very fair index of the general vigor and prosperity of the population. It is found that in hard times, or in times of national profligacy, there is always diminution in the number of marriages. The interests of a State are largely concerned in this social relation, as we shall notice more fully in another connection. Not less does the number of deaths indicate the vigor and prosperity of a country or the opposite. For, besides the actual losses of lives more or less valuable, these tell of a tax upon the comfort of families and of community, and upon their ability to secure a livelihood. It often happens that sickness and death paralyze the industries of a people, and are the severest burden of taxation imposed upon them. Where such a tax is avoidable, as is much of prevalent sickness, the State cannot be better employed than in preventing it. Every prudent attempt in this direction is an application of the principles of political

economy. It is a lack of foresight not to make liberal provision to prevent disease, rather than to cause the liberality to depend upon some violent outbreak. What a great pestilence is to cities and States in its paralyzing and discouraging influence, that is sickness and death to each individual family. The marriage, birth and death-rates are found to bear such a proportion to each other and to be such an index of real prosperity or its opposite, that the historical progress or decline of a nation may be traced thereby. The birth-rate does not become excessive where it is only the result of such a marriage-rate as results from announced, legitimate and open marriages. The marriage-rate tends to a right proportion wherever the family and its preservation, care and prosperity are regarded as the defense of the State. The English reports show how "the marriage-rate reflects with much accuracy the condition of public welfare." Its fluctuations coincide in direction though not in degree with those which indicate the success or depression of agricultural, manufacturing or commercial industries. The death-rate has its definite bounds wherever the care of families is such as enforces a proper oversight of the conditions of life and reduces to the minimum the avoidable causes of disease. It is because such statistics afford the data by which we can study the causes that affect these vital conditions of population, that the significance of vital statistics has in the last half century been greatly augmented. Before this, the value of such records was known as bearing on rights of property; on determining questions of age, as of minority or military service, or pensions, and later in the great interests of life insurance. But it has become evident that such records are essential to those studies of life, of disease and of death, on which hinge the dearest interests of the citizens and of the State.

Spencer Wells well expresses it, when, in his recent Hunterian oration before the Royal College of Surgeons, he says: "The knowledge gained by the statistical work of Dr. Farr, and since carried on by Dr. Ogle, at the General Register Office, has led to sanitary legislation, and sanitary work has been followed by a lower general death-rate and smaller mortality in single forms of disease, and especially in those places—the great towns—where sanitation has been most active."

The value and importance of this study has never been more manifested than in the forty-fourth annual report (1881) of the Registrar-General of births, deaths and marriages in England, as just published (1883). The death-register in 1881 numbered 491,935. The death-

rate was 18.9 per 1,000 living; the death-rate in the urban population, consisting of some fifteen and a half million persons, being 20.3, while that of the rural population, comprising some ten and a half million persons, was 16.8. This not only shows a gradual reduction of death-rate, but also how the greater attention paid to health-matters in cities, and the great powers given by the English laws, aid to bring cities to an approximation to the health of rural districts. In some of our own cities the death-rate is nearly double that of the healthiest country districts. Thus the total death-rate of Hunterdon county last year was 14.77 per 1,000, while that of the cities of over 5,000 inhabitants in Hudson county was 29.994 per 1,000.

The remarks of the Registrar-General are so illustrative, and bear so much on the relations of sanitary practice and of statistics to health, that they are here quoted: "There is nothing in the series of annual reports issued by this office that comes out more distinctly and unmistakably than the wonderful effect which the sanitary operations of the last decade have had in saving life. The public health act came into operation in 1872. The average annual death-rate for the immediately preceding ten years (1862–71) had been 22.6, and there were no indications whatsoever of any tendency of the rate to fall lower. Indeed, in 1871, the final year of this period, the rate was exactly the average, viz., 22.6. The act came into force; and at once the rate began to fall, and continued to fall year by year with almost unbroken regularity, until in 1881 it was, as above stated, no more than 18.9. Once only in the ten years that had elapsed since the act came into operation was the rate as high as the average of the previous decade. That was in 1875, when the rate was 22.7. In that year a second public health act, of more stringent character, came into operation; and from that date down to 1881 the death-rate did not once reach 22.0, and averaged no more than 20.5.

"Had the fall in the death-rate been limited to a single year, or to two years, or even to three, it might have been argued by sceptical persons that the improvement was due to a succession of seasons favorable to health, or to other causes unconnected with sanitary administration, and that the setting-in of the fall coincidently with the coming-into-operation of public health measures was no more than casual; but in face of a fall, lasting for ten years in succession and increasing each year in amount, no one can seriously maintain such a position. There can be no real doubt that the saving effected in life was the direct product of the money and labor expended in

sanitary improvements. Doubtless the money thus expended was enormous in amount; and it will be well therefore to consider what return it has brought in."

"Now we shall probably be well within the mark if we assume that for every fatal case of illness there are from four to five more cases which end in recovery. This is about the proportion in enteric fever, which is a more fatal disease than the average of diseases. The result, therefore, on this assumption would be that, speaking in round numbers, there were 500,000 fewer cases of illness, and 92,000 fewer deaths in England and Wales in 1881 than would have been the case had the population been living under the conditions that existed in 1862–71. It may perhaps be objected, and not unreasonably, that the year 1881, with its extraordinarily low death-rate, was so exceptional that it can hardly be taken as a fair sample by which to measure the annual return in life and health from the moneys spent in sanitary improvements. Let us then take the entire period of ten years that elapsed between the first public health act and the close of 1881. Had the death-rate remained during that period at its mean level in the preceding decade, the total deaths from 1872 to 1881, inclusively, would have been 5,548,116, whereas they were actually no more than 5,155,367. Thus no less than 392,749 persons who, under the old regime, would have died, were, as a matter of fact, still living at the close of 1881.* Add to these saved lives the avoidance of at least four times as many attacks of non-fatal illness, and we have the total profits as yet received from our sanitary expenditure. Moreover, it is important to note that these profits were not equally spread over the ten years, but that there was a manifest tendency to progressive increase throughout the period. This is what might be anticipated, for the full effect of sanitary improvements requires time for development."

So far as this State is concerned, it was among the earliest to make an attempt to secure such statistics. However faulty the methods, there was still some advantage in the attempt. The Legislature, in 1878, adopted the present method of collection and record. It has been so far successful, as that the returns furnished will in accuracy and extent compare favorably with any in this country. There is an effort to fulfill the law on the part of those concerned, with the rarest exceptions. The faithfulness of assessors and city clerks is greatly to be commended. The returns of births are below the standard in cities, and it may yet become necessary to make the law as to these

* The mean birth-rates in the two decades, 1862–71 and 1872–81, were almost exactly the same, so that no correction need be made in this case.

more stringent. Such cities as Paterson and Orange show how fully and accurately returns can be secured. As it is possible from the cities and townships in which the returns are more accurate, and from the death-rate under one year of age, to allow for the deficits, so far as comparisons are concerned and deductions are made, the omission is not as disturbing as would at first sight appear. For if we have a sufficient number of actual returns from which to make large generalizations, the omitted events, which belong to exactly the same species of record, in their differences so balance and modify each other that by mathematical formulas "they may be considered as being numerically in the same ratio as the observed (or recorded) events to which they refer."

In the conduct of the Bureau of Vital Statistics it has been the effort of the Board of Health and the medical superintendent to secure those facts, and only those facts, which the ablest authorities on the subject, both in this and other countries, have regarded as essential for record and preservation. The next effort has been to file them in such manner and to record them in such order as shall make them most readily available either for purposes of legal, or social, or medical or sanitary reference. We were so fortunate as to adopt a system and to place the clerical work in such competent hands as has well accomplished this purpose. The result of the medical oversight of the system is to give an order of return, such as shall render the events recorded comparable, and to see to it that the returns are so arranged as shall enable us more especially to determine the causes of diseases and death. It can also be said that to physicians these returns have an educational and clinical value, as they lead to a closer study of the nomenclature of disease, and so to its diagnosis. This always leads to better treatment and to closer watchfulness over all the events of sickness. This has led also to a great extension of inquiry into the preventable causes of disease, and has been one of the influences in aiding those who have special relations to disease. For it is to be acknowledged that until recently most physicians had not come to estimate either the value or importance of that part of education and observation which should accurately acquaint them with the physical surroundings affecting their patients, and with the bearing which these had upon invalidity or death.

As to how far the statistics thus secured should be tabulated and deductions made therefrom and printed as statistical tables, there are some limitations. Some of the facts are only valuable to reason from

after there has been a very large accumulation in numbers. Others, while aiding much the students of sanitation or the Board in testing its work, do not need the printed page, while others which are felt to be desirable are limited by financial considerations. Work with figures, when the figures are to be interpreted as relating to life, is always expensive, and while wise must not too far outrun the appreciation of the legislator or the physician. Most even of the medical profession have never studied numerical methods in this regard. Although John Hunter had inculcated its methods of precision, it was not until the time of Louis, 1832–60, that the use of the numerical method became authenticated. "This last," says Bowditch, "though not infallible, apparently presented a means for as near an approach to the truth as men could hope to secure in medicine. It is now adopted by some of the best minds as the basis of public hygiene."

While the continuous observation of close observers is always valuable, the value is greatly enhanced if facts have been recorded at the time. Indeed, in a vocation which admits of numerical and clinical statements of occurrences, very few who are competent to make reliable observations will be content to do without this aid to their opinions. Quintelet says: "There are many results that can be derived from a record of vital statistics which it is not always obligatory to attempt to derive. For instance, the fact has been ascertained, after very extended comparisons, that the ratio of male births is such that about 106 male children are born to 100 females; that the number of births is greater in the spring than in the summer months." Although such facts are worth knowing and may have a bearing on questions of national vigor, it is not worth while that the statistics be frequently studied to determine facts of this character. On the other hand, it is important to know how many of those born fail to reach majority, or to live to middle life or other designated age, and why they thus fail. For it is thus that we come to a knowledge of the influences which are prevalent to the shortening of human life. Even where we cannot at once intercept the causes, a knowledge thereof is the first hopeful attainment in that direction. The effort, therefore, of this department has been, first of all, to put on record such facts as to the vital movements of population as are deemed important to be accessible for calculations and determinations which social science and political economy have declared to be desirable, and, next, to select from these for study such facts as have the most direct bearing on the welfare of the people. While our records admit of the whole range

of study which is claimed to be of value, other circumstances indicate the selection to be made.

As to marriages, it is desirable to know what has been the number of them for the last five years, what the nationality of those who have been married, and what the occupations of the husbands, and how far residence in city or country seems to modify the marriage-rate.

Some of the facts as to these will be found fully expressed in the tables.

As to births, the name, place and date of births, are matters of identification, and need only the record, and do not need full tables to be printed therefrom. But the parentage of the children, and the number of children as betokening the average size of families, and the number who have previously died, give some important indication as well as the average birth-rate as compared with the death-rate.

Here again the tables give sufficiently, in detail, the results which five years show.

Still-births not only are something of a measure of the vigor of population, but point us often to certain social conditions that have to do with the limitations of life. While the act of causing abortion comes under the criminal code and not under the law, it is found that a watchfulness over premature and still-births is not less in the interests of private and public morality than an important record of the vital or devitalizing causes of such brief life. We find all authorized practitioners disposed to protect families, themselves and the public from the concealment of such births, while the law does much to deter from that criminality in which the failure to make returns is often the strongest evidence of improper interference. It has been asserted by leading medical practitioners in the State that the requirement of a birth certificate has diminished criminal secrecy, and deters those unfitted for complicated cases from venturing so far to imperil the life of mother and child. The loss of mothers and enforced orphanage always means peril to the State in the direction of thriftlessness, pauperism and crime.

Still more significance is attached to the usual death certificates and the classification of their contents. We therefore have heretofore traced the prevalence of some diseases, as consumption, diarrhœa, etc., besides giving each year details as to all the chief diseases which destroy life. From year to year the facts as to these have been prominently kept before the people as well as before the medical profession, and those Local Boards which have special relations to the care of

disease and of the public health. The attention of physicians is especially called to the importance of acquainting themselves with the classification or nomenclature of disease, as contained in the sixth report, pages 285–90.

The study of the tables, as condensed for the last five years, gives many important facts, illustrating how different localities vary in their death-rates, and shows how important is the study of the causes which affect the vitality of population.

DIVORCES IN THE STATE AND THEIR RELATION TO SOCIAL CONDITIONS.

It is not by mere formal custom or by accident that nations and States have always concerned themselves with some regulative laws as to the marriage relation. This has not been in order to patronize the moralities which center around marriage, but directly to insure to the State a reliable constituency for citizenship. The family, and not the individual, is the governmental unit. A sustained nation in which there would be multitudes of people but no marriage, is an impossibility. Laws have not only in the interests of property, but in the interests of natural existence, undertaken to surround marriage with certain safeguards, and to determine the degrees of relationship in which it may occur. When, as by a large class of citizens, it is not surrounded with the restraints and direction of a sacrament, it has been found necessary to make other special provisions for its solemnization and authentication. All the laws that have obtained in Great Britain, as in some other countries, as to previous notification of marriage, have been based upon the idea that clandestine marriages, or too early marriages, or hasty marriages are not in the interests of society and do not accord with the indispensable ethics of government. Our own laws, which inflict certain penalties upon those who perform marriage for those under age, without the consent of parents, or require their own asseveration of having reached a majority, are but the expression of that unwritten code which realizes that all that relates to matrimonial relationship is an integral and essential consideration in natural prosperity and perpetuity. The requirement of a certificate of marriage and of a permanent registry of the event, if it had no necessity as a legal record or as an aid to the study of population, would still be essential as a token of the State's concern for itself and for those thus about to constitute a family. Some States have carried the idea

so far as to require a tax or forfeit from those who cling to single life, because as a class they are less value to the State.

By tracing the ages at which marriage is consummated, the average lives of those marrying, the number of offspring born or raised, and all matters relating to the permanency of the relation, statisticians have been able to estimate the progressive or retrogressive forces of society and thus to warn us to provide against destructive forces. In connection therewith, divorce and the facts as to it become a necessary subject of inquiry. Consequently for a few years past statisticians and political economists have made investigations as to it in our own country, and have discussed with anxiety the portent of certain prevalent tendencies. This has led an able writer to say that "of the present state of social morality in our own country it must be said that the permanence of the family is seriously threatened. With many defects of the times, such a tendency did not show itself with marked prominence until about the middle of this century in the greater multiplication of demands for divorce. Law for a time yielded to this demand by multiplying the grounds of divorce. Strange as it may seem, this laxity commenced in Connecticut by adding, among other causes, habitual intemperance, intolerable cruelty, "bestiality" and "any such misconduct of the other party as permanently destroys the happiness of the petitioner and defeats the purposes of the marriage relation." Connecticut, in the course of fifteen years, from 1849 to 1864, increased its divorces from 94 to 426, and for the fifteen years following averaged 446 annually. For the last fifteen years, or about to 1880, there had been not quite one divorce for every ten marriages. In Vermont the record for 1878 was one divorce to every fourteen marriages, and Maine and Rhode Island showed the same general increase. Massachusetts, with more accurately compiled statistics, shows that while twenty years ago there was one divorce for every fifty-one marriages, in 1880 the rate was one to twenty-one, while the ratio of marriage to the population had much decreased. The present Governor of Massachusetts makes it a leading subject in his annual message. Indiana, Illinois and Ohio have shown the same tendencies, the State of Ohio, for instance, showing one divorce to every nineteen marriages, and some counties of each of these States surpassing this. In the ratio, too, it would be fair to mostly leave out the Catholic population, since that Church almost ignores the possibility of divorce.

In New York somewhat similar increase has taken place and similar laxity of law has prevailed. At a recent decision of the Court of

Appeals, a divorced defendant, whose remarriage would have been bigamy if married again in that State, is declared legally married because the ceremony was performed in an adjacent State.

In Pennsylvania it has been shown that to every ten marriages there is one divorce. The Court of Common Pleas of Philadelphia has the last year drawn attention thereto. Judge Mitchell said: "There is no doubt that our laws are more lax than even those of Indiana. Unfortunately the judge cannot change the laws." Judge Arnold said: "We shall do our best to eradicate what has become a great evil." It is added that the laws of most of the States need reforming on this subject. In 1878 the divorces in England were one to 300 marriages, which was considered an alarming increase.

It is to the honor of our own State that, much more than most of the surrounding States, it has clung to the sanctity of the family relation. Our system of marriage records has done much to emphasize the fact of State oversight, while some of the restraints upon hasty marriages have not been removed. The courts have, as a rule, been restrictive in their tendencies and viewed marriage as far more than an ordinary contract. Our laws of divorce have not undergone the questionable changes which have occurred in some other States. Full testimony is first taken before a master, and then the Court of Chancery can examine parties, and is strict in the interpretation of the law. The Court of Chancery is searching and strict in its interpretation of the law. Still there have been some undue extensions of facility for family dismemberment. Too often those who perform the ceremony are not careful enough to guard the rights of parents, and the civil right of performing marriages has been unduly extended. The chief need is that there be closer guard against hasty marriages, or marriage of those under age without consent of parents or guardians, and that the number of those authorized to perform the marriage ceremony shall not be inordinately multiplied. Some ministers are too careless in marrying those who marry in haste.

It is because we believe the caution to be timely, and prevention to be much better than an increase of divorces, that we notice the statistics of divorces for the five years since the re-organization of our Bureau of State Statistics. Compare these with the statistics of marriages, since both have to do with the vital oversight of population.

We herewith give a table of the number of divorces which have occurred during the last five years; the number by counties, and the causes for which divorce has been granted.

NUMBER OF DIVORCES GRANTED IN THE STATE OF NEW JERSEY, FOR A PERIOD OF FIVE YEARS, FROM JULY 1st, 1878, TO JULY 1st, 1883, IN YEARLY GROUPS.

Year.	Number Granted.	APPLICANTS.		CAUSES.					
		Husband.	Wife.	Adultery.	Desertion.	Extreme Cruelty.	Bigamy.	Impotence.	Near Relation.
1878–79...	144	59	85	60	78	3	1	2	.....
1879–80...	149	51	98	56	86	6	.....	1	.....
1880–81...	137	50	87	52	79	2	2	1	1*
1881–82...	175	58	117	63	103	5	4	.....	.....
1882–83...	183	56	127	56	115	7	4	1	.....
Totals..	788	274	514	287	461	23	11	5	1

*Married mother-in-law.

NUMBER OF DIVORCES GRANTED BY COUNTIES.

COUNTIES.	1878–79.	1879–80.	1880–81.	1881–82.	1882–83.	Totals.	Population, Census of 1880.
Atlantic.....	.....	1	1	4	6	12	18,704
Bergen.....	4	3	4	5	7	23	36,786
Burlington.....	5	7	5	5	7	29	55,403
Camden.....	9	6	7	7	11	40	62,942
Cape May.....	1	.....	1	.....	2	4	9,765
Cumberland ...	7	5	1	6	3	22	37,687
Essex.....	33	38	41	44	43	199	189,929
Gloucester.....	1	2	2	1	4	10	25,886
Hudson	28	30	17	34	35	144	187,944
Hunterdon.....	2	3	2	2	4	13	38,570
Mercer	9	6	6	17	10	48	58,061
Middlesex	9	6	5	3	8	31	58,286
Monmouth.....	5	7	10	5	6	33	55,538
Morris..... ...	4	2	5	4	4	19	50,861
Ocean	1	1	2	3	2	9	14,455
Passaic	9	14	14	16	12	65	68,860
Salem.....	1	.....	1	.....	4	6	24,579
Somerset.....	2	4	.....	2	4	12	27,162
Sussex.....	1	1	1	2	1	6	23,539
Union.....	10	6	7	6	3	32	55,571
Warren	3	4	1	3	3	14	36,589
Out of State...	.....	3	4	6	4	17	.....
Totals.....	144	149	137	175	183	788	1,131,117

SUMMARY OF MARRIAGES FOR FIVE YEARS, FROM JULY 1st, 1878, TO JULY 1st, 1883.

YEAR.	Marriages.	Supplement of each year.
1878–79.....	7,188	171
1879–80.....	7,935	227
1880–81.....	8,109	257
1881–82.....	8,837	745
1882–83.....	9,116	.....
	41,185	1,400
	1,400	
Totals.....	42,585	

This gives a divorce rate of 18.50 per 1,000 marriages, or 2,000 persons; or, one divorce to every 54 1-24 marriages.

Comparisons with the tables of all the years, as to the number of marriages in each county and with the population, will give further details. The result of these comparisons, and of those with other States, indicates that our system of marriage certificate and of procedure in applications for divorce is mainly correct. But in view of the tendencies and some increase in this State, the conditions and sanctity of marriage should be preserved; the officers performing the ceremony should be those of the higher grades, and the grounds on which divorce is granted should not be multiplied.

CLIMATOLOGY.

The report on this subject last year, as a part of the report of vital statistics, sought to present for permanent reference the ground on which the study of local conditions of climate must rest. In the article on comparative facts in climatology and geology, as needed in the study of vital statistics and the causes of disease, the important facts thus needed as to New Jersey are stated.

This year we complete the full statement of data for five years as to those Stations which are taken to represent the different parts of the State. By reference to these and to former reports all the material is found by which local calculations and comparisons with death-rates can be made.

The places relied upon for our reports are as appears in the tables and in the sixth report.

The tables for Cape May, Barnegat and Sandy Hook were kindly furnished by the Signal Service. The records of New York City, Philadelphia and Easton also admit of comparisons. We are, as before, indebted to the following observers:

I. Newton, Miss E. Foster.
II. Paterson, J. T. Hilton, C.E.
III. Newark, Hon. Wm. A. Whitehead.
IV. New Brunswick, Prof. J. C. Smock.
V. Freehold, Chas. F. Richardson, A.M.
VI. Vineland, John Ingram, M.D.
VII. Cape May and Barnegat, U. S. Signal Service.
VIII. Sandy Hook, U. S. Signal Service.

These tables are deserving of the closest study for the five years, as giving a fair outline of what indicates the weather of each locality. The wonderful range of climate which the State affords cannot but attract attention. There is no other State in the country that affords,

in the same area, so remarkable and ascertainable a diversity. Thus, those who may have occasion to choose climates suited to particular conditions, may here find the climate of the North, that of the extreme South, and such variations as are afforded by soil, protection and special locality.

CONDENSED METEOROLOGICAL RECORDS FOR FIVE STATISTICAL YEARS.

Quinquennial Summaries from July 1st, 1878, to July 1st, 1883, to which is appended a Climatological Table of Means for the State of New Jersey.

STATION, NEWTON, N. J.

Latitude, 41° 2′ 45″ N.; Longitude, 2° 19′ 48″ E. Height of Barometer Cistern above Sea Level, 660 feet.

OBSERVER, MISS E. FOSTER.

	BAROMETER. Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878-79	29.968	28.138	29.287	92.0	-5.0	48.55	41.83	75.49	S.W., N.W.	13.92†	33.0	121	116	13
1879-80	?	?	?	96.0	5.0	53.95	48.83	?	S.W.	?	36.0	83	111	5
1880-81	29.997	28.332	29.167	93.0	-7.9	48.94	48.93	68.53	N.W., S.W.	15.89†	50.45	99	151	11
1881-82	29 983	28.552	29.296	99.0	-6.8	52.44	47.69	72.83	S.W.	43.74	61.5	139	141	30
1882-83	29.932	28.496	29.299	96.1	0.2	50.06	46.03	73.11	S.W., N. E.	41.684	63.7	129	124	25
Mean for 5 years.	29.970	28.379	29.262	95.62	-2.9	50.79	46.66	72.49	S.W.	28.8	48.93	114.2	128.6	16.8
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	115.234	244.65	571	64.3	84
Extremes	29.997	28.138	.....	99.0	-7.9	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow. ? No observation. † Record incomplete.

REMARKS.—*Atmospheric Pressure*—The highest daily mean of the barometer occurred in January, 1881. This locality is not affected by areas of high pressure for a longer period than thirty-six hours. Very low depressions do not occur more than four times in a year, and the most rapid changes in winter are not always accompanied by high winds. The months of January, February and March show the widest range. October to May, 1881-2, show a range greatly in excess of the mean.

Temperature—The months of November and February are the ones most frequently marked by sudden changes. The extremest changes do not occur within a shorter period than six hours. The mean daily range of the above period is 15.9°. Highest monthly range was 66° in April, 1881, being 13° above the mean for that month. August has been the most equable month of all the years.

Humidity—The high humidity of the autumn months causes the first half of each statistical year to show an excess of 3 to 14 per cent. over the latter half. Fogs are mostly the habit of the October, January and February months, those in winter occurring at night.

STATION, CITY HALL, PATERSON, N. J.

Latitude, 40° 55′ N.; Longitude, 74° 11′ W. Height of Rain Gauge above Sea Level, 142 feet.

OBSERVER, JOHN T. HILTON, CITY SURVEYOR.

	BAROMETER. Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878-79	.....	.....	.....	88.0	9.0	50.80	36.40	.....	.....	47.80	36.0	115	.....	.....
1879-80	.....	.....	.....	98.0	5 0	54.33	47.33	.....	.....	45.32	38.0	110	.....	.....
1880-81	.....	.....	.....	93.0	-6.0	50.41	48.33	.....	.....	62 69	47.50	114	.....	.....
1881-82	.....	.....	.....	98.0	-5.0	52.75	40.25	.....	.....	83.48	38.75	130	.....	.....
1882-83	.....	.....	.....	96.0	0.0	49.58	40.83	.....	.....	73.185	59.50	120	.....	.....
Mean for 5 years.	.....	.....	.....	94.6	0.6	51.57	42.63	.....	.....	62.495	43.95	117.8	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	312.475	219.75	589	.....	.....
Extremes	.....	.....	.....	98.0	-6 0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—*Temperature*—January—May, 1880 and 1881, had an extremely wide range. Highest monthly range was in May, 1880, 65°, being 16° above the monthly mean.

Rain-fall—The rain of March, 1881, amounting to 16.11 inches, took place at a period when the ground was frozen solidly, and quickly disappeared through the water-courses, hardly moistening the surface of the earth. The drought of 1881 is attributed to the unequal distribution of the rain-fall. During July, August, September and October, there were 98 days on which no rain fell. In September, 1882, occurred the memorable freshet, during which 18 inches of water fell in less than three days. Paterson has an exceptional topcgraphical position as regards the quantity of water that falls on the basin it occupies.

STATION, NEWARK, N. J.

Latitude, 40° 44′ N.; Longitude, 74° 10′ W. Height of Barometer Cistern above Sea Level, 35 feet.

OBSERVER, W. A. WHITEHEAD.

	BAROMETER. Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878-79	30.78	28.85	29.954	98.25	-2.0	53.73	42.98	.....	N.W., S.W.	46.105	.....	128	99	.....
1879-80	30.70	28.85	30.057	99.25	8.0	53.39	49.63	.....	N.W., S.W.	41.07	.....	94	92	.....
1880-81	30.85	29.17	30.022	96.0	-5.0	49.21	46.80	.....	N.W., S.W.	47.95	.....	115	92	.....
1881-82	30.80	29.35	30.064	100.5	3.0	53.64	44.97	.....	N.W., S.W.	36.32	.....	118	73	.....
1882-83	30.93	29.55	30.130	96.5	2.5	51.24	42.73	.....	N.W.	51.82	41.5	110	149	.....
Mean for 5 years.	30.81	29.15	30.045	98.1	1.3	52.24	45.42	.....	N.W.	44.653	.....	113	101	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	223.265	.....	565	505	.....
Extremes	30.93	28.85	.....	100.5	-5.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—*Atmospheric Pressure*—The annual variations have been slight. 1878-79 had the widest monthly range. The range for June and August, 1879, was greatly in excess of the mean.

Temperature—The mean daily range for the above period is 17.4°. Greatest monthly range was 61° in May, 1880, being nearly 9° above the monthly mean. September, 1881, recorded a maximum of 100.5° and a mean of 73.72°. The months of the fourth statistical year show the least deviation from the mean range.

STATION, AGRICULTURAL COLLEGE FARM, NEW BRUNSWICK, N. J.

Latitude, 40° 29′ N.; Longitude, 74° 26′ W., or 2° 37′ E. Height, 115 feet.

OBSERVER, THEODORE WEST.

	BAROMETER, Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878-79	.....	.....	.....	95.0	-8.0	50.12	43.41	.....	W. S.W.	39.83	.....	.....	.....	.....
1879-80	.....	.....	.....	98.0	5.0	52.83	50.58	.....	W. S.W.	29.33	.....	.....	.....	.....
1880-81	.....	.....	.....	95.0	-8.0	48.66	45.08	.....	W., S.	44.93	.....	.....	.....	.....
1881-82	.....	.....	.....	103.0	-3.0	52 19	43.58	.....	W. S.W.	34.78	.....	.....	.....	.....
1882-83	.....	.....	.....	95.0	3.0	47.87	44.41	.....	E., W. S.W.	49.12	.....	.....	.....	.....
Mean for 5 years.	.....	.....	.....	97.2	-2.2	50.33	45.41	.....	W. S.W.	39.598	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	197.99	.....	.....	.....	.....
Extremes.	.....	.....	.....	103.0	-8.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—*Temperature*—The winter months show wide ranges. The winters of 1878-79, 1880-81, and 1881-82, were more severe than usual. That of 1880-81 began in November and continued 153 days, of average temperature of 29.2°, (November 22d, 1880, to April 23d, 1881.) Heavy snowfalls; good sleighing for six weeks. Spring of 1879 marked by great changes of temperature. Greatest monthly range, 61°, in May, 1880—8.6° above the average. Rainfall of winter and spring, 1880, much below the mean. Autumn, 1881, noted for its long and severe drought. There was a high percentage of easterly winds in July, August, September and October, 1882.

STATION, FREEHOLD, N. J.

Latitude, 40° 15′ N.; Longitude, 74° 16′ W. Height of Barometer Cistern above Sea Level, 216 feet.

OBSERVER, CHAS. F. RICHARDSON.

	BAROMETER. Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878-79	30.47	28.78	29.74	95.0	-3.0	50.74	44.47	77.14	W.	48.43	27.07	157	84	48
1879-80	30.50	29.24	29.88	97.0	8.0	53.52	52.00	76.33	W.	41.84	35.70	119	84	45
1880-81	30.53	28 97	29.81	91.0	-11.0	48.55	48.33	77.14	N.W.	61.49	79.70	132	100	46
1881-82	30.51	29.14	29.84	102.0	-3.0	51.69	47.68	75 97	W.	41.11	50.74	144	100	37
1882-83	30.44	29.06	29.75	96.0	1.0	49.75	45.60	77.42	W.	51.87	43.50	139	88	41
Mean for 5 years.	30.49	29.03	29.804	96.2	-1.6	50.85	47.61	76.80	W.	48.95	47 34	128.2	91.2	43.4
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	244.74	236.71	691	456	217
Extremes.	30.53	28.78	.....	102.0	-11.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—*Atmospheric Pressure*—The mean monthly range of the barometer is low. October to May, 1881-82, show a range slightly in excess of the mean.

Temperature—Excepting July and August, all the months have a wide range. The highest monthly range was 63° in May, 1880, while the greatest excess of the mean range was in December, 1880, being 10.4° above the average. There has been a notable increase of the rain-fall in the winter months.

STATION, VINELAND, N. J.

Latitude, 39° 29′ N.; Longitude, 75° 01′ W. Height of Barometer Cistern above Sea Level, 111 feet.

OBSERVER, J. INGRAM, M.D.

	BAROMETER, Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy days.	Thunder and Lightning on Days.
1878-79	30.60	28.66	29.89	96.0	-4.0	52.88	46.75	76.41	S.W.	45.10	11.50	90	.....	.....
1879-80	30.59	29.01	29.91	97.0	10.0	57.07	55.16	73.00	S.W.	47.00	26.25	105	.....	.....
1880-81	30.60	28.88	29.84	98.0	-10.5	50.02	50.87	72.00	S W.	59.99	67.00	102	.....	.....
1881-82	30.67	29.06	29.94	104.0	0.0	56.17	49.16	65.42	S.W.	40.59	26 00	99	.....	.....
1882-83	30.61	29 14	29.92	96.0	4.0	53 37	44.66	66.00	S.W., N.W.	54.11	31.75	108	.....	.....
Mean for 5 years.	30.61	28.95	29.90	98.2	-0.1	53.90	49.32	69 96	S W.	49.36	32.5	100.8	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	246.79	162 5	504	.....	.....
Extremes.	30.67	28.66	.....	104.0	-10.5	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—*Atmospheric Pressure*—The first and fifth statistical years are near the average. October to March (inclusive) have a wide range in all the years, excepting December and January, 1879-80.

Temperature—The year 1878-79 is near the average, while 1879-80 is above the average by 8 per cent, and over 13 per cent. above 1880-81. The winter of 1880-81 was of extraordinary severity. There were 128 frosty days, and 51 days during which the temperature was below 32° for the entire day; and during the months of December, 1880, and January and February, 1881, the mean temperature was 27.16°, with extremes of 58° and —10.5°. These fluctuations in temperature have given an extremely wide and variable range to the above series. January, 1879, had a monthly range of 67°, 11.5° above the mean. The drought of 1881 was severe and long continued.

STATION, CAPE MAY, N. J.

Latitude, 38° 56′ N.; Longitude, 74° 58′ W. Height of Barometer Cistern above Sea Level, 27 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER. Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878-79	30.74	28.84	29 998	90 0	1.0	53.83	37.33	74.74	N.W.	42.44	.....	116	103	.....
1879-80	30.81	29.24	30.060	89.0	12.0	57.05	39.50	74.61	S	50 91	.....	125	105	.....
1880-81	30.78	29.03	30.000	90.0	2.0	52.20	37.83	75.40	N W.	60.54	.....	144	130	.....
1881-82	30.84	29.18	30.038	87.0	5.0	56 33	35.66	75.46	N W.	40 37	.....	144	125	.....
1882-83	30.74	29.28	30.043	86.0	11.0	54.71	32.50	77.10	S.	54.83	.....	127	78	.....
Mean for 5 years.	30.78	29.11	30.027	88.4	6.2	54.82	36.56	75.46	N.W.	49.81	.....	131.2	108.2	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	249.09	.....	656	541	.....
Extremes.	30.84	28.84	.....	90.0	1.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—The mean temperature of the winter months is 36.87°, the second statistical year having the highest, and the third the lowest mean. The higher annual mean of 1879-80 is doubtless owing to the increase of temperature of the winter months.

The above record gives expression to the same results reached by careful comparison of months, years and seasons. For evenness of pressure, temperature and moisture, Cape May has been justly indicated as a remarkable locality.

STATION, BARNEGAT, N. J.

Latitude, 39° 48′ N.; Longitude, 74° 9′ W. Height of Barometer Cistern above Sea Level, 20 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878-79	30.76	28.80	29.996	94.0	-1.0	50.61	39.25	78.84	N.W.	49.38	.....	148	91	.....
1879-80	30.79	29.09	30.060	96.0	10.0	53.40	36.08	78.72	N.W.	47.27	.....	153	107	.....
1880-81	30.78	29.03	30.002	94.0	-7.0	49.06	44.50	78.58	N.W.	60.13	.....	158	128	.....
1881-82	30.82	29.12	30.045	96.0	-1.0	53.03	40.81	78.89	S., N.W.	58.85	.....	139	118	.....
1882-83	30.78	29.12	30.043	92.5	6.4	51.90	36.37	79.29	E., N.W.	59.78	.....	143	110	.....
Mean for 5 years.	30.78	29.03	30.029	94.5	1.48	51.60	39.40	78.86	N.W.	55.08	.....	148.2	110.8	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	275.41	.....	741	554	.....
Extremes	30.82	28.80	.....	96.0	-7.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—The monthly ranges have been equable, excepting in January, February and March. Greatest monthly range 62° in January, 1879, is 17° above the mean. The range of the winter months in 1880 was low. The mean temperature of the winter months is 35.28°. The first, third and fifth statistical years were below the mean.

Rains were well distributed by months, excepting through the summer of 1881.

STATION, SANDY HOOK, N. J.

Latitude, 40° 28′ N.; Longitude, 74° 1′ W. Height of Barometer Cistern above Sea Level, 28 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878-79	30.75	28.77	29.978	97.0	-3.0	51.60	49.41	73.68	W.	60.37	.....	127	118	.....
1879-80	30.77	29.33	30.044	96.0	10.0	55.16	46.25	72.56	S.W., N.W.	46.75	.....	118	118	.....
1880-81	30.80	29.02	29.994	92.0	-5.0	50.64	44 40	73.62	N W.	53.14	.....	126	102	.....
1881-82	30.82	29.21	30.040	101.0	0 0	54.50	41.23	74.26	N.W.	46.20	.....	140	95	.....
1882-83	30.75	29.24	30.045	92.5	3.0	52.00	40.20	76.15	N. E., S. E.	48.23	.....	124	88	.....
Mean for 5 yrs.	30.77	29.11	30.02	95.7	1.0	52.78	42.49	74.05	N.W.	50.938	.....	127	104.2	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	254.69	.....	635	521	.....
Extremes	30.82	28.77	.....	101.0	-5.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Including melted snow.

REMARKS.—The monthly ranges were very equable. Mean temperature of the winter months is 36.85°. The first, third and fifth statistical years were below the mean, although the variations from the mean were not so extreme as at coast stations farther southward.

CLIMATE OF NEW JERSEY.

Table of Means for the Period from July 1st, 1878, to July 1st, 1883—Five Years.

STATIONS.	Altitude.	BAROMETER. Reduced to 32°.				THERMOMETER.				Mean Humidity.	Rain and Melted Snow.	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.
		Max.	Min.	Mean.	Monthly Range.	Max.	Min.	Mean.	Monthly Range.					
Newton	660	29.97	28.37	29.362	1.038	95.6	-2.9	50.79	46.66	72.49	28 80	43.93	114.2	128.6
Paterson	60	.....	.....	.....	.....	94.6	0.6	51.57	42.63	.....	62.495	43.95	117.8	.....
Newark	35	30.81	29.15	30.045	.898	98.1	1.3	52.24	45.42	.....	44.653	.....	113 0	101.0
New Brunswick	90	.....	.....	.....	.....	97.2	-2.2	50.33	45.41	.....	39.598	.....	.....	.....
Freehold	190	30.49	29.03	29.804	.844	96.2	-1.6	50.85	47 61	76.80	48.95	47.34	138.2	91.2
Vineland	119	30.61	28.95	29.900	.915	98.2	-0.1	53.90	49.32	69.96	49.36	32.50	100.8	.....
Cape May	27	30.78	29 11	30.027	.929	88.4	6.2	54.82	36.56	75.46	49.81	.....	131.2	108.2
Barnegat	20	30 78	29.03	30.029	.991	94.5	1.48	51.60	39.40	78.86	55.08	.....	148.2	110.8
Sandy Hook	28	30.77	29.11	30.020	.964	95.7	1.0	52.78	42.49	74.05	50.938	.....	127 0	104.2
For the State	.....	30.60	28.96	29.884	.9398	95.39	0.42	52.19	43.94	74.62	47.74	43.18	123.8	107.3

NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY TOWNSHIPS.

FOR THE YEAR ENDING JUNE 30, 1883.

ATLANTIC COUNTY.

	M.	B.	D.
Absecon	7	10	12
Atlantic City	67	100	144
Buena Vista	1	18	12
Egg Harbor City	22	39	23
Egg Harbor Township	32	66	56
Galloway	4	34	34
Hamilton	7	32	28
Hammonton	13	38	25
Mullica	2	12	19
Weymouth	3	13	8
	158	362	361

BERGEN COUNTY.

	M.	B.	D.
Englewood	15	37	67
Franklin	12	42	28
Harrington	7	21	39
Hohokus	18	52	35
Lodi	15	77	71
Midland	12	28	33
New Barbadoes	41	125	102
Palisade	10	25	43
Ridgefield	15	84	64
Ridgewood	9	18	35
Saddle River	2	28	24
Union	8	81	52
Washington	9	58	49
	173	676	642

BURLINGTON COUNTY.

	M.	B.	D.
Bass River	2	19	10
Beverly	17	21	46
Bordentown	58	136	90
Burlington City	54	132	134
Chester	31	61	30
Chesterfield	8	16	25
Cinnaminson	9	48	34
Delran	14	13	25
Eastampton	1	15	11
Evesham	10	33	34
Florence	9	49	24
Little Egg Harbor	15	54	25
Lumberton	4	17	10
Mansfield	12	34	21
Medford	9	38	37
Mt. Laurel	1	21	20
New Hanover	18	34	37
Northampton	61	88	92
Pemberton	26	56	49
Randolph	4	10	6
Shamong	5	5	13
Southampton	11	43	16
Springfield	3	40	14
Washington	1	11	8
Westampton	1	9	7
Willingboro	1	13	10
Woodland	1	5	2
	386	1,021	830

CAMDEN COUNTY.

	M.	B.	D.
Camden	451	762	834
Centre	5	35	39
Delaware	3	20	23
Gloucester City	44	134	117
Gloucester	14	75	77
Haddon	20	59	52
Stockton	7	60	77
Waterford	12	36	35
Winslow	16	43	37
	572	1,224	1,291

CAPE MAY COUNTY.

	M.	B.	D.
Cape May City	11	54	27
Dennis	7	36	22
Lower	15	49	20
Middle	10	47	40
Upper	10	29	22
	53	215	131

CUMBERLAND COUNTY.

	M.	B.	D.
Bridgeton	90	255	135
Commercial	11	15	30
Deerfield	17	21	26
Downe	14	25	13
Fairfield	25	72	35
Greenwich	10	21	12
Hopewell	9	35	20
Landis	51	142	93
Maurice River	10	47	36
Millville	71	244	140
Stoe Creek	5	26	10
	313	903	550

ESSEX COUNTY.

	M.	B.	D.
Belleville	16	68	54
Bloomfield	44	155	102
Caldwell	10	33	37
Clinton	18	50	39
East Orange	31	199	127
Franklin	10	29	26
Livingston	6	10	13
Milburn	9	41	35
Montclair	31	147	80
Newark	1,338	3,952	3,480
Orange	123	418	288
South Orange	19	78	53
West Orange	7	62	60
	1,662	5,242	4,394

GLOUCESTER COUNTY.

	M.	B.	D.
Clayton	17	49	22
Deptford		39	30
East Greenwich	9	19	26
Franklin	11	61	42
Glassboro	25	59	43
Greenwich	12	47	19
Harrison	12	59	37
Logan	1	26	22
Mantua	9	43	19
Monroe	14	46	28
South Harrison		1	
Washington	7	25	23
West Deptford	2	19	14
Woodbury	30	65	52
Woolwich	16	52	30
	165	610	407

HUDSON COUNTY.

	M.	B.	D.
Bayonne	61	251	196
Guttenberg	13	43	26
Harrison	31	164	153
Hoboken	349	783	803
Jersey City	948	1,571	3,108
Kearny	8	33	40
North Bergen	19	50	237
Town of Union	83	174	209
Union	2	44	37
Weehawken	64	15	35
West Hoboken	.....	171	152
	1,578	3,299	4,996

HUNTERDON COUNTY.

	M.	B.	D.
Alexandria	4	16	17
Bethlehem	13	40	28
Clinton	4	21	20
Delaware	29	60	44
East Amwell	18	30	17
Franklin	15	31	18
Frenchtown	13	19	26
High Bridge	7	39	35
Holland	8	24	30
Kingwood	11	28	29
Lambertville	47	81	57
Lebanon	25	61	48
Raritan	18	48	72
Readington	16	60	37
Tewksbury	12	36	34
Town of Clinton	10	17	13
Union	9	6	15
West Amwell	2	12	9
	261	629	549

MERCER COUNTY.

	M.	B.	D.
Chambersburg	47	163	119
East Windsor	26	24	39
Ewing	8	20	81
Hamilton	10	66	94
Hopewell	22	65	60
Lawrence	6	26	28
Millham	4	68	43
Princeton	27	61	75
Trenton	347	633	622
Washington	.....	15	14
West Windsor	5	27	13
	502	1,168	1,188

MIDDLESEX COUNTY.

	M.	B.	D.
Cranbury	16	39	20
East Brunswick	31	71	50
Madison	1	25	21
Monroe	23	45	37
New Brunswick	150	432	460
North Brunswick	13	28	13
Perth Amboy	55	216	139
Piscataway	27	63	59
Raritan	20	49	56
Sayreville	21	20	24
South Amboy	31	74	69
South Brunswick	9	48	49
Woodbridge	23	85	88
	420	1,195	1,085

MONMOUTH COUNTY.

	M.	B.	D.
Atlantic	6	20	20
Eatontown	24	42	54
Freehold	45	89	74
Holmdel	7	22	23
Howell	38	58	50
Manalapan	17	27	41
Marlboro	14	31	32
Matawan	25	57	69
Middletown	32	65	67
Millstone	12	25	23
Neptune	54	123	136
Ocean	63	204	133
Raritan	51	106	90
Shrewsbury	40	114	117
Upper Freehold	25	57	42
Wall	48	134	67
	501	1,174	1,028

MORRIS COUNTY.

	M.	B.	D.
Boonton	27	81	65
Chatham	25	56	73
Chester	20	65	34
Hanover	19	46	105
Jefferson	9	14	31
Mendham	15	20	29
Montville	7	19	22
Morristown	48	119	198
Mt. Olive	18	45	36
Passaic	9	10	16
Pequannock	10	72	38
Randolph	71	210	131
Rockaway	33	151	112
Roxbury	16	51	39
Washington	14	54	48
	341	1,013	977

OCEAN COUNTY.

	M.	B.	D.
Berkeley	.....	22	12
Brick	21	33	26
Dover	20	65	27
Eagleswood	5	10	7
Jackson	10	39	28
Lacey	4	22	13
Manchester	6	20	18
Ocean	1	7	12
Plumsted	8	38	23
Stafford	17	21	22
Union	15	17	15
	107	294	203

PASSAIC COUNTY.

	M.	B.	D.
Acquackanonk	6	34	24
Little Falls	13	15	38
Manchester	.....	19	15
Passaic	67	247	136
Paterson	594	1,617	1,415
Pompton	25	37	35
Wayne	2	47	21
West Milford	24	57	25
	731	2,073	1,709

SALEM COUNTY.

	M.	B.	D.
Elsinboro	.....	9	10
Lower Alloways Creek	4	18	13
Lower Penn's Neck	7	9	26
Mannington	3	15	44
Oldmans	11	29	27
Pilesgrove	21	56	59
Pittsgrove	16	52	32
Quinton	2	25	24
Salem	50	115	117
Upper Alloways Creek	8	31	21
Upper Penn's Neck	22	38	25
Upper Pittsgrove	9	29	18
	153	426	416

SOMERSET COUNTY.

	M.	B.	D.
Bedminster	8	41	35
Bernards	15	42	28
Branchburg	8	16	11
Bridgewater	71	150	153
Franklin	19	38	69
Hillsborough	17	59	51
Montgomery	12	45	33
North Plainfield	13	57	48
Warren	5	19	21
	168	467	449

SUSSEX COUNTY.

	M.	B.	D.
Andover	10	13	21
Byram	18	33	21
Frankford	18	18	35
Green	8	15	3
Hardyston	14	3	28
Hampton	4	10	13
Lafayette	6	5	5
Montague	7	2	3
Newton	30	29	39
Sandyston	7	9	14
Sparta	21	19	41
Stillwater	18	30	12
Vernon	12	20	20
Walpack	6	3	3
Wantage	19	40	57
	198	249	315

UNION COUNTY.

	M.	B.	D.
Clark	.....	1	7
Cranford	6	18	12
Elizabeth	241	831	686
Fanwood	.....	25	24
Linden	13	30	32
New Providence	2	19	12
Plainfield	57	191	161
Rahway	56	117	131
Springfield	4	21	12
Summit	11	46	38
Union	11	27	35
Westfield	16	42	38
	417	1,368	1,188

WARREN COUNTY.

	M.	B.	D.
Allamuchy	.....	4	2
Belvidere	12	31	35
Blairstown	16	30	22
Franklin	18	23	19
Frelinghuysen	8	10	8
Greenwich	15	17	18
Hackettstown	40	55	48
Hardwick	1	8	5
Harmony	9	29	14
Hope	8	38	28
Independence	14	5	13
Knowlton	17	31	17
Lopatcong	2	36	23
Mansfield	4	21	27
Oxford	26	123	81
Pahaquarry	3	7	3
Phillipsburg	82	251	147
Pohatcong	7	32	20
Washington Borough	18	56	36
Washington Township	7	15	25
	307	822	591

TOTALS OF MARRIAGES, BIRTHS AND DEATHS FOR ALL THE COUNTIES.

	M.	B.	D.
Atlantic	158	362	361
Bergen	173	676	642
Burlington	386	1,021	880
Camden	572	1,224	1,291
Cape May	53	215	131
Cumberland	313	903	550
Essex	1,662	5,242	4,394
Gloucester	165	610	407
Hudson	1,578	3,299	4,996
Hunterdon	261	629	549
Mercer	502	1,168	1,188
Middlesex	420	1,195	1,085
Monmouth	501	1,174	1,038
Morris	341	1,013	977
Ocean	107	294	203
Passaic	731	2,073	1,709
Salem	153	426	416
Somerset	168	467	449
Sussex	198	249	315
Union	417	1,368	1,188
Warren	307	822	591
	9,166	24,430	23,310

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, 1883.

COUNTIES. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undetermined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrhœal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Atlantic	88	53	27	104	88	361	18,701	19.30	2	6	.....	2	1	1	17	58	115	109	184	154	81	51	56	10	49	13	.....	4	13
Bergen	136	91	60	172	178	642	36,796	17.45	12	8	.....	18	4	4	26	58	95	30	56	18	19	15	33	4	223	87	9	53	140
Burlington	168	85	61	261	247	830	55,403	14.98	10	26	4	4	1	9	71	71	69	71	102	51	68	37	82	2	23	12	.....	2	17
Camden	313	162	122	396	255	1,291	62,942	20.51	18	50	1	30	1	6	46	54	123	70	143	66	31	22	102	6	41	80	1	49	247
Cape May	30	7	9	39	44	131	9,765	13.41	2	4	.....	1	.....	.....	5	14	22	17	26	13	6	7	15	1	18	9	1	8	18
Cumberland	129	39	64	145	106	500	37,687	14.59	.....	26	.....	8	1	.....	17	58	268	115	109	184	154	81	51	56	4	51	29	5	15	46
Essex	1046	618	469	1414	774	4,394	189,929	23.13	46	101	1	300	18	53	210	437	45	25	30	56	18	15	44	33	38	87	10	53	6	49
Gloucester	80	61	34	115	120	407	25,886	15.72	3	6	.....	3	4	1	14	47	47	12	32	24	12	11	26	2	18	12	.....	2	2	2
Hudson	1268	1005	486	1006	581	4,996	187,944	26.58	56	114	4	210	68	4	319	651	309	216	300	481	216	149	226	18	227	80	1	49	247
Hunterdon	87	62	61	136	198	549	38,570	14.23	7	11	.....	25	4	2	35	62	20	37	55	21	38	18	57	4	21	9	1	8	18
Mercer	243	146	113	377	287	1,188	58,061	20.46	9	32	2	14	2	2	71	128	102	75	107	65	55	42	104	4	51	27	6	5	46
Middlesex	232	162	123	312	226	1,085	52,296	20.75	7	21	.....	31	5	1	104	137	70	79	121	61	44	43	67	2	38	25	1	2	49
Monmouth	216	113	98	298	287	1,038	55,538	18.69	9	24	.....	18	1	4	52	123	69	71	102	51	68	37	82	3	41	28	1	9	45
Morris	176	121	107	271	271	977	50,861	19.21	20	24	.....	37	4	3	70	60	56	143	70	66	31	22	102	6	41	28	4	7	33	6
Ocean	46	16	23	63	63	203	14,455	14.04	.....	4	1	5	.....	.....	22	17	26	16	26	13	6	7	15	1	6	2	.....	3	7	3
Passaic	496	254	171	489	285	1,709	68,860	21.82	32	43	39	42	4	25	41	268	115	109	184	154	81	51	56	4	51	29	5	15	50
Salem	97	35	40	112	127	416	24,579	16.92	2	7	2	1	2	2	12	45	25	30	56	18	15	33	49	2	13	16	2	3	13	2
Somerset	80	53	36	122	155	449	27,162	16.53	11	11	.....	10	5	5	15	41	22	29	63	28	10	16	40	1	18	10	.....	1	13	1
Sussex	38	30	33	110	100	315	23,539	13.38	8	9	.....	4	1	1	23	16	25	17	36	22	11	11	28	3	16	11	1	1	16	1
Union	260	195	146	342	238	1,188	55,571	21.37	21	26	.....	60	.....	2	46	140	79	76	148	88	74	24	53	3	33	5	22	1	9	8
Warren	119	84	55	176	147	591	36,589	16.15	7	11	.....	27	7	.....	29	49	28	37	74	39	25	17	50	1	17	8	.....	4	9	5
Totals	5378	3412	2339	7060	4827	23,316	1,131,117	20.60	290	564	54	853	131	189	1146	2656	1527	1594	2756	1683	1235	759	1562	90	923	461	33	198	907	35

Death-rate per 1,000 from these diseases, exclusive of accidents, 19.80. Note that consumption has two columns.

Return of Deaths from all Causes and Certain Specified Diseases, in the Cities of the State of New Jersey, of over 5,000 Population, for the Year ending June 30th, 1883.

Cities Having Over 5,000 Population. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulat'n.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intest'l diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic County.																													
Atlantic City	46	27	11	39	21	144	5,477	*26.29	.....	3	.....	.....	.....	1	16	29	9	9	10	10	10	2	8	10	3	4	.....	3	5
Burlington County.																													
Bordentown	16	11	11	28	23	90	5,334	16.87	1	1	.....	1	1	.....	6	.....	7	8	8	6	9	2	8	1	1	3	.....	1	1
Burlington	20	19	9	46	39	134	7,237	18.51	.....	2	1	.....	.....	.....	3	6	5	18	12	9	11	7	12	.....	5	5	.....	1	8
Camden County.																													
Camden City	229	111	78	265	145	834	41,659	20 01	13	39	1	18	1	2	30	111	50	63	66	64	51	20	68	2	16	15	1	2	21
Gloucester City	33	14	16	30	20	117	5,347	21.88	1	1	.....	2	.....	1	4	17	5	7	12	7	7	3	5	.....	.....	1	.....	2	6
Cumberland County.																													
Bridgeton	30	6	19	35	41	135	8,722	15.48	.....	11	.....	.....	.....	.....	2	12	7	13	21	9	11	1	13	.....	9	1	.....	1	5
Millville	39	13	24	44	22	140	7,660	18.27	.....	4	.....	6	.....	1	9	19	11	17	17	5	6	6	6	2	3	4	.....	1	2
Essex County.																													
Newark	830	531	393	1135	576	3,480	136,508	25.49	30	89	1	271	8	37	182	354	297	245	404	254	157	135	237	14	167	60	9	39	115
Orange	78	41	26	94	44	288	13,207	21.80	1	4	.....	16	2	5	7	25	28	23	47	25	12	9	9	2	17	7	.....	4	8
Hudson County.																													
Bayonne	57	39	19	62	19	196	9,372	20.91	1	4	.....	3	1	3	9	40	7	14	25	19	6	7	8	1	8	3	.....	.....	16
Harrison	40	28	17	47	20	153	6,898	22.18	2	13	.....	18	.....	4	3	19	10	8	15	16	2	2	6	1	4	1	1	2	9
Hoboken	213	165	61	294	69	803	30,999	25.90	3	14	1	26	4	3	61	111	57	45	102	79	45	21	39	6	34	17	.....	11	40
Jersey City	773	633	313	980	372	3,108	120,722	25.74	29	65	2	150	52	34	178	403	171	194	412	314	133	85	135	10	164	48	.....	29	151
Town of Union	56	60	37	39	17	209	5,849	35.73	6	4	.....	3	4	1	52	24	14	8	30	18	8	4	7	.....	4	4	.....	1	2
Mercer County.																													
Chambersburg	31	16	19	27	20	119	5,437	21.88	1	7	.....	.....	.....	.....	14	16	8	4	13	9	3	4	7	.....	6	1	.....	.....	.....
Trenton	144	100	59	183	124	622	29,910	20.79	7	16	2	14	2	2	42	75	69	37	53	38	27	17	38	2	28	12	4	3	26
Middlesex County.																													
New Brunswick	103	85	62	119	86	460	17,166	26.79	2	7	.....	23	4	6	61	55	28	32	52	20	14	25	22	2	16	11	.....	1	16
Morris County.																													
Morristown	27	34	24	51	60	198	6,837	28 96	5	2	.....	2	1	.....	17	16	11	15	37	13	8	5	18	1	2	6	.....	2	5
Passaic County.																													
Passaic	41	26	15	33	20	136	6,532	20.82	1	7	.....	6	.....	4	2	22	4	10	15	11	9	5	3	.....	1	2	1	2	7
Paterson	416	210	143	409	225	1,415	51,031	27.72	20	31	39	35	4	18	38	224	100	90	154	132	60	42	45	1	42	25	4	11	32
Salem County.																													
Salem City	27	8	9	35	39	117	5,056	23.14	2	.....	2	.....	.....	1	4	8	10	10	20	6	5	5	16	.....	3	2	.....	1	3
Union County.																													
Elizabeth	166	141	91	174	111	686	28,229	24 30	11	13	.....	48	1	8	31	92	43	39	76	62	40	13	23	2	22	11	.....	3	33
Plainfield	43	23	18	45	32	161	8,125	19.81	.....	2	.....	3	.....	1	7	29	11	11	23	9	9	5	2	.....	4	5	1	2	6
Rahway	23	10	15	43	36	131	6,455	20.29	3	2	.....	6	.....	.....	2	15	10	15	16	8	6	4	10	.....	2	3	.....	1	4
Warren County.																													
Phillipsburg	39	34	9	38	21	147	7,181	20.46	1	3	.....	6	2	.....	21	17	7	7	11	9	3	1	13	.....	3	1	.....	1	6
Totals	3520	2385	1498	4295	2202	14,023	576,950	24 30	140	344	49	657	87	132	801	1739	969	942	1651	1152	652	430	758	57	564	252	21	124	527

Death-rate per 1,000, from these diseases, exclusive of accidents, 23.39. *See note page 349.

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, 1883.

Atlantic County. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Absecon	3	3	2	3	1	12	507	.....	.....	.....	.....	.....	.....	.....	.....	2	3	1	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....
Atlantic City	46	27	11	39	21	144	5,477	*26.29	.....	3	.....	.....	.....	1	16	29	9	9	10	10	10	2	8	12	3	4	.....	3	5
Buena Vista	1	3	1	1	6	12	885	.....	.....	.....	.....	.....	.....	.....	3	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Egg Harbor City	5	3	3	5	7	23	1,232	.....	.....	.....	.....	.....	1	.....	1	4	.....	.....	2	4	.....	1	2	.....	2	1	.....	.....	.....
Egg Harbor Township	12	8	.....	22	14	56	3,568	.....	1	.....	.....	.....	.....	.....	1	8	3	6	7	2	5	4	4	.....	1	1	.....	1	1
Galloway	7	3	1	14	9	34	2,337	.....	.....	2	.....	.....	.....	.....	.....	2	2	2	2	2	3	5	.....	.....	1	.....	.....	.....	.....
Hamilton	4	3	4	6	10	28	1,464	.....	.....	.....	.....	.....	.....	.....	3	3	4	3	2	1	2	1	2	.....	1	1	.....	1	.....
Hammonton	4	2	1	9	9	25	1,776	.....	1	1	.....	1	.....	.....	.....	1	4	.....	1	1	1	.....	1	.....	2	2	.....	.....	1
Mullica	3	1	3	4	8	19	717	.....	.....	.....	.....	.....	.....	.....	1	2	1	.....	1	1	.....	1	.....	.....	2	1	.....	.....	.....
Weymouth	3	.....	1	1	3	8	741	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	3	.....	1	.....	.....	.....	1
Totals	88	53	27	104	88	361	18,704	19.30	2	6	.....	2	1	1	27	54	24	21	25	22	19	11	27	12	13	11	.....	6	10

Death-rate per 1,000, without cities of over 5,000 population, 16.40.

* This and all other cities of health resort have an excessive death-rate by reason of temporary increase of population, generally including a proportion of invalids above the average. Local Boards keep a record as to this.

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, 1883.

BERGEN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Englewood	9	7	6	25	21	67	4,076	.....	.....	3	.....	1	.....	1	2	7	4	4	14	2	4	.....	7	.....	4	2	.....	.....	3
Franklin	10	2	1	9	6	28	2,206	.....	.....	.....	.....	.....	.....	.....	1	4	1	.....	2	3	4	.....	1	.....	1	.....	.....	.....	.....
Harrington	7	2	4	10	16	39	2,570	.....	.....	1	.....	.....	.....	.....	3	1	2	2	4	2	3	.....	1	.....	1	.....	.....	.....	1
Hohokus	5	2	5	11	12	35	2,920	.....	.....	1	.....	.....	.....	.....	1	1	3	2	7	.....	1	2	3	2	2	.....	.....	.....	1
Lodi	21	14	7	13	14	71	4,071	.....	1	3	.....	5	.....	.....	1	10	1	4	4	6	5	1	5	2	5	.....	.....	1	4
Midland	3	5	2	9	14	33	1,591	.....	.....	.....	.....	.....	.....	.....	2	1	.....	3	5	1	3	2	.....	5	.....	1	.....	1	.....
New Barbadoes	30	20	10	21	21	102	4,248	.....	1	.....	.....	.....	.....	.....	3	15	1	1	13	6	9	5	3	.....	4	1	1	1	2
Palisade	9	9	4	8	12	43	2,302	.....	.....	.....	.....	10	.....	1	6	2	.....	3	7	5	2	2	4	.....	1	.....	.....	.....	3
Ridgefield	12	8	8	22	15	64	3,952	.....	4	.....	.....	.....	.....	1	.....	5	4	2	12	4	3	4	5	.....	3	3	.....	.....	7
Ridgewood	7	6	2	8	9	35	1,478	.....	.....	.....	.....	.....	1	.....	.....	6	1	2	3	4	2	3	3	.....	2	.....	.....	.....	.....
Saddle River	4	3	3	8	6	24	1 355	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2	3	4	1	.....	1	◆1	.....	4	.....	.....	2
Union	8	7	7	17	12	52	3,164	.....	4	.....	.....	.....	.....	.....	1	3	3	3	6	5	4	2	.....	1	2	1	1	.....	6
Washington	11	6	1	11	20	49	2,853	.....	1	.....	.....	.....	.....	.....	.....	3	1	2	11	.....	2	3	5	1	3	2	.....	.....	2
Totals	136	91	60	172	178	642	36,786	17.45	12	8	.....	18	1	4	20	58	23	29	92	39	42	30	48	4	31	14	2	3	35

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

BURLINGTON COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Bass River	3	2	.....	2	3	10	1,006	.....	.....	.....	.....	.....	.....	.....	1	3	1	1	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....
Beverly	6	10	5	17	8	46	3,128	.....	.....	.....	.....	.....	.....	.....	2	6	2	4	1	3	3	1	6	.....	2	2	.....	.....	3
Bordentown	16	11	11	28	23	90	5,334	16.87	1	1	.....	1	1	.....	6	.....	7	8	8	6	9	2	8	1	1	3	.....	1	1
Burlington	20	19	9	46	39	131	7,237	18 51	.....	2	1	.....	.....	.....	3	6	2	18	12	9	11	7	12	.....	5	5	.....	1	8
Chester	4	.....	1	13	12	30	2,855	.....	.....	.....	.....	.....	.....	.....	.....	3	2	2	.....	.....	5	1	7	.....	3	2	.....	.....	.....
Chesterfield	4	2	.....	6	13	25	1,525	.....	.....	.....	.....	.....	.....	.....	.....	3	2	1	3	1	2	2	5	.....	.....	1	.....	.....	.....
Cinnaminson	8	5	2	7	8	34	2,184	.....	2	.....	.....	.....	.....	1	.....	4	1	2	.....	5	4	.....	2	.....	6	.....	.....	.....	1
Delran	8	.....	3	7	7	25	1,760	.....	.....	3	.....	.....	.....	.....	.....	2	2	1	1	3	.....	.....	.....	.....	3	.....	.....	.....	.....
Evesham	9	3	3	13	6	34	1,602	.....	1	1	3	1	.....	1	.....	4	1	.....	1	5	3	1	2	.....	1	.....	.....	1	1
Eastampton	3	1	1	5	1	11	566	.....	.....	.....	.....	.....	.....	.....	.....	3	2	1	.....	2	.....	.....	1	.....	.....	.....	.....	.....	.....
Florence	6	3	3	9	2	24	1,528	.....	.....	1	.....	.....	.....	.....	3	1	4	2	2	1	2	.....	3	.....	.....	.....	.....	1	.....
Little Egg Harbor	7	1	1	7	9	25	1,851	.....	.....	.....	.....	.....	.....	2	.....	.....	2	3	3	1	2	.....	1	1	.....	.....	.....	.....	1
Lumberton	2	.....	3	2	3	10	1,689	.....	.....	.....	.....	.....	.....	1	.....	.....	1	2	1	1	.....	.....	2	.....	.....	.....	.....	.....	.....
Mansfield	5	1	1	8	6	21	1,613	.....	.....	.....	.....	.....	.....	1	1	2	.....	3	.....	2	1	1	.....	.....	.....	.....	.....	.....	2
Medford	7	2	1	11	15	37	1,980	.....	.....	3	.....	.....	.....	1	.....	4	1	5	4	2	4	1	5	.....	2	1	.....	.....	.....
Mt. Laurel	7	2	.....	6	7	20	1,739	.....	1	1	.....	.....	.....	.....	.....	2	1	1	4	3	.....	3	1	.....	.....	.....	.....	.....	1
New Hanover	8	3	4	12	9	37	2,373	.....	.....	3	.....	.....	.....	.....	1	4	1	3	2	1	4	.....	4	.....	2	2	.....	1	1
Northampton	20	9	5	25	32	92	4,630	.....	2	4	.....	1	.....	1	4	10	1	16	9	4	5	.....	7	.....	4	1	.....	.....	4
Pemberton	9	6	2	11	20	49	2,885	.....	1	3	.....	.....	.....	.....	2	7	2	2	7	1	4	2	4	.....	5	3	.....	.....	.....
Randolph	1	1	.....	3	1	6	428	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	1	.....	1	1	.....	.....	.....	.....	.....	.....
Shamong	3	.....	.....	6	4	13	1,097	.....	.....	1	.....	.....	.....	.....	.....	1	1	1	4	1	1	.....	1	.....	.....	.....	.....	.....	1
Southampton	5	1	2	1	7	16	2,269	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	4	.....	.....	.....	.....	.....	2	1	.....	.....	1
Springfield	4	2	.....	6	3	14	1,886	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	2	1	1	.....	.....	.....	1	1	.....	.....	1
Washington	1	.....	1	2	4	8	389	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westampton	.....	1	2	2	2	7	715	.....	1	.....	.....	.....	.....	.....	1	.....	.....	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Willingboro	2	.....	1	6	1	10	743	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1	1	.....	.....	1	.....	1	.....
Woodland	.....	.....	.....	.....	2	2	325	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	168	85	61	261	247	830	55,403	14 98	10	26	4	4	1	9	25	71	43	81	70	54	62	24	74	1	40	24	.....	6	26

Death-rate per 1,000, without cities of over 5,000 population, 14.14.

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, 1883.

CAMDEN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Camden	229	111	78	265	145	831	41,659	20.01	13	39	1	18	1	2	30	111	50	63	66	64	51	20	68	2	16	15	1	2	21
Centre	9	6	4	9	10	39	1,532	.....	.....	2	.....	.....	.....	.....	3	3	2	3	3	4	3	.....	2	1	.....	2	.....	.....	2
Delaware	4	2	5	6	6	23	1,481	.....	.....	.....	.....	1	.....	.....	2	2	2	2	3	1	1	.....	.....	.....	1	.....	.....	.....	.....
Gloucester City	33	14	16	30	20	117	5,347	21 88	1	1	.....	2	.....	1	4	17	5	7	12	7	7	3	5	.....	.....	1	.....	2	6
Gloucester	13	4	5	33	22	77	2,527	.....	.....	2	.....	1	.....	1	.....	5	4	6	6	5	9	1	10	.....	8	2	.....	1	5
Haddon	9	9	4	11	19	52	2,551	.....	2	2	.....	2	.....	.....	5	8	.....	3	10	2	4	3	4	.....	2	.....	.....	1	1
Stockton	19	9	6	21	20	77	3,532	.....	1	4	.....	1	.....	.....	2	7	2	7	12	4	7	2	5	.....	2	2	.....	1	1
Waterford	10	1	2	13	9	35	2,149	.....	.....	.....	.....	.....	.....	.....	.....	5	5	3	4	2	.....	1	4	.....	3	.....	.....	.....	.....
Winslow	17	6	2	8	4	37	2,158	.....	1	.....	.....	5	.....	.....	.....	8	2	.....	.....	3	.....	2	4	.....	.....	1	.....	.....	2
Totals	343	162	122	396	255	1,291	62,942	20.51	18	50	1	30	1	6	46	166	72	91	116	92	82	32	102	3	32	23	1	7	38

Death-rate per 1,000, without cities of over 5,000 population, 21.33.

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, 1883.

CAPE MAY COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Cape May City	12	1	4	7	3	27	1,699	.....	1	1	.....	.....	.....	.....	2	6	1	.....	3	2	.....	1	4	.....	.....	1	.....	.....	.....
Dennis	7	.....	1	9	5	22	1,812	.....	.....	1	.....	.....	.....	.....	1	3	.....	2	4	.....	.....	.....	3	.....	.....	1	.....	.....	1
Lower	5	2	.....	3	10	20	1,977	.....	.....	1	.....	.....	.....	.....	.....	2	4	10	3	1	4	.....	4	.....	.....	.....	.....	.....	3
Middle	5	1	4	15	15	40	2,575	.....	.....	.....	.....	.....	.....	.....	2	1	2	2	2	.....	1	1	4	.....	.....	2	.....	.....	1
Upper	1	3	.....	5	11	22	1,702	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	30	7	9	39	44	131	9,765	13.41	2	4	.....	1	.....	.....	5	14	7	16	13	4	5	4	20	1	1	4	.....	.....	5

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, 1883.

CUMBERLAND COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal disease.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bridgeton	30	6	19	35	41	135	8,722	15.48	.....	11	.....	.....	.....	.....	2	12	7	13	21	9	11	1	13	.....	9	1	.....	1	5
Commercial	9	1	.....	7	10	30	2,265	.....	.....	1	.....	.....	.....	.....	.....	1	3	2	2	2	3	.....	4	.....	.....	2	.....	.....	2
Deerfield	4	.....	3	4	12	26	1,643	.....	.....	.....	.....	.....	.....	.....	2	1	.....	1	6	1	1	.....	2	.....	.....	1	.....	.....	1
Downe	4	1	1	4	4	13	1,687	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	3	.....	1	1	3	.....	.....	.....	.....	.....	.....
Fairfield	10	2	1	10	11	35	3,215	.....	.....	2	.....	.....	.....	.....	1	9	2	6	2	1	2	.....	3	.....	1	2	.....	.....	1
Greenwich	3	1	1	.....	7	12	1,215	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	2	1	1	.....	1	.....	.....	.....	.....
Hopewell	2	.....	3	5	11	20	1,764	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	3	.....	1	1	2	.....	1	1	.....	.....	.....
Landis	15	9	7	26	36	93	6,005	.....	.....	6	.....	.....	.....	.....	2	7	5	9	15	3	8	3	8	.....	3	1	.....	2	2
Maurice River	11	6	4	7	8	36	2,374	.....	.....	2	.....	.....	1	.....	1	4	2	5	2	4	1	.....	3	.....	1	.....	.....	.....	.....
Millville	39	13	24	44	22	140	7,660	18.27	.....	4	.....	6	.....	1	9	19	11	17	17	5	6	6	6	2	3	4	.....	1	2
Stoe Creek	2	.....	1	3	4	10	1,107	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1	2	.....	1	.....	.....	1	.....	.....	.....
Totals	129	39	64	145	166	550	37,687	14.59	.....	26	.....	8	1	1	17	58	30	60	71	26	38	13	46	2	19	13	.....	4	13

Death-rate per 1,000, without cities of over 5,000 population, 12.91.

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, 1883.

ESSEX COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal disease.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Belleville	20	6	4	11	13	54	3,004	.....	1	.....	.....	.....	.....	1	1	10	1	5	5	6	1	1	3	1	5	1	.....	1	3
Bloomfield	20	15	5	28	31	102	5,748	.....	3	1	.....	1	.....	1	5	9	7	7	11	6	7	5	9	2	7	6	.....	3	1
Caldwell	2	3	5	8	16	37	3,167	.....	1	1	.....	1	.....	2	4	.....	2	.....	5	2	5	2	6	1	2	2	.....	.....	.....
Clinton	8	7	5	6	10	39	2,742	.....	.....	.....	.....	3	1	.....	3	1	2	.....	5	4	2	2	1	.....	5	2	.....	.....	.....
East Orange	30	17	15	41	23	127	8,349	.....	2	2	.....	4	3	.....	4	11	7	11	17	10	8	6	5	.....	5	5	.....	2	.....
Franklin	4	1	1	12	8	26	1,617	.....	1	1	.....	1	.....	.....	.....	.....	4	2	6	1	2	1	4	.....	.....	.....	.....	.....	.....
Livingston	2	.....	.....	1	10	13	1,401	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	2	1	2	.....	.....	1	.....	.....	.....
Millburn	4	5	2	15	8	35	1,743	.....	7	.....	.....	1	.....	.....	.....	3	4	3	2	2	1	1	3	.....	2	.....	.....	2	2
Montclair	20	9	5	28	16	80	5,147	.....	.....	1	.....	.....	4	3	4	9	5	7	10	4	5	3	6	.....	3	4	.....	1	1
Newark	830	531	393	1135	576	3,480	136,508	25.49	30	89	1	271	8	37	182	354	297	245	401	254	157	135	237	14	167	60	9	39	115
Orange	78	41	26	94	44	288	13,207	21.80	1	4	.....	16	2	5	7	25	28	23	47	25	12	9	9	2	17	7	.....	4	8
South Orange	12	4	3	17	8	53	3,911	.....	.....	2	.....	.....	.....	.....	1	7	.....	7	7	.....	3	2	5	.....	2	.....	.....	.....	2
West Orange	16	9	5	18	11	60	3,385	.....	.....	.....	.....	2	.....	4	2	7	9	1	12	2	.....	.....	3	.....	7	1	.....	1	1
Totals	1046	648	469	1414	774	4,391	189,929	23.13	46	101	1	300	18	53	210	437	366	311	532	316	205	168	293	18	223	87	9	53	140

Death-rate per 1,000, without cities of over 5,000 population, 15.56.

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, 1883.

GLOUCESTER COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases	Consumption. M.	Consumption. F.	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.	Accident.
Clayton	3	6	2	6	5	22	1,981	.....	.....	.....	.....	.....	.....	.....	.....	3	1	2	5	1	1	.....	2	.....	2	1	.....	1	2
Deptford	9	2	4	7	9	30	1,520	.....	.....	1	.....	.....	.....	.....	2	7	1	2	3	1	4	1	1	.....	2	.....	.....	1	1
East Greenwich	3	.....	2	10	11	26	.....	.....	.....	1	.....	.....	.....	.....	.....	2	.....	4	2	1	4	.....	3	.....	3	1	.....	.....	.....
Franklin	10	3	6	13	9	42	2,480	.....	.....	.....	.....	1	2	.....	.....	5	3	6	3	4	3	1	1	.....	1	.....	.....	.....	1
Glassboro	8	8	2	13	9	43	2,088	.....	1	2	.....	.....	1	.....	1	3	7	1	3	5	2	.....	1	.....	1	2	.....	.....	1
Greenwich	5	3	1	2	6	19	2,598	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	3	.....	1	.....	3	1	.....	.....	.....	.....	2
Harrison	5	5	2	13	10	37	2,841	.....	.....	.....	.....	.....	1	.....	3	6	1	4	6	.....	3	2	6	.....	2	.....	.....	.....	.....
Logan	3	2	.....	7	10	22	1,765	.....	1	1	.....	.....	.....	.....	1	3	.....	.....	1	.....	2	2	2	1	1	2	.....	.....	2
Mantua	4	1	4	5	4	19	1,718	.....	1	.....	.....	.....	1	.....	2	2	.....	1	2	3	2	.....	2	.....	1	1	.....	.....	.....
Monroe	6	5	1	8	8	28	1,858	.....	.....	.....	.....	.....	.....	.....	.....	3	2	4	5	1	3	1	4	.....	1	1	.....	.....	.....
South Harrison	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	4	7	3	1	8	23	1,366	.....	.....	.....	.....	1	.....	.....	3	2	1	1	2	4	2	1	1	.....	.....	2	.....	.....	1
West Deptford	5	2	1	5	1	14	1,399	.....	.....	1	.....	.....	.....	1	1	2	.....	3	1	.....	1	.....	1	.....	1	.....	.....	.....	1
Woodbury	9	5	5	13	21	52	2,298	.....	.....	.....	.....	.....	.....	.....	1	4	3	2	7	4	4	.....	3	.....	4	1	.....	.....	5
Woolwich	6	2	1	12	9	30	1,974	.....	.....	.....	.....	.....	.....	.....	.....	3	2	5	5	.....	.....	.....	1	3	.....	5	1	.....	1
Totals	80	51	34	115	120	407	25,886	15.72	3	6	.....	3	4	1	14	47	21	36	48	24	32	12	37	2	23	12	.....	2	17

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

HUDSON COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Bayonne	57	39	19	62	19	196	9,372	20.91	1	4	.....	3	1	3	9	40	7	14	25	19	6	7	8	1	8	3	.....	.....	16
Guttenburg	13	2	2	7	2	26	1,206	.....	4	1	.....	1	.....	.....	.....	4	.....	1	2	4	2	.....	.....	.....	.....	.....	.....	.....	2
Harrison	40	28	17	47	20	153	6,898	22 18	2	13	.....	18	.....	4	3	19	10	8	15	16	2	2	6	1	4	1	1	2	2
Hoboken	213	165	61	294	69	803	30,999	25 90	3	14	1	26	4	3	61	111	57	45	102	79	45	21	39	6	34	17	.....	11	40
Jersey City	773	633	313	950	372	3,108	120,722	25.74	29	65	2	150	52	34	178	403	171	194	412	314	133	85	135	10	164	48	.....	29	151
Kearny	11	5	1	16	4	40	777	.....	1	2	.....	2	.....	.....	.....	5	3	1	10	1	.....	1	.....	.....	.....	1	.....	1	7
North Bergen	43	41	22	83	50	237	4,268	.....	2	3	1	2	3	1	4	24	34	18	38	11	6	15	25	.....	8	2	.....	1	10
Town of Union	56	60	37	39	17	209	5,849	35 73	6	4	.....	3	4	1	52	24	14	8	30	18	8	4	7	.....	4	4	.....	1	2
Union	9	9	.....	13	6	37	1,310	.....	.....	2	.....	.....	.....	.....	2	4	3	1	7	3	2	4	1	.....	1	1	.....	1	.....
Weehawken	9	6	2	15	1	35	1,102	.....	1	.....	.....	1	1	.....	4	5	1	.....	6	2	1	3	.....	.....	.....	.....	.....	1	9
West Hoboken	44	17	12	50	21	152	5,441	.....	7	6	.....	4	3	1	6	12	9	10	27	14	11	7	5	.....	4	2	.....	2	1
Totals	1268	1005	486	1606	581	4,996	187,944	26 58	56	114	4	210	68	47	319	651	309	300	671	481	216	149	226	18	227	80	1	49	247

Death-rate per 1,000, without cities of over 5,000 population, 37.36.
Death-rate per 1,000, without cities of over 5,000 population, and without North Bergen township, which has the County Institutions, 29.48.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

HUNTERDON COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Alexandria	1	1	2	2	9	17	1,324									1		3	3		1								1
Bethlehem	4	3	3	7	10	28	2,830			1		1				3	2	3	2	5	3	1	2			1			1
Clinton	4		3	5	7	20	2,133					1			1	2		2	1		1				2				
Delaware	8	3	3	8	21	44	3,092			1			1		1	5	3	1	4	4	2	1	2		1	2			1
East Amwell			1	8	7	17	1,696										1		3		1	1							1
Franklin		3	2	6	6	18	1,338							1	2			1	1		1		2		2		2		
Frenchtown	2	9		7	9	26	1,039		1					1		6	1	1	3	2	2	1	3		4				
High Bridge	4	4	4	14	8	35	2,209		2			1	1			1	2	3	2	3	1	2	3	1	1	1		2	3
Holland	6	1	1	6	15	30	1,886		2	1					1	3			2		3	3	7	1		1		1	1
Kingwood	6	3	2	4	13	29	1,694									3	2	2	3	2	3	2	3		2				
Lambertville	8	6	7	21	16	57	4,183		1	2		3			9	6	1	7	6	1	4	2	2		3	1		1	1
Lebanon	7	8	8	5	18	48	2,699			4		4	1		4	4		2	7	1	2		1			1	1	1	3
Raritan	12	13	12	18	17	72	4,188		1			3			16	8	3	3	4	2	4	1	4	1	4	1		1	3
Readington	6	2	1	12	18	37	3,103					1				3	2	6	4		1	3	7		2				1
Tewksbury	8	5	6	5	11	34	2,108					11				4	1	1	5	1	2		3		1				
Town of Clinton	5		2	3	4	13	842						1					1	1		2		3		1				1
Union	6	1	4	3	2	15	1,168			1					1	3	1		4		1		1						1
West Amwell				2	7	9	1,039										1	1			2		1	1					
Totals	87	62	61	136	198	549	38,570	14.23	7	11		25	4	2	35	52	20	37	55	21	38	18	57	4	21	9	1	8	18

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

MERCER COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Chambersburg	31	16	19	27	20	119	5,437	21.88	1	7					14	16	8	4	13	9	3	4	7		6	1			
East Windsor	7	2	2	15	11	39	2,271								1	2	2	5	5	1	2	7	1	2		1			1
Ewing	5	3	4	46	24	81	2,412			1					4	3	6	5	1	5	2	3	2	30	1	4	3		1
Hamilton	8	7	7	40	32	94	3,370			2					3	7	8	10	10	5	2	3	3	9		2	6	1	5
Hopewell	5	2	6	17	27	60	4,462			1					2	2	4	4	5	1	3	5	12			1	1		1
Lawrence	6	3	5	6	8	28	3,174								1	2	1	2	2	1	4	3	2				2	1	1
Millham	15	4	2	16	6	43				4					3	3	6	3	7	2						1			
Princeton	17	9	7	17	25	75	4,348		1	1					1	17	6	2	9	4	4	4	3		8	1			4
Trenton	144	100	59	183	124	622	29,910	20.79	7	16	2	14	2	2	42	75	59	37	53	38	27	17	38	2	28	12	4	3	26
Washington	1		1	6	6	14	1,281									1	1	2	1		2	1		1	1				2
West Windsor	4		1	4	4	13	1,396										1	1	1	1		2	1						2
Totals	243	146	113	377	287	1,188	58 061	20.46	9	32	2	14	2	2	71	128	102	75	107	65	55	42	104	4	51	27	6	5	46

Death-rate per 1,000, without cities of over 5,000 population, 19.68.

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, 1883.

MIDDLESEX COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Cranbury	4	2	1	7	3	20	1,599	.....	.....	.....	.....	.....	.....	.....	1	3	4	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	3
East Brunswick	8	6	5	15	13	50	3,272	.....	.....	1	.....	2	.....	.....	3	4	4	5	3	3	2	.....	1	.....	3	2	.....	1	1
Madison	5	2	.....	7	7	21	1,662	.....	.....	.....	.....	.....	.....	.....	.....	1	3	.....	2	1	1	.....	1	.....	1	.....	.....	.....	2
Monroe	6	3	3	8	14	37	3,017	.....	.....	1	.....	.....	.....	.....	.....	2	6	.....	.....	2	.....	.....	.....	.....	2	.....	.....	.....	1
New Brunswick	103	85	62	119	86	460	17,166	26.79	2	7	.....	23	4	6	61	55	28	32	52	20	14	25	22	2	16	11	.....	1	16
North Brunswick	3	2	1	4	3	13	1,251	.....	1	.....	.....	.....	.....	.....	.....	3	1	2	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Perth Amboy	44	25	19	37	14	139	4,808	.....	2	6	.....	1	.....	.....	22	26	6	7	11	10	5	3	5	.....	6	1	.....	.....	5
Piscataway	14	3	3	16	22	59	3,212	.....	.....	2	.....	.....	.....	.....	.....	8	3	5	9	3	2	3	8	.....	2	.....	.....	.....	4
Raritan	1	6	8	22	16	56	3,789	.....	.....	.....	.....	2	1	.....	4	3	1	9	9	2	2	5	1	6	1	.....	.....	.....	3
Sayreville	1	3	3	8	1	24	1,930	.....	.....	1	.....	1	.....	.....	.....	5	2	2	2	3	.....	.....	.....	.....	.....	.....	1	.....	.....	1
South Amboy	17	9	7	19	16	69	3,648	.....	1	2	.....	2	.....	.....	4	9	4	4	8	8	4	.....	6	.....	1	3	.....	.....	2
South Brunswick	5	4	7	18	12	49	2,893	.....	.....	.....	.....	2	.....	.....	3	4	5	3	5	1	4	.....	3	.....	2	3	1	.....	2
Woodbridge	21	12	4	32	19	88	4,099	.....	1	1	.....	1	.....	3	4	12	7	8	12	7	6	1	6	.....	4	2	.....	.....	4
Totals	232	162	123	312	226	1,085	52,286	20.75	7	21	.....	34	5	10	104	137	70	79	121	61	44	43	67	2	38	25	1	2	49

Death-rate per 1,000, without cities of over 5,000 population, 17.79.

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, 1883.

MONMOUTH COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Atlantic	7	1	.....	6	6	20	1,743	.....	.....	1	.....	.....	.....	.....	1	1	.....	1	2	1	1	2	1	.....	1	.....	.....	.....	1
Eatontown	7	5	1	20	11	54	2,642	.....	.....	3	.....	.....	.....	.....	.....	6	6	9	.....	2	4	1	3	2	.....	.....	.....	.....	1
Freehold	9	9	6	24	24	74	4,302	.....	.....	2	.....	.....	.....	.....	9	5	4	4	5	2	4	6	6	7	6	6	.....	.....	2
Holmdel	6	1	3	5	8	23	1,575	.....	.....	.....	.....	.....	.....	.....	1	2	.....	2	5	.....	.....	6	1	1	.....	1	.....	.....	.....	.....
Howell	8	9	8	8	16	50	3,374	.....	.....	2	.....	.....	.....	3	2	4	1	5	5	2	4	2	6	.....	1	2	.....	.....	6
Manalapan	9	1	.....	17	18	41	2,175	.....	.....	.....	.....	.....	.....	.....	1	2	6	5	7	.....	3	2	4	.....	3	1	.....	3	.....
Marlboro	9	4	.....	7	13	32	2,193	.....	.....	1	.....	.....	.....	1	1	6	2	2	1	2	2	1	3	.....	.....	1	.....	.....	1
Matawan	14	8	7	25	11	69	2,699	.....	1	2	.....	.....	.....	.....	7	9	3	5	7	6	3	3	4	.....	2	1	.....	.....	1
Middletown	15	5	8	15	24	67	5,059	.....	2	.....	.....	.....	.....	.....	2	9	4	3	5	7	3	2	10	.....	3	1	.....	2	5
Millstone	3	4	3	6	6	23	2,080	.....	.....	2	.....	.....	.....	.....	1	2	1	1	6	1	1	2	1	.....	.....	.....	.....	.....	.....
Neptune	37	22	19	36	23	136	4,187	.....	2	5	.....	4	.....	.....	2	27	5	5	18	9	8	4	10	.....	4	1	.....	2	3
Ocean	24	17	13	36	33	133	6,027	.....	3	.....	.....	9	.....	.....	2	14	7	6	12	6	10	2	12	1	4	3	1	1	13
Raritan	27	9	10	22	22	90	3,891	.....	1	2	.....	3	1	.....	12	14	10	7	11	2	2	2	3	.....	3	1	.....	1	2
Shrewsbury	20	10	6	41	35	117	6,526	.....	.....	2	.....	1	.....	.....	3	8	10	7	12	10	6	5	5	1	9	8	.....	.....	6
Upper Freehold	5	3	3	12	20	42	3,236	.....	.....	.....	.....	.....	.....	.....	3	3	5	4	3	1	3	2	5	.....	.....	1	.....	.....	.....
Wall	16	5	11	18	17	67	3,829	.....	.....	2	.....	1	.....	.....	5	11	5	5	3	.....	6	1	6	.....	2	.....	.....	.....	4
Totals	216	113	98	298	287	1,038	55,538	18.69	9	21	.....	18	1	4	52	123	69	71	102	51	68	37	82	3	41	29	1	9	45

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

MORRIS COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Boonton	21	7	7	14	15	65	2,682	.....	2	1	.....	3	.....	1	1	8	8	4	4	8	3	2	5	1	1	1	.....	.....	4
Chatham	9	5	6	23	29	73	4,276	.....	.....	.....	.....	1	.....	.....	1	5	10	5	18	1	3	1	5	1	1	4	.....	.....	2
Chester	15	2	3	6	8	34	2,337	.....	1	.....	.....	.....	.....	.....	.....	5	1	1	5	4	1	.....	4	.....	1	.....	1	.....	1
Hanover	8	6	4	55	32	105	4,138	.....	.....	3	.....	.....	.....	.....	4	3	6	3	9	3	8	1	*12	.....	4	2	.....	.....	3
Jefferson	4	2	5	8	10	31	1,792	.....	.....	1	.....	1	.....	.....	.....	.....	1	1	1	3	6	1	1	.....	3	1	1	1	1
Mendham	7	2	1	4	15	29	1,526	.....	1	.....	.....	.....	.....	1	.....	2	.....	2	4	1	6	1	2	1	.....	1	.....	.....	1
Montville	1	4	2	5	10	22	1,270	.....	2	2	.....	.....	.....	.....	2	1	2	2	3	.....	1	1	1	.....	1	.....	.....	.....	2
Morristown	27	34	24	51	60	198	6,837	28.96	5	2	.....	2	1	.....	17	16	11	15	37	13	8	5	*18	1	2	6	.....	2	5
Mount Olive	5	7	5	13	7	36	1,982	.....	2	.....	.....	1	.....	.....	.....	1	1	5	3	4	4	1	1	1	.....	.....	.....	1	1
Passaic	3	1	.....	5	7	16	1,896	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	6	1	2	1	1	1	.....	.....	.....	.....	1
Pequannock	8	6	5	11	8	38	2,239	.....	2	2	.....	1	.....	2	.....	1	5	1	2	4	5	2	.....	.....	2	.....	.....	.....	3
Randolph	41	17	15	34	23	131	7,700	.....	1	1	.....	6	2	.....	3	11	9	5	18	9	7	4	11	.....	4	.....	1	1	5
Rockaway	28	17	23	20	21	112	7,366	.....	4	4	.....	16	.....	.....	1	12	2	7	22	10	7	5	5	.....	2	.....	1	1	4
Roxbury	9	3	3	14	9	39	2,139	.....	3	1	.....	2	1	.....	.....	1	2	3	4	1	4	1	3	.....	1	.....	.....	.....	1
Washington	10	8	4	8	17	48	2,681	.....	.....	3	.....	4	.....	.....	1	3	2	4	7	8	1	5	3	.....	.....	1	.....	.....	.....
Totals	176	121	107	271	271	977	50,861	19.21	23	20	.....	37	4	4	30	70	60	58	143	70	66	31	102	6	22	16	4	7	33

Death-rate per 1,000, without cities of over 5,000 population, 17.69. * Morristown and Hanover township include Asylum deaths.

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, 1883.

OCEAN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Berkeley	3	.....	1	6	2	12	683	.....	.....	.....	.....	.....	.....	1	.....	.....	2	2	3	1	.....	.....	.....	.....	1	.....	.....	.....	.....
Brick	3	.....	4	6	12	26	2,999	.....	.....	.....	.....	.....	.....	.....	.....	4	4	4	1	2	.....	1	2	.....	2	.....	.....	1	2
Dover	9	2	3	8	5	27	2,439	.....	.....	.....	.....	.....	.....	.....	.....	4	2	2	2	2	1	3	.....	.....	.....	.....	.....	.....	2
Eagleswood	4	.....	1	1	1	7	592	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	1	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....
Jackson	3	4	3	6	11	28	1,803	.....	.....	2	.....	2	.....	.....	1	2	4	2	3	2	.....	.....	5	1	1	.....	.....	.....	1
Lacey	2	1	1	4	5	13	814	.....	.....	.....	.....	.....	.....	.....	2	1	.....	.....	4	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Manchester	6	2	1	6	3	18	1,057	.....	.....	1	.....	.....	.....	.....	.....	6	.....	1	2	1	.....	.....	1	.....	.....	.....	.....	1	.....
Ocean	3	2	.....	5	2	12	481	.....	.....	1	.....	.....	.....	2	.....	1	.....	.....	3	1	1	.....	.....	.....	.....	.....	.....	.....	.....
Plumsted	6	.....	2	9	6	23	1,561	.....	.....	.....	.....	1	.....	.....	.....	2	.....	2	3	1	.....	1	1	.....	.....	1	.....	1	1
Stafford	5	.....	3	10	4	22	1,008	.....	.....	.....	1	2	.....	.....	.....	3	4	2	1	.....	1	.....	4	.....	1	1	.....	.....	.....
Union	2	5	4	2	2	15	1,024	.....	.....	.....	.....	.....	.....	.....	2	1	.....	2	1	3	.....	.....	1	.....	.....	.....	.....	.....	.....
Totals	46	16	23	63	53	203	14,455	14.04	.....	4	1	5	.....	3	5	22	17	16	26	13	5	7	15	1	6	2	.....	3	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, 1883.

PASSAIC COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Acquackanonk	6	1	2	8	6	24	1,781	.....	.....	1	.....	.....	.....	.....	.....	6	.....	2	3	1	1	.....	3	.....	2	.....	.....	.....	1
Little Falls	10	7	3	15	6	38	1,404	.....	.....	1	.....	.....	.....	.....	.....	3	1	2	.....	1	.....	.....	.....	.....	1	.....	.....	.....	1
Manchester	1	4	1	4	5	15	1,513	.....	1	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Passaic	41	26	15	33	20	136	6,532	20.82	1	7	.....	6	.....	4	2	22	4	10	15	11	9	5	3	.....	1	1	2	.....	7
Paterson	416	210	143	409	225	1,415	51,031	27.72	20	31	39	35	4	18	38	224	100	90	151	132	60	42	45	1	42	25	4	11	32
Pompton	5	5	3	7	12	35	2,251	.....	3	2	.....	.....	.....	1	.....	1	1	1	3	3	5	3	1	.....	1	.....	.....	1	1
Wayne	8	1	3	6	3	21	1,757	.....	1	.....	.....	.....	.....	.....	1	2	1	1	1	3	1	.....	.....	.....	1	.....	.....	1	3
West Milford	9	.....	1	7	8	25	2,591	.....	.....	.....	.....	.....	.....	2	.....	.....	3	2	4	1	2	.....	4	.....	.....	.....	1	.....	1
Totals	496	254	171	489	285	1,709	68,860	24.82	32	43	39	42	4	25	41	268	115	109	184	154	81	51	56	1	49	29	5	15	50

Death-rate per 1,000, without cities of over 5,000 population, 13.98.

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, 1883.

SALEM COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Elsinboro	2	2	2	1	3	10	570	.....	1	1	.....	.....	.....	.....	.....	3	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Lower Alloways Creek	2	.....	2	7	2	13	1,373	.....	1	1	.....	.....	.....	.....	.....	1	1	.....	1	1	.....	1	.....	.....	2	.....	.....	.....	3
Lower Penn's Neck	6	1	3	10	6	26	1,334	.....	2	3	.....	.....	.....	.....	.....	.....	1	5	4	.....	1	4	1	1	.....	.....	.....	.....	.....
Mannington	11	4	3	11	12	41	2,230	.....	.....	2	.....	.....	.....	.....	1	6	2	2	5	.....	1	.....	5	.....	1	.....	.....	.....	2
Oldmans	8	2	2	9	5	27	.....	.....	.....	.....	.....	1	1	.....	2	3	2	4	4	2	1	.....	1	.....	1	.....	1	.....	.....
Pilesgrove	14	6	5	15	17	59	3,497	.....	.....	3	.....	.....	1	.....	1	8	5	2	7	2	5	1	3	1	2	1	.....	.....	4
Pittsgrove	4	5	5	7	14	32	1,778	.....	.....	.....	.....	.....	.....	.....	1	3	.....	4	4	4	2	2	5	.....	.....	3	.....	.....	.....
Quinton	6	.....	6	6	4	24	1,390	.....	.....	1	.....	.....	.....	.....	2	2	2	1	3	.....	.....	.....	1	.....	.....	1	3	.....	.....
Salem	27	8	9	35	39	117	5,056	23.14	2	.....	2	.....	.....	1	4	8	10	10	20	6	5	5	16	.....	1	3	2	.....	.....
Upper Alloways Creek	6	3	1	3	8	21	1,917	.....	.....	.....	.....	.....	.....	.....	.....	4	1	.....	4	2	.....	1	1	.....	.....	2	.....	1	3
Upper Penn's Neck	8	2	2	5	7	25	3,361	.....	.....	.....	.....	.....	.....	.....	.....	5	1	1	2	1	4	1	1	.....	1	.....	.....	.....	.....
Upper Pittsgrove	3	2	.....	3	10	18	2 073	.....	1	.....	.....	.....	.....	.....	2	2	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Totals	97	35	40	112	127	416	24,579	16 92	7	11	2	1	2	2	12	45	25	30	56	18	19	15	35	2	13	10	.....	3	13

Death-rate per 1,000, without cities of over 5,000 population, 15.31.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

SOMERSET COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Bedminster	2	6	5	13	10	35	1,812	.....	.....	.....	.....	4	.....	.....	.....	1	5	1	4	2	5	2	3	.....	2	.....	.....	.....	1
Bernards	6	3	1	7	9	28	2,622	.....	1	2	.....	.....	.....	.....	1	5	1	2	1	.....	1	.....	.....	.....	3	2	1	.....	1
Branchburg	1	3	.....	5	3	11	1,316	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	2
Bridgewater	31	18	13	39	52	153	7,997	.....	2	5	.....	3	1	4	7	17	4	12	18	14	15	6	17	.....	4	3	.....	.....	3
Franklin	12	7	3	18	28	69	3,818	.....	3	1	.....	1	2	.....	.....	3	6	.....	13	4	5	3	6	.....	2	2	.....	.....	5
Hillsborough	7	4	4	13	25	51	3,248	.....	1	1	.....	.....	.....	.....	3	4	1	4	11	.....	3	2	5	.....	1	1	.....	.....	.....
Montgomery	4	3	3	10	10	33	1,928	.....	2	2	.....	.....	.....	.....	.....	2	1	2	5	3	2	2	3	1	2	1	.....	.....	4
North Plainfield	13	5	5	14	11	48	3,217	.....	.....	.....	.....	2	1	.....	2	8	4	5	6	3	1	2	3	.....	1	1	.....	.....	.....
Warren	4	5	2	3	7	21	1,204	.....	2	.....	.....	.....	.....	.....	2	.....	.....	2	4	3	1	.....	3	.....	1	1	.....	.....	.....
Totals	80	53	36	122	155	449	27,162	16.53	11	11	.....	10	5	5	15	41	23	29	63	28	34	16	40	1	16	11	1	.....	16

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, 1883.

SUSSEX COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous disease of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Andover	.....	1	3	7	10	21	1,150	.....	1	2	.....	.....	.....	.....	3	.....	.....	3	1	1	1	.....	6	.....	.....	.....	.....	2	.....
Byram	2	4	3	5	7	21	1,406	.....	.....	.....	.....	.....	.....	.....	2	2	.....	2	4	2	1	.....	2	.....	.....	.....	.....	.....	.....
Frankford	7	1	6	6	14	35	1,682	.....	.....	1	.....	.....	.....	.....	3	1	2	4	6	1	4	1	1	.....	2	.....	.....	.....	2
Greene	1	.....	.....	2	.....	3	727	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hardyston	6	5	2	11	3	28	2,645	.....	1	1	.....	2	.....	.....	1	1	2	2	6	3	3	1	.....	.....	.....	.....	.....	1	1
Hampton	1	.....	.....	8	4	13	895	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	1	.....	.....	.....	1	.....	1	.....	.....	1
Lafayette	.....	.....	1	2	2	5	781	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montague	.....	.....	.....	2	1	3	1,022	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
Newton	1	5	7	14	10	39	2,513	.....	.....	.....	.....	.....	.....	.....	9	1	5	.....	1	2	5	3	4	.....	1	.....	.....	.....	.....
Sandyston	1	1	3	4	5	14	1,195	.....	2	1	.....	.....	.....	.....	1	1	.....	1	2	2	5	3	4	.....	2	1	.....	.....	.....
Sparta	9	6	2	15	9	41	2,274	.....	.....	.....	.....	.....	.....	1	3	3	5	5	4	4	2	1	3	.....	1	1	.....	.....	.....
Stillwater	1	1	.....	5	5	12	1,502	.....	2	.....	.....	.....	.....	.....	.....	1	1	1	1	1	.....	.....	2	1	.....	.....	.....	.....	.....
Vernon	3	.....	2	8	8	20	1,811	.....	.....	.....	.....	.....	.....	.....	.....	1	3	2	4	2	.....	1	2	1	.....	.....	.....	.....	2
Walpack	.....	.....	.....	1	2	3	575	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	1	.....	.....	.....	.....
Wantage	6	6	4	20	20	57	3,361	.....	1	4	.....	2	.....	.....	1	6	6	4	7	.....	6	1	4	.....	1	.....	.....	.....	2
Totals	38	30	33	110	100	315	25,539	13.38	8	9	.....	4	.....	1	23	16	25	29	36	17	22	11	28	3	7	5	.....	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, 1883.

UNION COUNTY. Statistical Divisions.	DEATHS AT ALL AGES						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	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.	Accident.
Clark	1	1	1	3	1	7	353								1			2										
Cranford	1		1	5	4	12	1,184			1						1			2	2								
Elizabeth	166	141	91	174	111	686	28,229	24 30	11	13		48	1	8	31	92	43	39	76	62	40	13	23	2	22	11		3	33
Fanwood	4	3	1	9	7	24	1,167			2						2		1	4	2	1	1	3						
Linden	7	3	3	13	7	32	1,889		2	1					2	5	2	2	5	2	4		1		1			1	1
New Providence	2		2	5	3	12	781		1								1	1	4		1								
Plainfield	43	23	18	45	32	161	8,125	19.81		2		3		1	7	29	11	11	23	9	9	5	2		4	5	1	2	2
Rahway	23	10	15	43	36	131	6,455	20.29	3	2		6			2	15	10	15	16	8	6	4	10		2	3		1	4
Springfield		1	1	5	5	12	844		1								2	2	1		2	1			1				1
Summit	7	4	6	15	6	38	1,910			2		1				2	3		7	3	4	3	2				1		5
Union	4	7	3	9	12	35	2,418		3	2		2	1		2		4	1	5	2	4	1	1		1				
Westfield	2	2	4	16	14	38	2,216			1					1	3	3	2	4		2		6	1	2	3		1	3
Totals	260	195	146	342	238	1,188	55,571	21.37	21	26		60	2	9	46	149	79	76	148	88	74	28	53	3	33	22	1	9	57

Death-rate per 1,000, without cities of over 5,000 population, 16.45.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

WARREN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																		
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal disease.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Allamuchy				1	1	2	648																					
Belvidere	4	4	4	17	8	35	1,773		2							3	1											1
Blairstown	1	4		5	10	22	1,458					4					5	2	5	1	1		2		3			1	2
Franklin	4	1	1	6	7	19	1,529								2	3	1	1	2	2	3	2	3		2				1
Frelinghuysen			2	3	3	8	1,042					1				1	1	1	2		1	1	3			1			1
Greenwich	2	1	1	7	6	18	2,554								1	1		2	4	1		1	2		2	1			1
Hackettstown	10	5	2	15	15	48	2,502			2		1				1		2	4	3	3		5		1	1			4
Hardwick	2			2	1	5	583						2		1	1		5	4										
Harmony	2	3	1	4	4	14	1,350			1							1	1		1									
Hope	8	5	1	8	6	28	1,569						1		1				3	1									
Independence	1	1	1	7	3	13	1,018						1			3	1	3	3	5	1	1	1			1		1	2
Knowlton	2	1	2	3	8	17	1,476									1		1		1	1	1	1	1		1			2
Lopatcong	5	1	6	4	7	23	1,591		2	1		2	1		1		2	1		1			2		1				1
Mansfield	4		3	8	13	27	1,709			1		2				5	1		4				3						
Oxford	17	16	10	19	16	81	4,594		2	2		3	1			1	2	6	4	2	2		3		1	1			1
																4	3	3	24	8	5	1	3		3				5
Pahaquarry				1	2	3	418											1			1								
Phillipsburg	39	34	9	33	21	147	7,181	20 46	1	3		6	2		21	17	7	7	11	9	3	1	13		3	1		1	6
Pohatcong	5	3		11	3	20						1				3		2	2	1	2	1	2			1			2
Town of Washington	4	2	6	5	6	36	2,142					2			2	3	1	1	1	2		2	3						1
Washington	9	3	6	12	7	25	1,452			1		4				4	2	1	3	2	1	2	4		1			1	5
Totals	119	84	55	176	147	591	36,589	16.15	7	11		27	7		29	49	28	37	74	39	28	17	50	1	17	8		4	35

Death-rate per 1,000, without cities of over 5,000 population, 15.09.

COMMENTS ON SPECIAL DISEASES.

While the returns, both of marriages and births, for the last year show an increase over those of the previous years, there is a considerable decrease of the number of deaths from the record of the former year, which was one of an exceptional amount of serious diseases. We confine this article to Comments on Special Diseases.

Remittent Fever. The comparison of this year with the former year, of city with country, furnishes some important evidence as to remittent fever. It is, first of all, to be borne in mind, that no other death record represents so large an aggregate of sickness, in proportion to the number of deaths, as does this fever. It stands for hundreds of cases of it that recover—for thousands often of the milder cases of intermittent fever, and of chills and fever, as well as for many neuralgic maladies, and a general malaisé traceable to the same cause. As one reads and compares these statistics with local reports, it is constantly evident that the disease is not a freak of nature, but the result of abnormal decay, chiefly of vegetable matter in undrained lands and immediate favoring circumstances of stagnation and heat. The summaries of local reports shows many instances in which great improvement has followed proper drainage, and many more where the need thereof is fully realized. We have some effective drainage laws upon our statute book, and there is great need that the life-saving advantage of thorough drainage be more fully realized. Important discussions, which have taken place the past year, not only confirm former views as to the relation of marshy or paludal localities to these periodic fevers, but also give prominence to two other views, viz., that in such districts the drinking-water often becomes the vehicle of the exciting cause; and, next, that the condition of warmth in which new cellars and the close ground vicinage of houses is often kept gives us such local conditions as correspond to summer

heat, moisture and decomposition, and so are making winter chills and winter remittents more common.

Typhoid Fever. While information of local outbreaks of typhoid fever of large extent have not reached us the last year, local and circumscribed outbreaks, clearly traceable to local causes, occurred in Beverly, Trenton, Bridgeton, Chambersburg, Paterson, Passaic, Camden, Asbury Park and Ocean Grove. But the noticeable fact is that the disease is quite diffused throughout the State, almost every county and nearly all of the cities showing many cases.

It is so certainly a result either of bad sewage or fœcal accumulations, or else of the direct conveyance of the poison from the secretions of those who have had the disease, that it is not to be looked upon as a result of any general cause, but as a fatal fever directly resulting from insanitary conditions. The cases late in the season, at Asbury Park, occurred in the very houses long before complained of, and before there was active response to the orders of the local Board of Health. The steady increase of this disease in the State is certain unless the greatest vigilance is used by local Boards of Health in promoting and securing the best conditions for the removal of animal secretions and decomposing animal matters from around human habitation. Added to this must be the most accurate precautions as to the disposal of all secretions, clothing, etc., about the sick, lest these, through drinking-water or other vehicles, shall carry the poison to those who are healthy and in healthy homes.

Small-pox. We have reason to rejoice in a great decrease of death-rate from this cause. It will not be sustained unless the increased attention given the last two years to vaccination is kept alive. School Boards, parents and Boards of Health must not neglect this matter. Full details are presented in the valuable articles on this subject, in the last report and in the two small-pox circulars of the Board. We have had some most satisfactory instances of the intelligent supervision and promptness of local Boards by which single cases have been prevented from starting an epidemic.

Scarlet Fever continues to be the great dread of mothers and the destroyer of very many valuable lives, especially between the ages of five and twelve. In a single township (Tewksbury, Hunterdon county), 150 cases and about 20 deaths are reported. The restriction which

has been made as to this disease is manifest where physicians and friends are on the alert early, with methods of isolation, disinfection and a proper care that the peeling off of the scarf skin is either prevented from mingling with the air, by oiling, or quickly disposed of by frequent bodily washings. The remarks as to it, in the last report, can be borne in mind without repetition here.

Measles. This is one of the diseases so communicable that comparatively few escape it. Its fatality during our civil war and sporadic instances of severe local epidemics show that in favoring climatic conditions and amid unfavorable circumstances of care and nursing, it may become a rapidly destructive disease. Still oftener does it cause such impairment of lung tissue as manifests itself in early manhood or womanhood, with symptoms of pulmonary disease. While the same strict rules of isolation and of prohibition from public schools as are applied to scarlet fever and some other contagious diseases, are not often enforced as to it, yet the type should be carefully noted and all cases receive careful attention at the outset. It has prevailed very extensively in many parts of the State, but not with a large proportionate mortality.

Rötheln. This is a disease so similar to measles as often to be known as German measles, and scarcely distinguishable in eruption from the other.

Two circumscribed epidemics of it were the past year recorded in the State, the one in Chester township, Burlington county, and the other at Atlantic City. One death is reported. As a rule, it is only of interest because its diagnosis from measles is so difficult.

Whooping Cough. We noticed in the last report, that for three years in succession, this had registered a higher mortality than measles. This year we have from it 189 deaths. It is a disease from which recovery would be almost universally the rule if its spasmodic symptoms were at once met by appropriate treatment. The carelessness of parents, or too much reliance on domestic remedies, is the more usual cause of the fatality. In order to prevent the spread of the disease, the sputa should not be received upon handkerchiefs to be carried in the pocket, but into some forms of disinfectant fluid. Changes of temperature must be carefully guarded, as it so easily passes into a suffocative catarrh, or causes bronchial disease.

Influenza, or a form of catarrhal fever, records a very few deaths in the State. But associate evidence from reports, and from medical practitioners, show that it prevailed very extensively in the State last winter and spring. It was especially prevalent in Atlantic, Burlington, Camden, Cumberland, Mercer, Hunterdon and Morris counties. In Middle Valley, Morris county, it affected nearly the whole population; and, in general, through the parts of the State affected, showed a progress, an extent, and a universality that easily identified it as being of the climatological form of that disease which, under various names, has traveled over States and continents, and subjected multitudes to its influence. It is especially worthy of note as interfering with labor, as sometimes affecting all mucous membranes, and as to be mitigated and even sometimes prevented by remaining indoors until the influence has passed by. So far as known it does not, like many of the zymotic diseases, depend much on local conditions. Yet, as the very young or the old frequently succumb to it, it needs much earlier attention than is usually given to catarrhs.

Croup and Diphtheria. We had occasion in the last report to trace an increase from 1873, in 1879–80, to 1,728, in 1880–81, and to 1,472, in 1881–82. The record for the year is 1,146. In the Town of Union, Hudson county, in a population of 5,849, it caused this year 52 deaths, and the year before 47.

While a majority of the cases occur in the city, it is also a disease very common in rural districts. Unlike small-pox, or measles, or scarlet fever, it seems to arise without antecedent cases from favoring local conditions. It is now believed that it is sometimes conveyed by water and by milk kept in improper milk cellars. Stagnant dampness in confined places and some forms of vegetable decay have in many cases been closely associated with it. Parents are becoming better informed as to the need of early medical advice, and as to the necessity of constant dilution of the impure air in rooms where children are sick therefrom. It is chiefly in confined localities that it takes on a virulent form.

Diarrheal Diseases. The connection of these with wrong food, bad air, impure water and poor milk is fully certified.

Young children that are allowed, in summer, to eat of all table dishes and of various kinds of fruit and confectionery at unseasonable times, are frequently its victims. In cities it is often desirable to use

water that has first been boiled and then poured from one pitcher to another for aeration, and made moderately cool with ice. In the country, wells are apt to become low in summer, and the quality of the water is such as to need similar treatment. Our last report contained a valuable paper on the various forms of artificial food. Some of these are valuable, but others directly injurious to young children. It is often, too, the case that children are overfed, and so an irritable condition of the mucous membrane is produced. The necessity of second summer sickness is taken entirely too much for granted. Where the transition from milk diet is to plain, well-cooked food in moderate supply, we rarely find this effort of nature to rid itself of unwholesome foods or drinks.

Consumption and Acute Lung Diseases. The study of pulmonary diseases can never diminish in importance so long as many thousands die each year therefrom. It is easy to see from our records the effects of such occupations as those of the potter, the hatter, etc. Also, that most of the dust trades and occupations count many victims. Nor is it surprising that many die therefrom in the open country, and especially females. Indoors work in damp houses, or the steam of the laundry and the kitchen, and the chill of the cellar, too often give sudden alternations of temperature. In many of our farm houses there is need of consulting more closely the health of those who labor indoors, and of providing the best and easiest methods of work. We look with much expectation to the diminution of this disease in the State, because the advantages of change of climate within our own borders are coming to be understood.

Brain and Nervous Diseases. These, both in the young and adult life, cause a great mortality. But there is a marked contrast between the brain and nervous diseases of adults and those of children. With adults, many result from excessive toil, and from an overstrain of the heart and circulatory system. With children, bad modes of sleeping, exposure to great heat, and especially the direct rays of the sun, and irritation of the stomach and bowels often are declared in this way. Forced study, or worry over books, is sometimes a cause. The little nervous ailments of children are too often overlooked. Many a convulsion is followed by no subsequent treatment. A single attack, or a few attacks, can often be prevented from becoming habitual or resulting in epilepsy or idiocy, when it is afterward difficult or impos-

sible to interrupt the tendency. Many cases, functional at first, thus become organic and incurable, and add to our dependent and afflicted population. There is great need that physicians be more impressed with the necessity of attending to children after a convulsion, and of cautioning the parents not to allow repetitions to take place, but to keep the child under medical supervision and treatment.

Diseases of the Heart and Circulation are not only common in old age or with those exposed through life to great business excitements, but occur also in the young, or as a result of such exposures as induce rheumatism. By early and active treatment, and by the use of salicylic acid and alkalies, many cases of rheumatism are prevented from seizing upon the valvular structure of the heart. It is a fact that heart diseases are prevented or ameliorated by care and hygienic conditions more than formerly, and thus many lives are prolonged.

Urinary Diseases. These, while grouped together, are distinguished in office tables. A large proportion of them are such as affect the kidney as a secreting and separating organ. Alcohol, the use of sharp condiments and other errors of alimentation and digestion, record their effects upon this excretory apparatus. Disease attacks its structure with comparative rareness, unless it has been subjected to very unfavorable conditions.

Adult Brain and Spinal Diseases seem to be on the increase. Whenever the nervous system is subjected to early irregularities or is overtaxed in middle life, it is apt to show itself in an early embarrassment of some part of this intricate structure. The number of imperfect or shortened lives past middle life are thus multiplied and much power abstracted from the years which would otherwise give both comfort and vigor for labor.

Erysipelas is becoming more and more an important study. Many facts seem to classify it as a specific disease of a zymotic character and to show that it frequently takes on the virulence of an infectious disease. There are so many evidences that it is inoculable and is apparently carried by contagion that great care is to be exercised as to it.

Its undoubted relation as a conveyor or excitant to puerperal fever makes it very certain that the medical practitioner or the nurse may

not pass from cases of this disease to those in child-bed, without the most precise and cleanly precautions. Since so much of this attendance is rendered by women, they need to know how precious lives are endangered unless all precautions are taken.

Puerperal conditions and diseases need the most careful guard. The loss of mothers, and especially if dependent children are left, means more to the State than is generally supposed. It is for this reason that some governments provide maternities, in order that the risks of loss may be diminished and that the poorer classes may be assured of skilled attendance.

Cancer, as a disease, seems on the increase. The returns for this year show 461 cases. While certain organs are especially prone to this degeneration, it is probable that some small and benign tumors or some forms of localized skin fissures and irritations are forced into a malignant type. The disease is being made more and more a subject of close investigation, and it is to be hoped that preventive care will accomplish more than has yet been accomplished by medicinal means.

Accidents. The constant increase of *accidents* should attract public attention. Drowning, accidents by fire-arms, by railroads and by machinery are more often the result of carelessness than of some unavoidable catastrophe.

There should be laws of prohibition as to bathing and fire-arms, applicable to minors. Machinery in factories should be more fully protected and strict inquiries be made into all other forms of accident. This very watchfulness is a great preventive.

The space at command has required brevity in this summary, but as the record of this year will form a part of the quinquennial record just tabulated, to be more fully analyzed in the next report, there is not so much need of details here. As the tables advance in number of years and in completeness, they lead us to important facts as to localities and greatly aid in the estimates of methods for the promotion of public and private hygiene. This means better and stronger lives, which add alike to the comfort of the citizens and the capital of the State.

QUINQUENNIAL TABLES.

Statement of Marriages, Births and Deaths, including all Supplements, for the five years ending June 30th, 1883.

Cities of over 5,000 Population not included in the Counties.	M.	B.	D.	Population 1880.	Death-rate.
Atlantic County	457	1,404	1,122	13,227	16 96
Atlantic City	200	494	611	5,477	‡22.31
Bergen County	984	3,447	3,044	36,786	16.55
Burlington County	1,356	4,206	3,292	42,832	15.37
Bordentown	236	623	444	5,334	16.65
Burlington City	284	675	692	7,237	19.12
Camden County	433	1,685	1,598	15,936	20.06
Camden City	2,057	3,690	4,391	41,659	21.08
Gloucester City	134	695	481	5,347	17.99
Cape May County	365	1,076	657	9,765	13.46
Cumberland County	742	1,993	1,567	21,305	14.71
Bridgeton	515	1,108	773	8,722	17.84
Millville	407	1,173	760	7,660	19.84
Essex County	1,039	4,130	2,963	40,214	14.74
Newark	6,194	18,931	16,051	136,508	23.52
Orange	542	2,103	1,293	13,207	19.58
Gloucester County	869	3,146	2,066	25,886	15.96
Hudson County	336	1,519	2,317	14,104	§32.86
Bayonne	273	1,165	896	9,372	19.13
Harrison	142	687	698	6,898	20.24
Hoboken	1,468	4,285	3,980	30,999	25.68
Jersey City	4,532	8,497	14,647	120,722	24.27
Town of Union	324	801	780	5,849	26.98
Hunterdon County	1,300	3,668	2,662	38,570	13.80
Mercer County	625	1,947	1,980	22,714	17.43
Chambersburg	176	665	554	5,437	20.38
Trenton	1,607	2,983	3,043	29,910	20.35
Middlesex County	1,019	3,514	2,830	35,120	16.12
New Brunswick	697	2,183	1,778	17,166	20.71
Monmouth County	2,276	5,840	4,793	55,538	17.26
Morris County	1,354	4,427	3,737	44,024	16.98
Morristown	212	604	657	6,837	19.22
Ocean County	478	1,611	1,010	14,455	13.97
Passaic County	401	913	822	11,297	14.55
Passaic City	298	1,089	670	6,532	20.51
Paterson	2,494	7,145	6,206	51,031	24.32
Salem County	573	1,960	1,503	19,523	15.40
Salem City	237	494	485	5,056	19.13
Somerset County	835	2,556	2,141	27,162	15.76
Sussex County	885	1,533	1,732	23,539	14.72
Union County	260	1,155	1,039	12,762	16.28
Elizabeth	1,062	3,789	2,773	28,229	19.65
Plainfield	261	856	663	8,125	16.32
Rahway	288	577	704	6,455	21.81
Warren County	1,092	3,197	2,343	29,408	15.93
Phillipsburg	329	1,164	653	7,181	18.19
Totals	42,698	*121,403	†109,906	1,131,117	19.43

* In the Birth Record, all Cities which have increased to 5,000 population, are still with their Counties, as originally recorded.

† Total additional Still Births for five years, 7,195. ‡ See note, page 349. § See note, page 357.

Total Averages for the State for five years—Persons married to 1,000 persons living, 15.10; persons born to 1,000 persons living, 21.47; persons deceased to 1,000 persons living, 19.43.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Cultivator of ground.	Water employe.	Railroad employe.	Laborer.	Baker.	Barber.	Blacksmith.	Brewer.	Brick layer.	Butcher.	Cabinetmaker.	Carpenter and Joiner.	Carmaker.	Cigarmaker.
Atlantic County	84	92	17	81	2	2	5	2	.....	5	3	27	.....	3
*Atlantic City	12	8	11	16	2	3	2	.....	.....	.....	2	15	.....	.....
Bergen County	217	11	26	134	6	8	18	.....	.....	12	1	36	3	4
Burlington County	531	56	23	203	10	11	19	.....	4	16	2	35	6	1
Bordentown	56	12	13	26	2	1	3	.....	1	2	1	7	2	3
Burlington City	69	1	11	34	3	2	3	.....	5	3	.....	5	3	1
Camden County	201	6	11	43	3	.....	7	1	.....	2	1	13	.....	.....
Camden City	176	97	95	200	17	21	37	2	11	20	7	58	10	16
Gloucester City	12	5	5	47	2	2	3	.....	3	1	.....	7	.....	2
Cape May County	90	76	6	35	4	.....	4	.....	1	3	.....	19	.....	19
Cumberland County	268	125	9	62	.....	3	18	1	2	4	2	14	1	.....
Bridgeton	119	32	9	70	4	5	4	.....	.....	4	.....	7	3	5
Millville	34	42	7	42	2	4	11	.....	.....	2	.....	6	.....	6
Essex County	100	3	38	90	7	3	15	2	.....	15	2	63	3	4
Newark	159	32	164	364	111	75	80	84	7	140	24	218	16	75
Orange	22	1	16	58	1	4	4	.....	.....	7	1	22	1	8
Gloucester County	319	10	14	84	2	6	16	.....	.....	8	2	28	2	3
Hudson County	18	5	8	34	11	5	4	2	3	7	1	14	1	6
Bayonne	5	12	11	84	1	.....	.....	.....	.....	2	.....	8	.....	1
†Harrison	1	.....	3	9	1	1	.....	.....	1	2	.....	2	.....	1
Hoboken	24	73	71	152	26	13	11	6	2	43	15	34	2	30
Jersey City	103	152	281	486	42	37	38	7	5	80	17	145	6	41
‡Town of Union	5	3	6	15	5	5	4	5	.....	6	2	1	4	5
Hunterdon County	664	3	53	106	3	7	26	.....	1	4	3	37	7	2
Mercer County	281	1	17	89	7	1	8	.....	1	8	2	18	4	3
‡Chambersburg	4	.....	1	22	3	.....	.....	.....	.....	.....	1	5	1	.....
Trenton	141	4	45	206	26	23	28	2	6	24	3	38	3	14
Middlesex County	242	51	54	134	6	5	19	1	1	18	.....	61	2	2
New Brunswick	69	37	25	129	7	2	3	.....	.....	16	.....	28	.....	1
Monmouth County	748	137	68	270	14	9	37	1	.....	25	2	105	9	4
Morris County	319	11	78	141	4	4	46	.....	.....	16	1	38	4	2
Morristown	36	.....	7	24	3	.....	6	.....	1	1	.....	12	2	.....
Ocean County	150	67	13	76	1	1	6	.....	.....	2	.....	26	.....	1
Passaic County	122	.....	10	80	3	1	12	.....	.....	4	.....	19	1	.....
‖Passaic City	10	.....	5	52	.....	.....	5	1	.....	6	.....	6	4	3
Paterson	86	10	50	312	23	24	63	7	10	48	5	102	3	10
Salem County	392	24	8	67	2	3	8	.....	3	13	.....	13	.....	1
¶Salem City	51	1	2	16	.....	.....	1	.....	1	2	.....	3	1	3
Somerset County	311	4	28	101	2	7	15	.....	.....	15	2	29	3	4
Sussex County	372	5	49	98	3	4	16	.....	2	10	1	29	1	.....
Union County	51	.....	10	21	.....	.....	1	.....	.....	3	1	9	.....	1
Elizabeth	36	37	47	169	8	6	16	.....	.....	17	5	42	.....	3
Plainfield	18	.....	7	22	2	1	5	.....	.....	8	.....	16	.....	.....
Rahway	24	1	12	25	2	3	4	.....	.....	2	1	14	6	2
Warren County	428	11	52	112	3	5	25	.....	.....	14	4	24	9	3
Phillipsburg	46	5	60	67	1	2	3	.....	.....	1	1	9	.....	2

* Atlantic City, included with county for years 1878-79 and 1879-80.
† Harrison, included with county for years 1879-80.
‡ Town of Union, included with county for years 1879-80.
‖ Chambersburg, included with county for years 1878-79, 1879-80 and 1880-81.
‖ Passaic, included with county for years 1878-79 and 1879-80.
¶ Salem, included with county for years 1878-79.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.—Continued.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Clergyman.	Clerk and bookkeeper.	Cooper.	Dentist.	Druggist.	Editor.	Furnaceman.	Glassmaker.	Grocer.	Harnessmaker.	Hatter.	Innkeeper.	Jeweler.	Lawyer.
Atlantic County	.....	10	1	.....	3	1	.....	16	6	.....	.....	2	.....	.....
*Atlantic City	.....	4	2	.....	.....	.....	.....	2	2	1	.....	5	1	1
Bergen County	1	87	.....	.....	1	3	.....	1	9	1	2	9	5	11
Burlington County	6	37	.....	1	5	2	.....	1	2	2	.....	6	1	4
Bordentown	1	10	.....	.....	2	.....	.....	1	.....	1	.....	.....	1	2
Burlington City	2	8	1	1	1	1	.....	.....	2	1	.....	2	1	.....
Camden County	3	17	.....	.....	.....	.....	1	12	1	.....	2	.....	.....	2
Camden City	10	179	4	4	15	5	.....	18	28	7	11	21	6	14
Gloucester City	.....	8	1	.....	1	.....	.....	.....	.....	.....	.....	3	.....	1
Cape May County	5	16	.....	.....	.....	.....	.....	3	1	.....	.....	2	1	.....
Cumberland County	6	23	.....	1	4	2	.....	17	1	1	.....	1	.....	1
Bridgeton	1	23	2	1	3	.....	.....	59	4	2	.....	.....	1	2
Millville	1	15	.....	1	1	.....	.....	113	1	.....	.....	.....	.....	2
Essex County	6	108	.....	5	9	4	.....	1	15	3	71	7	11	15
Newark	17	506	19	12	38	4	.....	4	73	66	295	68	215	26
Orange	1	31	.....	3	2	1	.....	.....	6	.....	184	4	.....	6
Gloucester County	5	29	2	1	5	.....	.....	76	7	5	.....	2	4	1
Hudson County	1	33	2	1	.....	1	1	2	2	.....	.....	2	.....	.....
Bayonne	1	20	9	3	.....	.....	.....	.....	2	1	.....	1	1	2
†Harrison	.....	2	.....	.....	.....	.....	.....	.....	1	1	.....	1	2	.....
Hoboken	.....	178	11	2	5	3	.....	1	26	1	2	25	16	8
Jersey City	9	534	15	8	28	5	.....	1	62	7	6	49	41	39
‡Town of Union	.....	11	3	.....	3	.....	.....	.....	5	.....	.....	2	1	.....
Hunterdon County	4	4	.....	1	5	1	.....	.....	2	4	1	2	4	13
Mercer County	7	37	.....	.....	5	.....	.....	.....	3	.....	1	6	2	5
‡Chambersburg	.....	3	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....
Trenton	5	106	6	7	7	.....	.....	.....	14	2	1	17	7	13
Middlesex County	7	59	1	1	4	1	.....	1	5	1	3	5	2	4
New Brunswick	9	48	1	.....	4	.....	.....	1	6	2	3	4	3	6
Monmouth County	15	135	2	5	8	3	.....	.....	16	14	4	8	4	19
Morris County	12	41	.....	2	7	2	3	.....	5	3	5	2	5	4
Morristown	2	17	.....	2	5	.....	.....	.....	3	.....	.....	.....	1	4
Ocean County	4	19	.....	.....	2	.....	.....	.....	.....	2	1	2	1	1
Passaic County	1	20	1	.....	.....	.....	.....	.....	2	.....	2	3	.....	1
‖Passaic City	.....	29	.....	.....	1	1	.....	.....	4	.....	.....	1	.....	1
Paterson	2	118	3	1	5	2	.....	1	25	3	2	12	2	18
Salem County	3	12	.....	.....	.....	.....	.....	14	1	2	.....	2	.....	.....
¶Salem City	1	5	.....	.....	.....	.....	.....	18	.....	.....	.....	.....	.....	1
Somerset County	13	41	.....	1	5	.....	.....	.....	10	1	1	6	1	8
Sussex County	3	33	.....	4	2	2	3	1	2	1	.....	7	1	8
Union County	1	38	.....	.....	2	.....	.....	.....	4	.....	13	3	2	1
Elizabeth	3	111	1	2	9	2	.....	.....	15	4	5	4	7	10
Plainfield	1	33	.....	.....	2	.....	.....	.....	4	2	4	.....	1	2
Rahway	.....	36	.....	1	2	1	.....	.....	5	2	.....	3	4	2
Warren County	10	40	3	1	6	.....	.....	.....	1	2	1	2	.....	11
Phillipsburg	.....	16	.....	.....	3	.....	1	.....	2	.....	.....	2	1	2

* Atlantic City, included with county for years 1878-79 and 1879-80.
† Harrison, included with county for years 1879-80.
‡ Town of Union, included with county for years 1879-80.
‖ Chambersburg, included with county for years 1878-79 1879-80 and 1880-81.
‖ Passaic, included with county for years 1878-79 and 1879-80.
¶ Salem, included with county for years 1878-79.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.—Continued.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Machinist.	Manufacturer.	Mason.	Miller.	Painter.	Photographer.	Physician.	Plumber.	Police and watchman.	Potter.	Printer.	Restaurant keeper.	Shoemaker.	Stationer.
Atlantic County	4	3	4	1	4	.....	2	1	1	.....	3	.....	12	.....
*Atlantic City	2	1	.....	.....	8	.....	1	.....	.....	.....	.....	1	1	1
Bergen County	11	11	14	3	26	.....	5	4	1	.....	16	.....	7	.....
Burlington County	35	3	5	12	21	.....	12	3	1	2	8	1	22	.....
Bordentown	6	2	.....	2	5	.....	2	.....	.....	5	.....	.....	1	.....
Burlington City	4	3	4	5	3	.....	3	2	.....	1	3	.....	40	1
Camden County	2	4	1	3	7	.....	6	.....	.....	.....	4	.....	3	.....
Camden City	71	13	7	2	37	5	13	8	5	4	40	22	58	.....
Gloucester City	6	2	2	.....	.....	.....	1	.....	1	.....	3	.....	5	.....
Cape May County	2	3	2	.....	13	.....	4	1	.....	.....	4	.....	.....	.....
Cumberland County	2	3	1	5	1	1	2	1	1	1	3	2	25	.....
Bridgeton	21	1	.....	6	9	1	1	.....	.....	.....	5	1	1	.....
Millville	3	2	3	.....	5	.....	.....	.....	.....	.....	2	1	11	.....
Essex County	21	14	12	.....	23	.....	9	6	2	.....	10	.....	11	.....
Newark	234	54	77	5	134	7	36	35	20	4	53	7	173	6
Orange	.....	5	8	1	14	.....	3	7	.....	.....	4	.....	4	.....
Gloucester County	9	1	6	11	4	.....	4	1	.....	.....	4	1	4	.....
Hudson County	9	1	3	1	10	.....	2	2	1	.....	7	.....	3	1
Bayonne	5	2	4	.....	2	.....	.....	2	3	1	.....	.....	4	1
†Harrison	.....	.....	.....	.....	3	.....	.....	1	.....	.....	.....	.....	.....	.....
Hoboken	37	4	13	2	23	4	16	8	2	3	14	9	19	1
Jersey City	143	32	15	2	66	3	31	27	28	1	52	8	33	1
‡Town of Union	3	1	6	.....	7	.....	.....	1	.....	.....	.....	2	3	.....
Hunterdon County	7	5	3	16	16	.....	8	1	1	.....	4	1	14	.....
Mercer County	5	2	6	6	5	.....	6	.....	.....	26	3	.....	4	.....
‡Chambersburg	1	.....	3	.....	1	.....	.....	.....	.....	7	.....	.....	.....	.....
Trenton	46	14	9	5	23	4	7	9	3	20	18	4	9	1
Middlesex County	9	8	8	4	13	1	9	1	2	3	3	.....	11	.....
New Brunswick	22	6	2	2	12	1	4	6	2	.....	6	.....	20	.....
Monmouth County	5	9	35	18	55	3	17	5	1	1	11	7	4	.....
Morris County	17	6	13	11	22	1	12	3	.....	1	11	2	7	.....
Morristown	3	2	6	.....	4	.....	4	1	.....	.....	.....	.....	4	.....
Ocean County	5	2	4	3	3	.....	1	.....	.....	.....	2	.....	2	.....
Passaic County	8	3	6	3	3	.....	1	1	1	.....	3	.....	.....	.....
‖Passaic City	10	3	1	1	7	1	1	.....	.....	.....	.....	.....	.....	.....
Paterson	179	13	19	5	46	2	15	18	9	.....	16	1	19	.....
Salem County	1	.....	2	4	5	.....	1	.....	.....	.....	3	1	4	.....
¶Salem City	2	.....	.....	.....	3	.....	1	.....	.....	1	.....	.....	.....	.....
Somerset County	10	7	7	6	3	1	10	2	1	3	3	1	2	.....
Sussex County	6	1	9	10	5	.....	6	1	1	.....	3	.....	10	.....
Union County	5	1	4	.....	7	.....	3	.....	2	.....	2	.....	4	.....
Elizabeth	73	9	9	1	23	.....	3	4	4	3	5	1	3	1
Plainfield	6	3	2	.....	2	.....	3	1	.....	.....	.....	1	.....	2
Rahway	8	5	4	.....	11	1	3	1	.....	1	2	.....	1	.....
Warren County	10	7	2	18	12	.....	8	.....	.....	.....	4	1	3	.....
Phillipsburg	6	3	2	2	6	.....	.....	2	.....	1	4	.....	.....	.....

* Atlantic City, included with county for years 1878–79 and 1879–80.
† Harrison, included with county for years 1879–80.
‡ Town of Union, included with county for years 1879–80.
§ Chambersburg, included with county for years 1878–79, 1879–80 and 1880–81.
‖ Passaic, included with county for years 1878–79 and 1879–80.
¶ Salem, included with county for years 1878–79.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.—Continued.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Stone cutter.	Surveyor and civil engineer.	Tailor.	Tanner.	Teacher.	Telegraphier.	Tobacconist.	Weaver.	Wheelwright.	Worker in S. W. & C.	Other trades.	Merchant.
Atlantic County	.....	.....	5	1	2	3	2	3	3	3	37	15
*Atlantic City	.....	1	.....	.....	.....	.....	.....	1	.....	.....	33	7
Bergen County	2	2	2	.....	12	8	1	13	3	10	108	48
Burlington County	.....	.....	.....	2	7	7	.....	2	5	3	100	51
Bordentown	2	.....	1	.....	1	3	1	1	.....	.....	37	6
Burlington City	3	.....	.....	.....	.....	.....	1	.....	1	1	42	4
Camden County	.....	.....	.....	.....	4	2	.....	4	4	.....	31	15
Camden City	8	5	3	.....	1	10	6	20	9	9	205	112
Gloucester City	.....	.....	.....	.....	.....	.....	.....	11	.....	3	30	6
Cape May County	2	.....	.....	.....	6	1	1	.....	2	.....	27	16
Cumberland County	1	.....	2	.....	8	1	.....	.....	4	.....	42	34
Bridgeton	3	.....	1	.....	2	.....	1	1	1	1	56	19
Millville	.....	.....	2	.....	1	.....	1	1	.....	3	69	93
Essex County	3	2	3	3	10	.....	3	10	3	4	147	82
Newark	44	8	149	92	24	14	6	11	7	14	1281	256
Orange	1	1	3	.....	1	1	2	.....	.....	1	68	23
Gloucester County	2	.....	.....	.....	8	2	.....	5	8	.....	57	37
Hudson County	4	.....	2	1	3	1	.....	3	.....	15	63	26
Bayonne	.....	.....	1	.....	1	.....	.....	.....	.....	.....	23	21
†Harrison	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	16	1
Hoboken	1	1	13	1	7	3	3	5	2	9	239	119
Jersey City	13	10	29	.....	13	23	12	19	2	11	599	363
‡Town of Union	6	.....	13	.....	1	.....	.....	12	1	16	58	9
Hunterdon County	2	1	1	1	21	13	.....	1	7	1	83	51
Mercer County	2	1	.....	2	11	6	3	2	5	2	55	31
§Chambersburg	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	19	.....
Trenton	4	1	12	2	5	10	2	4	3	4	297	59
Middlesex County	2	2	1	.....	1	11	4	1	.....	.....	86	53
New Brunswick	2	2	5	.....	1	12	.....	1	.....	7	92	24
Monmouth County	.....	8	9	.....	10	7	2	1	7	1	165	99
Morris County	2	.....	1	.....	16	6	.....	3	4	.....	329	57
Morristown	1	1	.....	.....	.....	1	.....	.....	.....	.....	23	9
Ocean County	.....	2	1	.....	8	3	.....	5	.....	.....	24	23
Passaic County	1	.....	.....	.....	1	.....	.....	7	1	2	49	15
‖Passaic City	.....	.....	.....	.....	1	.....	.....	8	.....	6	57	8
Paterson	5	2	15	3	7	15	1	177	2	321	445	60
Salem County	1	.....	1	.....	2	4	1	1	3	.....	27	15
¶Salem City	1	.....	.....	.....	.....	1	.....	.....	.....	.....	17	7
Somerset County	3	3	1	.....	6	5	2	22	2	2	37	38
Sussex County	2	.....	1	.....	15	1	.....	1	4	2	87	37
Union County	.....	.....	7	.....	4	2	.....	.....	.....	1	30	18
Elizabeth	3	.....	3	6	4	8	1	1	.....	6	177	51
Plainfield	.....	1	3	1	1	2	.....	.....	.....	.....	60	16
Rahway	.....	.....	5	.....	2	3	1	.....	2	2	47	11
Warren County	3	2	5	3	13	10	1	.....	2	.....	136	45
Phillipsburg	1	1	.....	.....	.....	.....	.....	.....	.....	.....	48	11

* Atlantic City, included with county for years 1878–79 and 1879–80.
† Harrison, included with county for years 1879–80.
‡ Town of Union, included with county for years 1879–80.
§ Chambersburg, included with county for years 1878–79, 1879–80 and 1880–81.
‖ Passaic, included with county for years 1878–79 and 1879–80.
¶ Salem, included with county for years 1878–79.

Summary of Vital Facts from New Jersey Birth Record for Five Years, ending June 30th, 1883.

NOTE.—These Tables include the Births for Five Years, as to which the Facts herein stated are given. In three instances, viz.: in Atlantic City and Salem City, for two years, and in Passaic City, for one year, the Births of the Cities are included with their respective Counties.

	Male.	Female.	Previous children.	Number living.	Native father.	Foreign father.	Native mother.	Foreign mother.	Mixed parentage.	Black.	Population, 1880.
Atlantic County	803	751	4,480	3,405	1,262	277	1,321	227	132	18	13,227
Atlantic City	172	135	832	600	275	27	283	26	17	21	5,477
Bergen County	1,700	1,659	9,676	7,509	2,127	1,226	2,207	1,078	423	116	36,786
Burlington County	2,112	1,929	10,624	8.340	3,655	333	3,776	270	176	111	42,832
Bordentown	295	302	1,777	1,316	492	107	506	75	61	26	5,334
Burlington City	303	309	1,546	1,198	491	41	587	34	25	55	7,237
Camden County	827	830	4,488	3,373	1,435	196	1,517	139	134	177	15,926
Camden City	1,845	1,750	9,103	6,562	2,892	619	3,046	455	358	167	41,659
Gloucester City	348	343	1,957	1,433	456	226	487	201	155	.....	5,347
Cape May County	545	495	2,734	2,176	998	26	1,026	23	30	66	9,765
Cumberland County	1,039	901	5,090	4,024	1,733	176	1,793	143	101	79	21,305
Bridgeton	556	533	2,584	1,987	934	100	1,017	76	43	71	8,722
Millville	591	573	3,203	2,436	1,034	112	1,078	83	57	6	7,660
Essex County	2,038	2,013	11,044	8,652	2,524	1,424	2,808	1,260	626	81	40,214
Newark	9,253	8,858	57,494	43,648	8,601	9,160	9,330	7,663	3,129	253	136,508
Orange	1,072	1,017	6,880	5,378	926	1,159	1,017	1,078	388	70	13,207
Gloucester County	1,617	1,490	8,130	6,350	2,721	357	2,879	232	213	132	25,886
Hudson County	725	680	4,700	3,331	533	843	649	731	241	1	14,104
Bayonne	505	422	3,014	2,251	336	586	384	536	143	4	9,372
Harrison	300	363	2,102	1,489	328	337	330	331	113	.....	6,893
Hoboken	1,864	1,912	12,624	8,707	970	2,780	1,308	2,343	708	4	30,999
Jersey City	3,775	3,561	22,932	15,706	3,084	4,144	3,622	3,644	1,458	62	120,722
Town of Union	399	355	2,609	1,897	203	545	281	464	153	.....	5,849
Hunterdon County	1,775	1,713	9,059	7,408	3,263	290	3,374	214	129	34	38,570
Mercer	1,167	1,089	5,905	4,548	1,675	514	1,757	406	217	162	22,714
Chambersburg	162	152	1,010	761	150	171	166	154	43	1	5,437
Trenton	1,526	1,411	7,357	5,623	1,884	1,009	2,125	805	446	83	29,910
Middlesex County	1,763	1,679	9,103	7,064	2,204	1,203	2,396	1,037	372	70	35,120
New Brunswick	1,078	1,044	6,346	5,095	1,379	719	1,518	591	337	49	17,166
Monmouth County	2,966	2,771	14,852	12,588	5,007	692	5,177	592	398	222	55,538
Morris County	2,247	2,075	12,951	10,212	3,122	1,191	3,293	1,040	487	37	44,024
Morristown	231	288	1,476	1,205	431	131	435	129	57	21	6,837
Ocean County	815	753	4,623	3,735	1,498	83	1,485	85	39	8	14,455
Passaic County	562	534	3,287	2,599	811	382	831	265	143	18	11,297
Passaic City	453	434	3,002	2,193	349	528	380	507	201	17	6'532
Paterson	3,670	3,386	21,164	14,930	2,839	4,239	3,210	3,741	1,401	70	51,031
Salem County	1,105	984	5,306	4,288	1,969	93	2,042	75	55	163	19,523
Salem City	164	155	995	846	298	20	309	12	10	21	5,056
Somerset County	1,289	1,222	6,854	5,671	2,006	487	2,190	335	263	143	27,162
Sussex County	785	699	3,770	3,028	1,346	139	1,403	89	80	4	23,539
Union County	573	531	3,378	2,727	734	364	802	296	143	28	12,762
Elizabeth	1,954	1,838	11,186	8.541	1,792	2,000	2,070	1,683	743	47	28,229
Plainfield	440	409	2,416	1,844	616	218	648	197	84	63	8,125
Rahway	260	272	1,488	1,161	422	124	441	109	64	36	6,455
Warren County	1,606	1,538	8.315	6,634	2,706	398	2,841	322	151	29	29,408
Phillipsburg	573	578	3,647	2 874	878	262	975	185	124	.....	7,181

Summary of Vital Facts from New Jersey Death Record, by Counties, for Five Years ending June 30th, 1883.

COUNTIES.	DEATHS AT ALL AGES.					PRINCIPAL CAUSES OF DEATH.																	
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Disease of heart and circulation.	Urinary diseases.	Adult brain and spinal disease.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic	426	243	128	445	433	4	34	11	26	4	24	91	235	228	137	120	89	54	147	15	107	42	3	19	27
Bergen	596	451	286	889	736	94	80	6	97	11	25	140	254	373	241	241	209	102	201	16	136	68	6	35	87
Burlington	907	629	383	1,234	1,295	49	137	16	60	17	47	195	417	695	390	270	249	143	357	24	245	99	16	55	56
Camden	1,578	966	678	1,859	1,192	81	249	158	193	11	57	216	801	887	564	464	318	141	429	17	224	122	10	65	80
Cape May	151	72	69	148	196	7	31	.....	15	2	10	25	72	75	56	47	21	15	66	3	39	26	2	4	9
Cumberland	656	473	321	800	823	9	132	1	90	18	19	214	316	498	318	214	181	85	220	15	154	56	8	24	47
Essex	4,707	3,497	2,039	6,341	3,472	330	554	26	945	126	201	1314	1,956	3,002	2,421	1898	969	692	1251	104	794	392	45	228	242
Gloucester	473	347	184	570	569	30	68	9	39	7	19	80	236	346	212	130	122	43	140	11	117	44	7	13	30
Hudson	5,873	4,747	2,441	7,357	2,730	392	551	351	968	188	177	1436	2,795	2,843	2,574	2318	934	590	963	97	827	332	47	257	493
Hunterdon	415	252	251	677	1,008	37	75	1	65	9	17	122	198	315	248	107	211	85	310	19	141	76	11	33	51
Mercer	1,140	650	511	1,807	1,289	51	138	23	174	19	35	210	545	917	523	313	261	145	492	38	283	135	24	57	95
Middlesex	1,038	680	490	1,357	1,047	81	106	12	128	14	61	211	522	623	461	273	314	164	284	29	218	108	11	36	124
Monmouth	1,096	580	416	1,188	1,288	39	90	6	95	8	52	152	583	649	445	298	314	177	396	14	266	101	16	46	118
Morris	802	431	302	1,209	1,155	116	78	.....	185	24	37	168	331	538	509	287	249	127	471	24	189	81	31	62	106
Ocean	207	108	96	302	271	3	28	1	17	1	13	50	89	175	91	62	45	10	77	6	69	16	5	15	17
Passaic	2,001	1,302	791	2,299	1,329	138	164	42	316	47	68	314	1,089	1,096	867	650	367	230	360	34	312	128	25	88	102
Salem	438	220	205	580	695	50	36	3	32	12	13	110	184	267	222	169	143	78	215	11	138	50	6	27	41
Somerset	393	223	210	596	696	50	36	3	32	12	13	110	184	259	184	101	118	58	190	11	72	40	6	27	41
Sussex	249	200	186	515	527	41	55	.....	78	2	9	75	105	237	134	106	453	275	328	31	249	106	11	45	112
Union	1,164	818	514	1,508	1,134	106	92	6	174	30	49	301	514	694	340	216	148	75	229	21	144	41	12	33	75
Warren	649	442	345	791	725	37	81	10	133	15	12	172	272	346	91	62	45	10	77	3	69	16	5	15	17
Totals	24,959	17,386	10,961	32,477	22,495	1721	2818	659	3857	573	958	5719	11,763	15,077	11,861	8609	5575	3199	7247	555	4789	2115	318	1185	1990

Total deaths in the State, for five years (including supplements), was 109,906, and the average death-rate, 19.43.

Rates for short periods, or which deal with small numbers, are only approximate, and sometimes misleading, since temporary causes may have been in operation, and small numbers do not eliminate or balance errors which practically disappear in large aggregates. So, five or ten years analyses are much more important than any single year.

The number of deaths before twenty, in proportion to the rest, are much more informatory as to local causes affecting health, than the total deaths. So, also, the number dying from the zymotic diseases, and especially from fevers, croup, diphtheria, diarrheal diseases, consumption, and brain and nervous diseases of children.

Summary of Vital Facts from New Jersey Death Record, in Cities of over 5,000 Population, for Five Years ending June 30th, 1883.

CITIES.	DEATHS AT ALL AGES.					PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Remittent fever, &c.	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.	Accident.
Atlantic City	187	120	48	153	100	......	13	......	15	1	8	33	121	68	42	48	36	20	46	11	27	14	1	6	19
Bayonne	259	198	73	274	90	10	13	......	22	4	10	54	124	93	123	107	28	26	28	7	31	9	......	7	32
Bordentown	69	59	39	148	126	5	6	1	7	2	3	19	25	83	30	44	39	16	39	4	18	10	......	7	8
Bridgeton	177	120	90	203	195	3	36	......	22	......	9	87	85	116	80	51	54	15	50	4	42	12	2	6	15
Burlington City	115	103	72	224	176	11	13	2	7	1	8	36	54	140	63	37	47	34	55	9	31	9	3	12	12
Camden City	1,062	715	499	1,279	689	56	162	147	148	7	37	187	543	594	388	342	199	104	256	8	120	92	7	37	47
Chambersburg	152	80	75	148	80	6	22	......	29	4	7	29	67	77	60	35	16	8	29	4	29	12	3	8	2
Elizabeth	669	512	308	792	480	42	39	1	105	15	33	158	315	354	309	278	137	59	160	8	110	52	6	19	63
Gloucester City	137	56	60	143	79	5	15	......	6	4	2	16	61	81	42	46	15	7	29	1	17	5	2	8	9
Harrison	172	138	78	228	73	28	31	......	34	2	11	23	81	99	85	92	19	12	23	1	16	8	3	7	13
Hoboken	1,076	870	360	1,280	370	37	72	35	132	20	36	376	547	474	438	531	180	115	150	22	114	63	14	52	72
Jersey City	3,650	2,986	1,568	4,645	1,694	218	361	254	645	144	122	825	1774	1860	1668	1437	610	334	611	57	584	215	27	168	298
Millville	183	168	102	188	117	......	38	......	43	14	9	57	106	124	83	55	26	21	32	2	27	12	1	3	8
Morristown	106	90	52	220	194	13	6	......	8	1	9	29	62	101	75	48	33	25	109	2	25	14	2	5	11
Newark	3,753	2,872	1,637	5,151	2,470	245	374	24	778	101	143	1080	1574	2370	1857	1456	740	531	949	67	611	298	37	167	191
New Brunswick	441	271	208	491	346	19	47	9	65	12	28	114	215	243	185	121	84	73	99	11	62	50	2	7	28
Orange	331	231	127	408	187	7	22	......	51	7	21	66	130	198	201	123	51	34	61	8	35	26	......	17	14
Passaic City	214	130	69	173	90	6	19	......	19	2	10	33	106	82	71	78	37	23	22	5	19	5	3	11	14
Paterson	1,630	1,065	637	1,887	1,009	91	134	42	266	43	52	255	905	913	689	520	270	180	278	21	255	103	17	64	63
Phillipsburg	202	117	76	163	93	5	21	......	28	2	6	69	69	74	56	59	24	6	46	......	26	5	1	11	13
Plainfield	164	98	67	174	164	4	12	1	14	7	3	30	93	104	84	54	31	28	39	5	24	12	3	3	14
Rahway	130	79	59	229	202	13	9	3	27	5	4	13	56	115	96	48	44	18	53	9	39	20	1	6	7
Salem City	110	48	41	134	140	9	14	2	2	......	6	20	42	82	58	17	19	9	45	......	28	11	4	5	5
Town of Union	224	201	118	181	71	16	16	4	49	8	2	132	97	88	65	88	32	24	28	3	22	11	......	8	5
Trenton	769	395	278	1,022	599	31	66	19	116	8	15	108	324	639	282	185	135	82	210	17	143	59	15	31	48
Totals	15,982	11,722	6,741	19,938	9,834	880	1561	544	2638	414	594	3849	7576	9072	7130	5905	2906	1804	3447	286	2455	1127	154	675	1011

Cities are generally more unhealthy than their death-rates indicate, since the population is in many of them much decreased for four months in the year, and thousands remove themselves instead of removing the evils which distress and sicken those who remain. Hence, in many of our cities, the death-rate for June, July, August and September, reckoned for the remaining population, is a fair criterion of the health of locality, or at least should be considered for purposes of correction. So health laws are a great defense to all, but especially to the working classes of cities. It is a question of labor and social science and art, as well as of comfort and hygiene.

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