FIFTH ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY,

1881.

MOUNT HOLLY, N. J.:
PRINTED BY CHARLES H. FOLWELL.
1881.

THE STATE BOARD OF HEALTH.

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REPORT OF THE SECRETARY OF THE BOARD.

To His Excellency, George C. Ludlow,

GOVERNOR:—As Secretary of the State Board of Health, I have the honor herewith to transmit to you its fifth annual report. Two reports previously made by commissions appointed by the Legislature, as well as the experience of localities, showed the need of attention to the health of the people as a great material interest. The four reports which then followed have elucidated not only the importance of the subject, but the commendable progress which is being made in many parts of the State in a wise concern for this important department of public welfare.

The developments both of science and of art have thrown light upon the records of actual experience, and show most forcibly that a large number of diseases are preventable, or can so far be limited as greatly to reduce their frequency and their virulence. Even those whose profession it is to deal with the sick are constantly being surprised at the amount of evidence accumulating to show that the causes of disease are within the possibilities of control. Much of this control can not be that of the individual. From some sources of ill-health he cannot protect himself because he can not be expected to have the knowledge of methods, such as by education, by free information, must be made the common property of every citizen. From others he can only protect himself by public provision, since the deadly nuisance may be on his neighbor's premises, or in the street, upon which he must travel.

Among those who have carefully looked into the matter, there is a prevailing sentiment that legislation needs to look more thoroughly after such interests of labor and of capital, and, hence, of all households and of all citizenship, in those respects in which health and life are imperiled by such preventable evils as necessarily fall within the range of public concern.

Edwin Chadwick, C. B., the veteran sanitarian of England, in a recent article, points out some of the interests and results of sanitary administration, which bear alike on public health, vital statistics and political economy. Commencing with a quotation from the Health Report of the Local Government Board for 1880, he says:

"'Before concluding the part of our report which relates to sanitary administration, it may be useful to draw attention to the annual death-rate for some years past, as indicating the effect which recent sanitary measures would appear to have had upon the public health.

"'The following table shows the death-rate for each of the four last decennial periods:

ENGLAND AND WALES.

Annual death-rate per 1000.	1841–50.	1851–60.	1861–70.	1871–80.
All causes.....	22.4	22.2	22.5	21.5
Seven zymotic diseases.....	.....	4.11	4.14	3.36
Fever.....	.....	0.91	0.88	0.49

"'From the above figures it will be seen that, speaking generally, the death-rate of the country remained stationary from 1840 to 1870, but that in the period 1871–80 it fell from 22.5 (of the previous decade) to 21.5, a reduction equivalent to nearly 4½ per cent. It may, therefore, be roughly estimated that about a quarter of a million of persons were saved from death in the ten years 1871–80, who would have died if the death-rate had been the same as in the previous thirty years. If twelve cases of serious but non-fatal illness be reckoned for every death, it follows that about 3,000,000 persons, or over one-ninth of the whole population, have been saved from a sick-bed by some influences at work in the past decade, which had not been in operation previously. The case, indeed, is still stronger than this. The death-rate of rural districts is habitually lower than that of urban districts; and as the population is steadily concentrating itself, more and more, into the towns, the death-rate of the whole country would tend to increase, if the other circumstances affecting it remained the same. When we find that this tendency has been so much more than merely counteracted, it becomes interesting to see where the gain has been, and to endeavor to trace some of the causes to which it may be due.

"'Comparing, then, 1861–70 with 1871–80, it will be seen from the foregoing figures that of the entire reduction of 1.0 in the death-rate, more than three-quarters (4.14—3.36=0.78) comes under the head of 'The Seven Zymotic Diseases;' of the diseases, that is, which are most influenced by sanitary improvements, and most amenable to control by the action of sanitary authorities. And of this three-quarters, just half (0.88—0.49=0.39), or three-eighths of the entire reduction, is in 'Fever'—the disease which, more than any other, shows itself in connection with such faults of drainage, of water-supply, and of filth accumulation, as it is within the province of good sanitary administration to remove.

"'It is particularly significant that, since the year 1870, when the fever death-rate was 0.80 per 1000, it has fallen pretty steadily, year by year, as follows, down to 0.32 in 1880:

1871.....	.70	1876.....	.44
1872.....	.61	1877.....	.41
1873.....	.58	1878.....	.42
1874.....	.59	1879.....	.30
1875.....	.55	1880.....	.32

"'Thus in the five years, 1871–5, the fever death-rate was 0.61; in the five years 1876–80, it was 0.38.'"

"During the decade from 1861 to 1870, there appeared to be no gain from the outlay on sanitary works or on sanitary service in England and Wales; but since then the service appears to have made an effective start, and the pecuniary gain may be thus stated: Under the inquiry as to interments, the cost of funerals—all round—was ascertained to be £5 each. The gain under that head will, therefore, be about one million by the quarter of a million of funerals saved during the last decade. The direct cost of sickness has been estimated at about £1 per case. The gain under that head during the decade will, therefore, amount to about three millions; a gain, that is to say, of medical treatment and other expenses. But the gain to the wage classes, from the saving of lost labor, will have been far greater. Dr. James Watts, who has had great experience in friendly societies, states the average loss of working time at two working weeks and a half per member between twenty-one and seventy years of age, and he estimates the total loss to the wage classes, by the loss of work through sickness, at upwards of thirteen millions per annum. The gain derivable from sanitation may be further illustrated from its advance in military service. The first British army went out to the Crimea under the established curative or medical service, and it was lost. Sanitary Commissioners, trained in service under the first General Board of Health, were then sent out to reform the condition of hospitals and camp, and within three months reduced the sickness and mortality from a plague-rate down to an ordinary standard of health, and by the end of the summer of 1855, to a rate lower than that of the best hospitals at home; and the War Minister declared in Parliament that by the application of their science the second army had been saved. Since then, the Army Medical Department has applied extended sanitary operations. Their exercise under great difficulties is best shown in India. Formerly the death-rate in the Indian army was 69 per 1000 per annum. The average mortality from 1869 to 1878 was only 20.41. There was, therefore, a gain of 48.59 per 1000; or, on the present force out there, a gain of 2350 men. The death-rate of the army at home was formerly 18 per 1000. In the year 1879 it was 7.55, being a gain of 10.55 per 1000. As the strength of the army in 1879 was 80,700, the gain was 843 per annum. The total gain to the army in India, and the army at home, and the rest of the army, will be 3413 men per annum. As each soldier is estimated at £100, this represents in money value £344,000, or more than a third of a million. It is not very easy to get at the real amount of the sickness, but the total gain, including the diminished death-rate, is considered to be under-rated at half a million per annum. For the decade, the total saving of military force from death have been upwards of forty thousand men, and upwards of eight millions and a quarter in money.

"The total number of men killed on the battle-field and on the deck, including those killed at Waterloo, Trafalgar, and the most severe battles during the twenty-two years' war was, according to the army returns, 19,796. The lives saved from premature destruction by the civil sanitary service, during each of the ten years of the decade, was 25,000. The wounded during the twenty-two years' war were 79,709; but, taking a serious sickness as equivalent to a wound, the achievement of the sani-

tary service has been, during the same period, some three millions of cases saved by the civil sanitary service. The deaths by steam explosions, in mines and on railways, amount to about 5000 annually, but the lives saved by the civil sanitary service in England and Wales are five-fold greater than the lives thus destroyed by civil accidental violence. A reduction of the death-rate by 4½ per cent. is only an instalment of sanitary progress. Thus, in the instance of Croydon, visited by the delegates of the Congress, the death-rate has been reduced from 25 to 16 per 1000, chiefly by the methods introduced by the first General Board of Health, by which spring supplies of pure water are carried into the houses, and the fouled water carried at once out of the houses and out of the town, by one Local Board Authority; while all putrescible matter, instead of remaining for months and years in conditions of putrefaction, is undecomposed, and flows upon the land within two hours. So in Salisbury, Leamington, and a number of other places. At Croydon, it has been stated by Dr. Alfred Carpenter that, by complete sanitation, the death-rate might be reduced to 10 in a thousand. In the Metropolis the death-rates among the wage classes in their common dwellings is upwards of 30 per 1000. In the model dwellings in London, it is, however, about 16 or 17, even with surrounding deteriorating conditions. On the demonstrations of various model instances, it may be held that the reduction of the general death-rate by 4½ per cent., as reported, satisfactory as this is, cannot be considered more than one-third of the results obtainable by advanced sanitary administration and further sanitary works. The pain and misery, and the social disorder, occasioned by excessive sickness and premature mortality, are generally beyond pecuniary estimation. Such estimates as those given serve to show the money loss incurred by inattention to the continuance of preventable physical evils."

Dr. De Chaumont, of the Royal Army College, at Netley, adds his testimony, thus:

"Parallel with the progress of medicine and the collateral sciences, advances have been made in sanitary science which amount to important revelations, so that it has become possible to lay down certain principles, which, as we have seen, are capable of practical application to the great advantage of us all. Thus, the dwelling in marshy districts has been proved by *incontrovertible* evidence to be usually followed by attacks of ague and fever of various kinds; that destitution and crowding give rise to typhus; that the withdrawal of vegetable diet produces scurvy; that small-pox, measles and scarlet fever are communicable by contact to otherwise healthy persons; and by *equally* strong evidence, though not so generally accepted, acknowledged and acted upon, sanitary science reveals to us that out of the 700,000 deaths which take place in one year in the United Kingdom, no less than one-third, or some 240,000 deaths, have been traced to those particular diseases which are liable to be favored or propagated by neglected house-sanitation. In fact, the highest medical and sanitary authorities have decided that by good sanitary appliances and surroundings, resulting in the maintenance of the purity of the air and water within and around our dwellings, typhoid fever, diphtheria, sore throat and cholera might be rendered exceptional diseases, instead of being, as they now are, the fruitful causes of illness and death to the alarming extent these statistics attest."

This care of the public health is no longer regarded as merely a professional concern, or one of generous patronage. The welfare of

the State and its highest material interests depend very much upon how far it promotes the health and life of the citizen. It is *political economy* that requires the closest attention to the subject. It has been said that the progress of a people can be tested by the exact attention given to the prevention of preventable diseases. It would seem as if the test were a safe one, for the greatest progress in statistical inquiry, and in the provision of State oversight, has been made by those who, in other respects, are admitted to be most prosperous.

The year has been an important one in the history of sanitary progress. The International Medical Congress, held in London, in August, 1881, devoted large attention to the consideration of sanitary questions. The English and European governments are showing their appreciation of the natural and economic import of the subject, and also of vital statistics, by large provisions of a State character. The sacrifice of human life, by avoidable diseases and accidents, is no longer disputed. Nor is it disputed that far more is known by way of prevention than is generally applied. It is accepted, too, as a principle of good government, that there must be in the interests of the people and for the material prosperity of the State, adequate provision made for governmental care of the public health. There are regards in which neither personal or local authority can avail. More authority and more outlay are needed in this State for the carrying out of provisions which are indisputably in the common interests of all the people.

In our own State, where the kinds of industry and the relations to great centres so guide population as to mass it in cities or group it in frequent villages, these demands are most imperative. Evidence is constantly reaching us as to admitted evils and the inadequacy of any local provisions to deal with them. It was not until the State provided and enforced local Boards of Health that it became possible to give either the requisite information or power. Until within two years, many of our cities had no Boards of Health, except in the form of occasional committees, and our townships were without that summary right to deal with positive nuisances, which is not unfrequently demanded. The authorization of local Boards of Health led to the establishment of over two hundred in the State, and to the reorganization of some in cities where, under charter law, they were ineffective. It will, of course, happen that some of these will be inadequate until they become more fully informed. But it is already gratifying to see how they are sources of information as well as of authority, and how

they help to prevent or abate existing evils. No one can compare the newspapers of the State, or read the correspondence coming to this Board, without being made aware of the spirit of inquiry and discussion which now has hold of the public mind as to these interests—a spirit which always means progress when the subject touches such vital interests. The Board has thus been enabled to become a bureau of information, as well as to perform the important service of unifying and comparing the records and the experiences of localities. It is often able to give direction to important sanitary measures in the various parts of the State, and is appealed to for advice and assistance in measures that involve the best personal and pecuniary interests of communities.

LOCAL EPIDEMICS.

In the report of last year we had occasion to notice the occurrence of four epidemics, so marked in their causes and results as to attract the attention of the public at large. Three of these had so far subsided as to enable us to give their history, but the fourth had not reached its height when the report was issued. A paper connected with this report will notice it more fully. The three other epidemics are of interest because of the results which have followed.

At the date of our report the alleged causes of the malaria at Bound Brook had been ordered to be removed—the dam which had obstructed the water courses had been taken down. Following upon this there was a thorough opening of the obstructed water courses, so as to secure a sufficient channel for the water, to give opportunity for the marsh, which had been overflowed, to dry.

The people of Bound Brook were aroused to the necessity of thorough sanitary work, and formed a local health organization, that devoted itself assiduously to completing the improvement, and to additional local care of any other possible sources of disease. The result is not only gratifying to the citizens of that town, but a new evidence of how far it is in the power of the people to abate or prevent disease.

On visiting the place about July 1st, of this year, we found the contrast in the appearance of the marsh such as could not but give promise of good results. We watched with interest the record of the summer months with their extreme heat and dryness. It is the testimony of the physicians and all the inhabitants that the evidence of malarial poison has so far vanished that the few cases occurring are

easily accounted for by the effects of the previous year. This is all the more marked because in the worst localities, in which no improvement took place, this year has also recorded a large number of cases. With the evidence that can be furnished from other States and countries as to the relationship of uninterrupted water courses, water-soaked lands and vegetable decay to periodic fevers, it ought not be necessary to adduce evidence near at hand. But, if needed, we here have it with the personal inspection and testimony of many competent witnesses, so pronounced as not to need the repetition of any other warning. Bound Brook now knows that a thirty thousand dollar tax ten years ago would not, even in a pecuniary way, have been so serious as the losses it has suffered. Its only comfort is that the renovation is so complete and the result so certified that it can regain its reputation for salubrity. In order to keep this it will need constant vigilance. Although, like other places, it may still have occasional cases, there is no reason to believe that such a prevalency will ever again occur.

The typhoid fever epidemic at Princeton was so plainly occasioned by local causes that the Trustees of the College, the Directors of the Theological Seminary, and the citizens of the town alike seem to have come to the conclusion that in some way or other the water supply and the sewerage of all Princeton must be put upon an unquestionable basis of health. The College at once proceeded to provide a system of local sewers and delivery, which is not yet completed.

The Seminary secured the services of Prof. McMillan, of the College, and at once applied the small pipe and flush tank system for the disposal of its sewage. We hope hereafter to present an outline of these. We call special attention to these improvements because they outline the methods which are applicable to most of the inland cities and smaller villages of the State. The citizens of the borough have taken more time for deliberation, but have come to feel that a system of water supply and sewerage is desirable for the entire community. Intelligent and thorough investigations have been made as to the sources for a supply of pure water. Sanitary maps and plans of sewerage have been furnished, and it is believed ere long a perfected system will be rapidly executed. It has been the pleasure of the Board to co-operate in many ways with these efforts, as it was early our duty to publicly and privately urge attention to those interests.

SMALL POX.

The delay in adequately dealing with the earliest cases of small pox in Camden, and the active and judicious measures afterward taken, show alike the evils of procrastination and the success which crowns vigorous efforts for the public health. The disease is one which is within our powers of control and could be made to cease from the earth, if vaccination were universally practiced. But it is our misfortune that we still need constantly to guard against the encroachments of this disease. Philadelphia, with all its excellent proclivities, has relied so much upon its good reputation for health, and has had such inadequate provision for accurate health inspection and protection that more than one city has been indebted to it for small pox, typhus and typhoid fevers. As to small pox, it seems to have come to be indigenous there. Its continued prevalence makes it all the more necessary that New Jersey should be protected. We are constantly having reports of sporadic cases in various parts of the State, and believe we owe it much to the local Boards and to the law permitting them to offer vaccination to the poor, that the disease has not gained the proportions of an epidemic throughout the State. It has more points of locality scattered over the State than in several years past. It is very important that the local Boards and city authorities insist that children attending school shall be vaccinated, and, as far as possible, that they extend the protection to those who are under school age.

Much has been said and written of late both as to the protective power of vaccination and as to the relative advantages of virus taken from children and that obtained directly from the cow. This latter is not, as some suppose, virus which has been taken from individuals and inserted into the teats of calves and so "freshened," nor is it a disease that often occurs spontaneously, and thus enables us to get it from original cases. It is so rare that most of our matter comes from an authenticated case of the spontaneous disease in France, and is known as the Beaugency stock. From the successive use of this upon calves we have a continuous line of virus in quantities. It is easy to see, however, that frauds may be perpetrated, and that the so-called animal virus, valuable as it is; may be variously substituted by that derived from persons. Or the operation, as conducted on calves, may be so carelessly done as that the liquid from the vesicle is mingled with blood or other foreign matters. This would not, in the vast majority of cases, be attended with any evil result. But, if the calf

happened to have any malignant disease, such an anthrax, it is not certain that there might not be peril. It is important to guard against any possibilities that might bring discredit upon this virus. Early in the year the Secretary, accompanied by Dr. F. Gauntt, visited the farm in this State where animal vaccination is performed, to furnish virus for the New York State Board of Health. Dr. F. Gauntt was also requested to make a thorough inquiry into the whole subject of animal vaccination, as it affects our own supply of virus. It is believed that this paper will direct more attention to the subject, and will lead our physicians and druggists to be more certain as to the source and quality of matter. Some of the Board and some of the States are considering the assured purity so important as to agitate the question whether the supply should not be under the direction or limitation of State Boards or local Boards.

DRAINAGE FOR HEALTH.

The relation of drainage to health has recently forced itself upon public attention, because of the admitted prevalence of malarial diseases in localities once free therefrom, and their great increase where they were more frequent. In contrast to this, has been the remarkable diminution of such diseases where thorough drainage systems have been perfected. If there is any one fact established both in Geology, Physical Geography and Hygiene, it is that the ponding or stagnation of water is hazardous to health. It is an almost inflexible rule that soil too wet to produce crops is too wet to live upon. Nature, indeed, by a growth of weeds, and by protection from the sun, sometimes intervenes to prevent serious consequences. But even this intervention is often interfered with by man. In the country, too, frequently, natural water courses are obstructed at points which involve large overflow or continuous stagnation. The necessary structural changes in cities will, unless guarded, cause many pits or receptacles of stagnant water, or prevent the natural insensible drainage, or that equally potent drainage which results from evaporation and from the free circulation of air in the ground. The time, therefore, has fully come when it is necessary for the State to consider just what the requisitions of drainage are, and thus keep the common interests of agriculture and health in their wonted relationship. In cities the subject will be still more urgent, because of the close assemblage of people and the various artificial hindrances which will arise.

It is true that stagnant water alone, if all organic matter could be removed or kept therefrom, would not probably cause malarial disease. It is also true that if vegetable matter could be kept constantly covered, the evil results would be postponed. It is quite as true that with our alternations of climate, our hot suns and our changes of dry and wet seasons, this result is not likely to be attained without special provision therefor. Heat and moisture are ever and anon sure to succeed in producing a fermentative process which results in excessive vegetable growth, or in chemical changes deleterious to health. The accumulation of such material, and the occurrence of favoring seasons with the suspension of culture and vegetable growth to appreciate the product, are sure to cause sickness and premature death. It is because of this not less than of its bearing on fertility of soil that England and France have found it profitable to expend so much on the drainage of the soil, both of city and country. No subject is now better understood. New Jersey has its Geology and its physical conformation plainly marked. Its stone and clays and limestone furnish ready at hand the materials for drains and sewers. Diseases have already marked out their indications and enforced the necessity by the records of pecuniary loss.

The drainage of the Great Meadows of Warren county has diminished malarial disease on a ratio proportionate to that with which it has increased the productiveness of the soil. Many of our cities are more in need of drainage than they are of sewers. The laws passed last winter bearing on the subject were most important and timely. Already some sections are availing themselves of the advantages they offer. There is not a State in the United States that has more important interests in this regard. We urge upon all townships, districts and municipalities, the great importance of the subject. The General Drainage Law of the State, approved March 8th, 1871, as amended March 19th, 1874, and that of 1881, chapter 158, and the act respecting sewerage and drainage, chapter 56, laws of 1880, are especially worthy of note, and seem to furnish all necessary power.

WATER SUPPLY.

No sanitary subject has more earnestly occupied the attention of our citizens the past year than this one of water supply. It has long been recognized in many of the cities of our State that other provisions than those now made must be had in the near future. The

wide-spread drought of the present season has affected almost every portion of the State. It has put to test the water supply of many places in such a way as to exhibit its insufficiency or to show its doubtful quality. An examination of our abstracts from local reports will show how wide-spread has been the scarcity. The failure of a few wells in dry seasons, in the country, is not of much significance. But when country towns and large cities have revealed to them the utter inadequacy of their supply, and their increasing liabilities to a water famine, or to impure water, we may well use the opportunity to acquaint ourselves with the best sources of supply. Good water and plenty of water are so essential that we cannot often afford to approach the edge of danger or of want. While we do not, like John Hunter, call it "a compound of every species of matter into which we find it capable of being converted," we do find that it can become the vehicle of almost every substance hurtful to our lives.

It is well, as a key to the subject, to bear in mind that water supply is very much a geological question. The nearness of water to the surface depends much upon the strata or formation of the ground. Next, the quality of the water, in a mineral sense, is affected by the minerals or ground structure it finds.

The soil which represents animal or vegetable decay has much to do with determining the quality of the water in what are called its organic constituents. The order and character of the strata determine how far the ground serves as a percolator or filter, and so has much to do with the purity of the water.

Remembering where it comes from, how shall we avail ourselves of it? Shall we catch it in a cistern, fresh from the clouds? or shall we take it from the rivers, where nature by her water-sheds and by her conformation keeps it exposed on the surface? Shall we get it from lakes, where nature gathers and holds it as if in her own great drinking bowls? Or shall we intercept in a similar way by artificial methods, and so make reservoirs along the edges or somewhere amid the contour of the hills? Or shall we make other reservoirs along the basins of rivers, and so seek to get the same supply, with that additional percolation which the ground between such well reservoirs and the river may afford? Shall we make artificial strainers by means of great filter beds, and purify the river on the same principle that we may purify even sewage?

We put these questions in succession, not fully to discuss them, but to fasten attention upon the fact that there are various methods,

natural and artificial, by which water is to be secured, and that the question of mode is to be determined by giving full weight to those kinds of evidence which, to a degree, must be special to each locality.

What is best for Trenton, on the Delaware, does not determine what is best for Newark, on the Passaic.

What is best for Princeton, on the shale, does not tell what is best for Vineland, in the sand.

Some of the river cities can do nothing better than to make every other value of their rivers bend to securing and preserving them as water supplies. Others can do nothing better than to value them chiefly as exits for sewage. Others may need them entirely for commerce, or as water ornaments. Now and then a river may be utilized both as a water supply and for the disposal of sewage, if only all the details of proper arrangement are fully carried out, and if the administration is complete.

Again, the quality of the water is not to be arrived at by generalizations. Some streams are polluted by the very substances and quantities of the substances by which other streams are not polluted. The evidences of the pollution of a stream are those of large probability, where it is shown that the character of the pollution is very degraded and the quantity very unusual. The chemical and microscopical tests tell much. The experiences of close observers, and especially of physicians, in accurately dealing with diseases and recording and studying effects, is a historical testimony of great value.

It is not negative evidence that no epidemic has occurred, for inferior water may tell on health in slow and insidious as well as in rapid and alarming ways. Thus, the question of water supply is one to be studied for localities and in localities, not alone by general statements, or by the promiscuous opinions of men, wise, no doubt, in their own departments of industry, but never having studied out the details of this subject. Yet be it known that in the hands of students and observers, these questions are as determinable as are fact-matters, or scientific and business questions in other directions.

The great error to which most towns are subjected, is that of entering upon a scheme that has not in it the elements of perfect success, because there has not been a full and exhaustive study of the best methods, and of what is best for that place. Science and art now make such knowledge practical, and right results attainable. For most towns and cities it is safest not to commit any important question of water supply to local decision, or to the execution of any one engineer, until a report thereupon has been secured from several persons chosen with reference to their technical knowledge of locality, of population, of sanitary condition, etc.

Thus far, about thirty of our cities and towns have a special water supply, furnished either by water works at the expense of the city or by a water company. In some of these, wells and cisterns are also considerably used. When companies offer to run their own risk, and supply at their own expense, there should not be any less caution on the part of municipalities in satisfying themselves as to the quantity and quality that can be relied upon from the proposed source; for after the company in influence or power comes to overpower the corporation, or if the quality of the supply is unsatisfactory, the existence of such companies becomes serious hindrances. This caution is given with the knowledge, however, that some such supplies in our State are excellent, and the management fully in the interest of the citizens.

The Reform School, at Jamesburg, after the sickness there, had occasion to seek a new supply. The deep, large well did not furnish water of satisfactory quality. The plan now adopted is thus plainly described by the Superintendent, James H. Eastman:

"Its development and construction was briefly as follows: There were indications of water just over the crest of land 1500 feet to the south and east of our buildings, in the margin of a wood lot. At the highest practical point up this crest we dug a lateral trench some rods in length to a depth of about ten feet. We found much water in a stratum of white gravel and sand. A temporary outlet was made for it to run off down the side hill. The quantity seemed abundant, and the quality, from handling and use, satisfactory. Taking a few levels, it was apparent we could bring it by gravity to a more convenient place for storage and use. We continued the deep trench, therefore, across a shallow and through a ridge, with but two slight deviations from a true line, a distance of 950 feet. At this point we constructed a brick cistern to hold 12,000 gallons, arched over the top and nearly hid in the ground. When we would collect the water in the trench, we used common six-inch drain tile, and for its passage six-inch terra cotta pipe, laid in cement through the suspected places, shallows and clay beds. The water is admitted to the cistern opposite the overflow, and six inches above it. Thus, the water is kept in a constant state of agitation. Contiguous to this we made an *open reservoir*, of several hundred thousand gallons capacity, to take the overflow from the cistern, and conveyed thither also water from other parts, through drain tile. This was made for use in case of fire. We may draw water from either of these by the aid of two powerful steam pumps. For our further protection against fire we have laid *water mains*, with fire plugs, about our grounds, and purchased 600 feet of hose pipe."

It is quite certain that, in many localities, there must soon be a

change in methods of supply. The wells which were sufficient in our seaside villages, will not do when 100,000 people crowd upon the shore.

The ten acres of ground which gave pure water to Newark when the New England settlement took place, is not the ten acres which has since received thousands of tons of decomposing matter, and is covered with a population of thousands to a square mile. To some degree our people are realizing this. Some of the towns and cities are already well supplied.

Newark, Jersey City and Hoboken are not unmindful of the great problem that they must soon consider. Some of the seaside resorts which have depended on driven wells and cisterns, are seeking sources more abundant and such as will supply a population too compact for a driven well system in a cretaceous formation.

The following cities have water works for artificial water supply:

Atlantic City,	Hackensack,	New Brunswick,
Bergen,	Hackettstown,	Passaic,
Bloomfield,	Hudson City,	Paterson,
Bridgeton,	Jersey City,	Perth Amboy,
Bordentown,	Lambertville,	Phillipsburg,
Burlington,	Long Branch,	Rahway,
Camden,	Millville,	Salem,
Cape May,	Morristown,	Trenton.
Elizabeth,	Mt. Holly,	
Flemington,	Newark,	

Asbury Park and Ocean Grove have recently formed a water company. Hoboken has arranged to be supplied from the Hackensack instead of the Passaic, and Bayonne has contracted with Jersey City. Red Bank, Princeton, Orange and other towns are seeking supply. Other places which have water works which were erected with faulty skill, or which drew from a too limited supply, are debating changes or additional sources. We only insist that the importance of adequate and healthy supply be considered, before it is impressed by serious inroads upon the health of the people, or by some violent outbreak of disease, and thus that forethought and administrative skill secure the ground and sources of supply before those complications occur which increase both the risk and the expense. While as the philosopher, Stephen Hales, puts it, "the All-wise Framer of these admirable machines has so ordered it as that their healthy state shall not be disturbed by every little variation," and has made us consistent with a very considerable latitude of variation, "it will not do for us to swing much further in our lines of departure."

SEWER DISPOSAL OF SEWAGE.

The question of how to dispose of sewage in large cities is one of vital concern. Where there is a general water supply it now seems almost settled that there must be a system of sewers. If so, what shall they carry? A natural answer is, have them do all possible service. Thus, they have been so built as to answer as drains to the soil, as carriers of all the liquid and semi-liquid matter of households, and of the storm water from the buildings and streets. With this, much refuse not very liquid is often floated along. With a good flow and a good outfall, such sewers are very convenient. Being large, they can easily be cleansed, and if properly policed, they obey that great law as to all such matters. "Get the material away within a few hours of its production." But such sewers are expensive, and if their sides are allowed to become foul, or if they have not free access to air or air flushing, as well as water flushing, they are apt to become filthy.

Of late, there has been much tendency to the small pipe system. This supposes a separate system for drainage, if necessary, and a separate plan for the storm water. It lays pipes for carrying sewage only, and is not intended to contain any matter that is not in a liquid or semi-liquid condition—that of the water closet being supposed to be easily soaked and reduced. Some would even exclude this, and depend therefor on a dry earth system. The choice of a system is often a question of locality. It is, therefore, better that any city considering what change to make, should consult the Board directly rather than rely upon general statements.

Whether the sewage shall be discharged into streams directly, or whether it shall be used to irrigate and fertilize a farm purchased by the city, or whether it shall be so filtered through soil as to leave in it its more solid contents, and deposit organic material so that the water left clear may soak into a stream, or whether it shall be dealt with by some chemical process so as to settle and separate the more valuable parts—all these are questions of locality and business expediency which, like all other valuable improvements or business operations, are to be stated with all the details, before preference or method can be certified.

But a more difficult question is, what to do in towns or villages in which a sewer system is impracticable. There are many communities in which there are two or three streets with houses as close as they would be in a city, where there is need of some organized system of

disposal, or where, at least, the householder needs to know how he can be best rid of all such material, and how he shall not suffer from his neighbor's nuisances a few feet from his back door. We have constant evidence that law needs to regulate such dwellings in these regards, in which the life and health of one's self and family are greatly involved.

There is also need of the best information to householders, since these evils arise not from malice aforethought, but often from the carelessness of the occupant, or the puzzle he is in to provide anything satisfactory. To such, a few suggestions may be of service.

I. *As to Quantity.*—There is a wastage in households that multiplies the bulk of substances to be removed, and so complicates the process. Even water may be so plentifully used as to cause dampness and disease, and to be difficult of riddance. So a first effort should be not to make a quantity such as shall complicate removal. Especially let there not be the embarrassment as to quantity from delayed removal. For this there are two reasons—the daily accumulation is often easily removed, when that of a week or more would be a burden. Then the keeping is evil, because it gives opportunity for that change or fermentation which so often causes foul air and disease.

II. *As to Separation.*—It is very important to keep distinct certain parts of household accumulations. There is a great deal of dust and dry dirt that is easily disposed of at once in the kitchen fire. Where there is no other use therefor, the leaves of vegetables, &c., after a day of drying, are easily disposed of in the same way. The ash heap should never be the receptacle of any other refuse; then it is easily carted away. Much of waste water is not so soiled but that it may be poured on the grass or around the vines or flowers a little distance from the house. A garbage barrel should represent nothing but kitchen refuse, and preserve its purity by being emptied or disposed of frequently, being occasionally rinsed out with a disinfectant when emptied.

There are some that contend for an entire separation of all wash room and chamber slops from any fœcal material. The urine and wash water, if daily emptied separately and not always on the same spot, will be very largely disposed of on a very small lot. The tub or half barrel, or the earth closet system, will take care of the usual family accumulation of the privy, with an easy system of methodical

change. The cesspool is objectionable, just because it is a store vault for filth, which is not injurious with daily removal, but the danger of which is in its storage. There are two ways of storing. One leaves the bottom and sides pervious, in order that the water may soak away into the ground, and so not so great a bulk accumulate. If the ground is porous, if it is of that composition or admixture which makes a good filter, if there are no wells near, this way will dispose of considerable dirty water. The more solid material left behind, if exposed to the power of earth and air, will partly dry away. But experience shows that it is a risky mass, which is sometimes capable of such changes as to induce serious disease. The other form of cesspool, and that usually the better form, is made cement-tight, like a cistern, in order that it may hold what gets into it, and may be emptied when full, which is now in cities generally done by the odorless excavating apparatus. While such storage of filth may do as a temporary resort, it is plain that we ought not to rely on this as a desirable method.

The small pipe and flush tank system seeks to substitute this as follows: The cesspool is substituted by a tank capable of emptying itself with a gush, by a syphon or by an automatic fixture known as a flush. It has going out from it a common drain pipe, branching off in all directions eight or ten inches under ground. These pipes are laid loose-jointed, so that the material thrown out may leak out and enrich the soil. This also allows full entrance of air. The effect of the flush is to clear the pipes quite differently from what they would be cleared if the liquid were allowed to dribble through. The plan is in operation at Princeton Seminary and a few other places.

If the flush tank is placed higher, and the flush takes place in trenches so arranged as that one may be used and then another, these being covered over in winter, it is surprising how easily they are managed. With any regularity of administration, and with very little expenditure of time, the usual waste and closet material is thus easily disposed of.

In most of our towns the great want is an inspector, who has been taught as to the best methods, and who, by two inspections a year, and suggestions, and by a report to the Health Board, would prevent or correct very many errors. The time has come when most of our cities need a health inspector as much as they do a mayor or an alderman. Some of our smaller towns that have adopted this plan have found it very advantageous.

LOCAL SANITARY SURVEYS.

This Board, soon after its formation, urged upon our larger towns and cities the necessity for such sanitary surveys and maps as would show the geological structure, the natural and artificial water courses, all underground constructions, and the surface topography. Such maps are not only essential for sanitary study, but as locating every structure and giving contour and gradients, they save much after expense. Hoboken, Jersey City, Elizabeth and Bayonne furnish excellent examples of skilled work in this direction. Specimens can always be seen at the office of the Board in the State House. Trenton, Princeton, &c., are now engaged on such maps. Some of the cities that had imperfect maps are making new surveys. There is now a conviction on the part of most of our Boards of Health, where the population is dense, that such a map is indispensable, and we trust that all our cities will see to it that the work is committed to skillful men, and that all the details are well combined.

SANITARY EXHIBIT.

In connection with the State Fair at Waverly there has been for the last three years a Sanitary Department, under the conjoint auspices of this Board and of the officers of the State Agricultural Society. The design has been to give opportunity for the exhibit of all those household and other appliances which are intended to guard the public health. The success of the exhibit this year was much greater than heretofore, and attracted crowds of visitors. Various forms of apparatus and appliances and systems of ventilation, of heating, of sewering, of emptying of cesspits, are thus open to view, and aid much in giving to the public information on these subjects. It is hoped that the exhibit will grow in interest from year to year, and will be of sanitary service to the State.

The New Jersey Sanitary Association continues its useful work in inquiring as to the special sanitary needs of localities, and in discussing the various advances in sanitary science and art. A *resumé* of its work for the last four years will probably be given in the next Report.

KEROSENE EXPLOSIONS.

In the second report of this Board, pages 16–22, and in the fourth report, pages 25–28, are given some facts as to the dangers arising from the use of kerosenes that are unsafe. The same brand that last year killed a girl of twelve, has this year killed the mother of a small infant, within three miles of the same town. Evidence is constantly coming to us of the risk that is being run, especially among the poorer classes, who are the chief consumers of this dangerous explosive. Some tests made by one of our public analysts show that these lower grades of kerosene are to be found in almost every part of the State. There is need that wise legislation be had, such as shall impose no unnecessary burdens upon honest producers, but such as shall shield the public from a danger so serious to human life. The time has come when a stringent law on the subject would meet with public support and approval.

SMOKE AND STENCH NUISANCES.

The experience as to the Elizabeth nuisance of last year needs to be borne in mind (see fourth report). Owing to the stringency of the New York law, it is believed that many objectionable factories will incline to remove within the limits of this State. Already many localities complain. The rendering establishment near the Hackensack is unnecessarily malodorous. We have had occasion this year, in conjunction with a committee of the New York State Board of Health and the local Board of Bayonne, to examine the petroleum and other factories at Constable's Point. It is admitted that the odors are prejudicial to health and comfort. It is also now known that, by proper apparatus and oversight, most of the evil can be remedied. Already the Standard Oil Company and one or two others have introduced important and remedial improvements. Others continue to make an unnecessary nuisance. We ask that local Boards of Health attend to these evils and bring the force of persuasion and of law, if need be, to bear on their limitation. The Bergen Point nuisance is so serious a detriment to the people of Staten Island, that the Governor of the State, as well as the State Board of Health, have earnestly invited the attention of our authorities thereto. We find, too, that some of our cities incline to push their nuisances into country districts which need to be on the guard against such encroachments and see to it that all such material is rightly handled and utilized.

OUR SUMMER RESORTS.

The extent to which the New Jersey shore, from Sandy Hook to Cape May, is becoming a place of resort, cannot be overlooked in

the interests of public health. Tens of thousands are thus attracted within our borders, under conditions not always promotive of health. While they come to the sight of a pure sea and to a soil naturally free from organic matter, yet they have all the perils of a floating and non-housekeeping population. It is difficult for habits of regularity to be preserved as well as in the more staid and quiet household. Many come who are not in full health, and therefore are especially susceptible to unhealthy influences. Our interest as a State is not merely to secure their temporary sojourn, but to attract them and their descendants to more permanent settlement. Besides, these resorts have a sanitary relation to those who are already our permanent citizens. Multitudes of our own people are forced to go to these places in order to maintain their own equilibrium of health for the year.

Many of our cities are in such an inadequate condition for health that the only way to keep the death-rate within respectable limits is for a good percentage of the people to leave for the summer. Thus they are not only able to live themselves and to save some of their own children, but can point to a death-rate based on a full population the year round and argue against city improvements with more plausibility. I am satisfied that one of our counties and several of our cities would have an alarming death-rate if all the people stayed at home. But alas! some of the crowded city conditions are beginning to be found near the seashore. Slops and offal and excretions do not always find a proper disposal. Water supply is not always good. The laws of air space are not regarded. Houses and tents in sight of the sea may become foul, even though sea air blows over them. Some of these towns are being very rapidly built under no adequate sanitary direction. The desire for water seems so great that the rage for artificial ponds is well nigh irresistible. We could name several of these so-called lakes that are simply abominable, as are also some of the devices for making scanty natural lakes great beauties by the introduction of salt water and the flooding of adjacent land. There is such a thing as a safe artificial lake, but it is among the most skillful devices of the sanitary engineer. It often means the damming up and overflow, near the place of exit, of a natural water-course, and generally will mean malaria in some season when accumulation is sufficient and when climatic conditions favor. We warn the people against these malarial pockets, which will some time spread their influence. It was the intention of the Board to complete this year a work already begun, of a sanitary examination of all health resorts,

as to which we hope to state facts, more than opinions, including the conditions of hotels, etc. It is expected that it will be completed before our next report.

FIRE ESCAPES AND SUMMER RESORTS.

We have just at hand the following communication:

ILLINOIS STATE BOARD OF HEALTH,
SPRINGFIELD, Nov. 11, 1881.

To the Secretary New Jersey State Board of Health:

MY DEAR DOCTOR:—At the last quarterly meeting of this Board, the Secretary submitted a paper on the "Dangers of Summer Resorts," prompted, in part, by his personal experience in August last, at Beach Haven, N. J., when the Parry House was destroyed by fire. The rapidity of the combustion—the entire building being completely destroyed within an hour—the limited means of egress, and the time of occurrence of the fire (3 A. M.) rendered the escape of the inmates without loss of life little less than miraculous. The Parry House was in no essential respect different from the average hotel as found at many popular summer resorts, the most cursory examination of which would reveal the same insufficient provision for exit and a like flimsy and combustible character of structure.

After discussion by the Board, it was

"*Ordered*, That the Secretary be instructed to address a communication to the New Jersey State Board of Health, and to the Boards of Health of other States in which there are summer resorts, inviting attention to the subject; and respectfully recommending that, in case there are no adequate laws governing the construction of such buildings with reference to danger from fire, inspections should be made of these resorts covering this point, as well as the general sanitary conditions which obtain in and about such places—this recommendation being based upon the belief that the publication of reports of such inspections would go far toward securing a correction of the evils disclosed."

This Board will be glad to co-operate with you in any manner indicated, to the extent of its ability, either in this or any other direction, in the common labor of promoting the public safety.

Very respectfully,

JOHN H. RAUCH, M. D., *Secretary*.

EZRA M. HUNT, M. D., Sec'y.

The subject referred to is one of great importance, and has recently had the emphasis of a tenement house fire in New York, and the shocking disaster in Vienna. Few of our hotels are properly provided with means of exit. The same is true as to city school buildings and other public edifices. We earnestly direct the attention of all concerned to these defects, so that we may not depend entirely upon deaths by fire to popularize fire escapes.

REGULATION OF MEDICAL PRACTICE.

Within the last few years our Legislature has seen fit to return somewhat to the former habit of the State, in recognizing that there should be some guard upon the qualifications of those who deal technically and professionally with the lives of its citizens, and who administer to them articles which, in the hands of others, are prohibited from use as poisons. The first step in this direction was a law to guard against the ignorant dispensing of drugs, and for this purpose provided a Board of Pharmacy. The next step was the passage of a law, chapter 199, 1880, prohibiting from the practice of medicine and surgery in this State any person who had not in some form or other a diploma certifying his or her competency. This law very properly made no discrimination between those of different schools of medicine. It did not even intend to certify that all having diplomas are competent practitioners. But it did intend to say, that in so serious and important a business as the special care of human life, the person who offered his services as a physician or surgeon should at least have the testimony of some incorporated school or licensing body that the necessary preliminary studies had been pursued. The law was not the outcome of medical effort, but arose from glaring facts which had come to the notice of members of the Legislature, and especially from the exposures as to the bogus sale of diplomas in Pennsylvania. To this law an amendment was passed the last winter, not requiring a diploma registry from any person who had in one place been practicing medicine and surgery for twenty years.

The law, as it thus stands, is the mildest and the simplest that could be thought of if any effort at all is made to protect from uneducated or irresponsible practitioners. It is merely an attempt to put on record in each county the place and date at which, and the institution or authority from which any person claiming to be a practitioner of medicine and surgery has received credentials. In order to make the law effective for the purposes for which it is intended, there should be an index to these records, as made in the office of county clerks, so that all may be able to have that information to which all are entitled. It is also important as to the records of vital statistics, that those who, as physicians, give certificates of death, should be thus far authenticated. So soon as this is done, we shall hope to furnish a list of all practitioners recognized by the law.

LIBRARY.

It has from the first been the effort of the Board to secure such a sanitary library as should be of advantage to the citizens of the State, and especially to those who, in the interests of our people, have occasion to consult the best authorities. As Great Britain and the Continent have been so far ahead of us in the development of this science and art, most of the authorities have not been largely accessible here. Some of these, like the earlier English Health Reports, are difficult to secure, and yet are invaluable in the study of health problems and of vital statistics. The Board has enjoyed some special advantages for selecting and procuring the best literature on the subjects of heat and ventilation, water supply, drainage and sewerage, house construction, engineering, plumbing, and the many collateral subjects included in the care of the public health. We now have a library which, though not very large, will favorably compare with that of any other State or city Board on the subject, and it is worth much more than its original cost. A list of all books and pamphlets is given in this report, in order to acquaint the people with the best authorities, and also to give access thereto. The library will be open on every Friday from nine to twelve to any wishing to consult it. Boards of Health, or individuals, who may wish books for special study, may make an arrangement by which, at the expense of expressage, they may avail themselves of their use for two weeks.

In many cases very valuable articles are to be found on special subjects, scattered through the various sanitary journals and the reports of State Boards of Health, all of which are on file at the office. A careful examination of this catalogue will not only show the extent of subjects concerned, but also point to the most valuable sources of information.

METEOROLOGY AND CLIMATOLOGY.

The study of these has a two-fold interest for the citizens of our State. We need to determine the relations of climate as a cause of disease, or as modifying its symptoms or severity. It is found that the changes of the seasons, and that the constitution of the atmosphere, even for days or weeks, have an influence upon disease. Different conditions seem to favor different diseases. The actual influence is only to be ascertained by comparing the actual recorded state of the weather at any one time, or for a selected period, with the diseases

which have occurred during that period. Conclusions derived from any one comparison, or from a limited number of cases, either of occurrent weather or occurrent disease, would probably lead to erroneous conclusions. But if the accurate observer of weather puts on record his observations through sufficient periods, and the accurate observer of disease also the maladies that have happened and the phases they have shown, we have on hand the materials for a statement of the series of facts as to each, side by side. It is found that thus we are able to trace the relations of climate to disease, and so to guard against changes which, although they occur, admit of adaptation of the system to them, or avoidance of them. In any science or art such as this, facts must be collected long before their utility is apparent, since it is only by series of data that we arrive at safe conclusions. Thus far our chief aim has been to secure accurate observers, and a sufficient number of observations, to admit of future comparisons when the statistics of disease shall reach over sufficient periods.

There is another important reason for careful climatological records in the State of New Jersey. It is an established fact that certain climates agree best with certain persons, or with certain phases of disease. If we can determine where the corresponding or suitable climates are to be found, we are able to situate our own citizens, and especially those not in perfect health, in the climate best adapted to them, as also to indicate resorts adapted to those coming from other States or countries and seeking such adaptations.

New Jersey affords a wonderful field for such inquiry, and for the settlement of such adaptations, if by recorded observations we can be able accurately to define our climatology. Variety of climate is not determined merely by latitude or longitude. Even as to this, by its very shape, our State gives, for its size, unusual variety. But the sharp contrasts of our geological strata, the relations we bear to an extended sea coast, the forms of our bays and rivers, the character of our forests, the mountain tracks and the broken hill and valley contour of some sections present a diversity well worthy of the closest study in the interests of health and population. Many a consumptive goes South who could escape cold and malaria much better in our pine regions and on our warm and sandy seacoast than in the Florida Everglades. Many who need mountain air may find a home amid the high hills or the rocky ranges of Morris, Sussex and Warren counties better than in more distant mountains. We hope ere long, by a series

of tables, to be able to show these great diversities of climate as to locality, and yet its equability from year to year in selected spots. The Meteorological Report and the tables will be found near those of Vital Statistics, so that references and comparisons may be more readily made.

REPORT OF THE INSPECTOR OF MILK.

The milk law did not originate as a proposition of this Board. It was, we believe, first offered by a milk-producing association of this State that had been annoyed by the quantity of skimmed and diluted milk which had become an unfair competition to honest producers. Inasmuch as fraudulent milk is a great evil to the public health, we were asked to have such relation to it as to make choice of the inspector. With the execution of the law we have nothing to do. The inspector chosen was appointed after a competitive examination, and has been faithful in the execution of his trust. He has frequently communicated both with this Board and with the Council of Public Analysts. Relying upon no one instrument or method of detection, he has adopted the plans believed to be best adapted to protect the people from adulterations of this liquid. There are some defects in the law which need to be remedied. But these must not be used as a plea for destroying the principle of the law, and so making it, as the former law on our statute book was, practically worthless.

Many sanitary laws, and such as affect adulterations, must confer large powers and trust to the judiciousness of the officer. In case of arbitrary use of his powers, he is liable to the penalty of the courts. There can be no doubt that the reduction of milk in quality by the abstraction of cream, and its increase in quantity by the addition of water, is too common and too serious a matter to be overlooked. Milk is a great dependency in treating many diseases and in helping small children and invalids to resist disease. Besides, any such fraud is an offence against law and should be resisted. This Board does not believe it to be the policy or duty of the State to have an extended and costly system of inspectorship, but it rather seeks to have such an oversight as shall awaken the attention of localities thereto. All of our larger cities should have a local inspector or a system of license, and should put themselves in the position of protecting the people from so serious a fraud.

REPORT OF THE COUNCIL OF ANALYSTS AND INSPECTORS—ADULTERATION OF FOODS, ETC.

Under the law passed by the Legislature of 1881, the Board appointed the following Council of Analysts:

Prof. A. R. Leeds	Hoboken.
" F. C. Van Dyck	New Brunswick.
" H. B. Cornwall	Princeton.
Wm. K. Newton, M. D.	Paterson.
Wm. H. Newell, M. D.	Jersey City.
Shippen Wallace	Burlington.
Prof. C. F. Brackett, M. D., E. M. Hunt, M. D.,	Members *ex officio*.

An early conference was held with the Board, and the preliminary work outlined. Different departments of inquiry were assigned to such of the members as were to conduct experimental inquiries. The results have been such as we think will show the necessity of such investigations. We refer for details to the report herewith transmitted. It is evident that a larger appropriation is required if the work so well begun is to be of essential service. New York State has deemed the subject one of such importance as that an appropriation of $15,000 therefor was made the last year. While there are limits to the practicability of all such investigations as conducted by the State, it is a principle that whenever any system of fraud largely affects the citizens of a State, it should be guarded not only by law but by persons appointed to detect the fraud and to bring action against offenders. It is found that the wage classes are the chief sufferers from these deteriorations. The amount at present appropriated might be increased four-fold to the advantage of the State.

CONTAGIOUS DISEASES OF ANIMALS.

The duties of the Board as to contagious diseases of animals have been arduous during the past year. While the cases have not been numerous, yet constant watchfulness is required, and those that have occurred have presented complications in management. One lot affected with pleuro-pneumonia had so many owners that continued quarantine was inadmissible, and the slaughter of the herd became necessary. We have been able, in several instances, to prevent the spread of the disease. The present law has been of much service, but is awkward in its application and requires some modification. If we

are to be secure against contagious pleuro-pneumonia, swine-plague and anthrax, glanders and some other diseases becoming epidemic in the State and causing great losses, we must have the system of management clearly defined. The minutes of the Board as to it and other particulars will be found in the Report of the State Board of Agriculture, as required by the law.

The papers presented as a part of this report, will, we believe, be found useful in the households, cities and townships of the State. The summary of reports from localities has many suggestive facts. The Report of the Medical Superintendent of Vital Statistics will contain other facts and inquiries as to the diseases of the State.

THE RELATION OF THE STATE BOARD OF HEALTH TO OUR PUBLIC SCHOOL SYSTEM.

BY L. DENNIS, M. D.

The question may pertinently be asked, what has the State Board of Health to do with our public schools? The answer may be given broadly in the terms of the act creating that Board: "Be it enacted, That the Board shall take cognizance of the interests of health and life among the citizens of this State; they shall make sanitary investigations and inquiries in respect to the people, the causes of disease, and especially of epidemics, and the sources of mortality, and the effects of localities, employments, conditions and circumstances on the public health; and they shall gather such information in respect to these matters as they may deem proper for diffusion among the people."

When it is considered that the school children, from the ages of five to eighteen years, constitute about one-third of the population of the State, that they are in the main exposed to like "causes of disease, and especially of epidemics," that they are in similar localities, engaged in similar employments, surrounded by closely correspondent conditions and circumstances, and, lastly, when it is observed that among them is afforded an opportunity for the "diffusion among the people" of such information in regard to matters of life and health as is nowhere else presented in the State, it must be admitted that here the Board has all the conditions requisite for the prosecution of part of its work most favorably and uninterruptedly.

Nowhere else are gathered so many individuals engaged in the same occupation upon whom can be so thoroughly tested the various applications of a sanitary sort intended to preserve health and prolong life. Nowhere else can the causes of disease, and especially of epidemics, be so thoroughly investigated, for no class of the community is so liable to epidemics. As a body to be studied, therefore,

they present advantages unsurpassed. Unhealthy surroundings may be noted and their effects watched even when the causes are not removed or removable. Here, if anywhere, are found the conditions of intelligence and education in those who have the charge and direction of this mass of humanity, so essential to the proper carrying out of sanitary suggestions. For this reason appeals to boards of trustees in regard to the proper location and construction of school houses and outbuildings, the amount and direction of light admitted, the vital subjects of heating and ventilation, the proper furniture of the rooms, the discipline and personal habits of the pupils, in so far as they are matters of sanitary inspection and direction, are all more likely to be listened to and heeded. Upon each one of these subjects volumes have been written, and a vast amount of information, thoroughly practical and very valuable, has been spread before the community in such shape that it is easily accessible.

It would seem, therefore, that much good might be done by simply putting into the hands of those most interested in these matters such general rules as careful inspection of the working of our educational system shows to be most frequently violated, to the detriment of pupils and teachers. This being done, the Board will have merely gone over the surface of its duties and obligations in reference to this large and important class of society. Manifestly it will be of little permanent advantage to these persons to have housed them in properly constructed buildings thirty hours out of the week, if for one hundred and thirty hours during the same week they are living in conditions to breed disease and death. It will avail little to shield them from harm arbitrarily thus for a period of from five to twelve years, if both before and after this stage of life they may be surrounded by all that is most disadvantageous to growth and development. It must be said, however, that the Board does not propose to desert them thus ignobly, but by the diffusion of increased light and knowledge, to make their homes bright, healthy and happy, and thus extend its fostering care over them at all periods of life.

How can this work be most efficiently done? Legislative reports on matters of health unfortunately find fewer readers than recipients; the instruction of the press is fitful, erratic, incomplete and uncertain of reaching the class for which it is intended; the pulpit and the platform know and reveal almost absolutely nothing on these subjects; the State Sanitary Association meets once a year, and rouses up in the minds of those least in need of it the spirit of reform and some

activity to secure it; individuals here and there, sanitary and civil engineers, physicians, and intelligent, earnest, thoughtful laymen are exerting each his own influence in the right direction; but there is no systematic, well-directed, persevering effort in any community to learn or to teach all that may be known on these matters, much less to put in practice the knowledge acquired. A careful consideration of the subject, then, forces upon us the conviction that in the schools themselves we have the most complete, well arranged and thoroughly efficient agency, not only for their own protection and improvement, but for the diffusion of such knowledge throughout the State, among all classes of its people, as shall, in one generation, correct abuses, secure the enactment of, and obedience to, right sanitary laws, and, in a word, reform the habits of our whole population. To secure these results there should be systematic instruction in all grades of schools and educational institutions in anatomy, physiology, hygiene and general sanitary science, and combined with these such physical exercises as are best adapted, in each grade, to strengthen and develop harmoniously the whole body, while the mind is under training, both by this and other discipline, for its own proper work in the future. This is no new or utopian scheme. Some of the leading educators and scientists of both England and America have been most earnestly advocating its claims upon the attention, not only of those who have the direction of our schools and colleges, but of all who have at heart the welfare of the public.

William Jolly, of England, to whom we are indebted for the principal dates of the following historical sketch, observes that, as early as 1818, the German educator, Pestalozzi, recommended physical education. In 1819, George Combe, the English writer and teacher, began the recommendation of the teaching of physiology and hygiene in schools, and continued his efforts for this object unceasingly till his death, in 1858. By lectures, addresses, books, pamphlets, and by practical instruction in schools, this eminent worker did much to popularize the subject both in England and this country. In 1828, Charles Maclaren, editor of the *Scotsman*, published five articles in that paper on the subject of education, in which he recommends it. In 1831–33, James Simpson lectured on it in different parts of Great Britain. In 1834, Dr. Charles Caldwell issued at Boston his "Thoughts on Physical Education." In 1837, Dr. Horace Mann, of Massachusetts, published a lecture on "The Means and Objects of Education," advocating it. In 1848, William Lovett was the first to

teach physiology in a common school in England. In the same year it was first taught in Scotland, in the Williams School, Edinburgh, by George Combe and Mattiew Williams. In 1850, the teaching of physiology and hygiene in common schools was established by law in Massachusetts, as follows: "Sec. 1. Physiology and hygiene shall hereafter be taught in all the public schools of this Commonwealth, in all cases in which the school committee shall deem it expedient. Sec. 2. All school teachers shall hereafter be examined in their knowledge of the elementary principles of physiology and hygiene, and their ability to give instruction in the same." In 1851, William Lovett published in England his "Elementary Anatomy and Physiology for Schools and Private Instruction," the first practical textbook for use in schools. In the same year Dr. Roth, in his "Exercises and Movements According to Ling's System," was the first to advocate scientific physical education in England. In 1853, sixty-five of the most eminent and distinguished physicians of London, including the principal instructors in anatomy and physiology and the practice of medicine and surgery in that metropolis, and also all the medical officers of the royal household, signed the following memorial to the English government:

"*Medical Opinion on the Importance of Teaching Physiology and the Laws of Health in Common Schools.*—Our opinion having been requested as to the advantage of making the elements of human physiology, or a general knowledge of the laws of health, a part of the education of youth, we, the undersigned, have no hesitation in giving it strongly in the affirmative. We are satisfied that much of the sickness from which the working classes at present suffer might be avoided; and we know that the best directed efforts to benefit them by medical treatment are often greatly impeded, and sometimes entirely frustrated, by their ignorance and their neglect of the conditions upon which health necessarily depends. We are, therefore, of opinion that it would greatly tend to prevent sickness, and to promote soundness of body and mind, were the elements of physiology, in its application to the preservation of health, made a part of general education; and we are convinced that such instruction may be rendered most interesting to the young, and may be communicated to them with the utmost facility and propriety, in the ordinary schools, by properly instructed school masters." London, March, 1853.

This opinion, which was drawn by George Combe, "was deposited in the hands of the government, and a large impression of it was printed and circulated." The government gave effect to it by ordering the preparation of an elementary work on "Physiology Applied to Health," and "Marshall's Physiological Diagrams," to illustrate it, for the use of schools, and by instituting examinations in physiology, and making a certificate of ability to teach it a title to an increased allowance of pay.

In the year 1854 the eminent English physician, Dr. Paget, delivered a lecture at the Royal Institution of Great Britain, on the "Importance of the Study of Physiology," in which he claimed for it two classes of advantages: 1st. The science itself would be benefited by the creation, in this manner, of a greater number of observers. Also, by securing thus, co-operation and mutual understanding among all scientists—since all would have had some physiological instruction—a ground-work of common language or terminology would be laid here for future use. Again, this teaching would point out early in life those who have aptitude for the science itself. 2d. The advantages to the student, physical and mental, would consist in guiding to the improvement of his health by teaching the economy of his powers; also, in providing worthy materials for thought; likewise in cultivating peculiar modes and suggesting ends of thinking. He would have not merely the facts, but chiefly the general principles of the science taught. For example, the principle of the economy of force in the system he admirably illustrates by observation of the alternate action and repose so necessary to the continuance of all healthy muscular, nervous and digestive functions. Hence, with these general principles he would combine useful rules of health. One so instructed would, he claims, be prepared to receive the higher truths of sanitary and medical science. Among the chief advantages of physiological teaching, in his judgment, are these: 1st. That it is confessedly a science of uncertainties, thus teaching its students to weigh, think and decide, and not merely to receive and believe. 2d. It is a science of designs, and thus happily adapted to answer the questions, "Why?" "Of what use?" so frequently asked by children in the prosecution of their studies. These he ably and beautifully illustrates by a statement of some of the arrangements for the circulation of the blood, respiration, the history of the development of the wings, legs, heart and blood cells of the chick, and the wonderful provisions for the repair of damaged organs in the lowest as well as the highest orders of animals.

In the same year, 1854, Professor Huxley, in an address at St. Martin's Hall, on "The Educational Value of the Natural Historical Sciences," claimed for physiological science the very highest value as

a branch of knowledge—teaching, like all science: 1st. Observation of facts, including experiments. 2d. Comparison and classification, or the formation of general propositions. 3d. Deduction, or the return from general propositions to facts. 4th. Verification, or proof of previous inferences.

Its value as discipline he regards as due to its training and strengthening of common sense, and its great exercise of the faculties of observation and comparison. Of its practical value he considers it hardly needful to speak, it is so self-evident. In closing, he says: "It appears to me that, as with other sciences, the common facts of biology, the uses of parts of the body, the names and habits of the living creatures which surround us, may be taught with advantage to the youngest child. Indeed, the avidity of children for this kind of knowledge, and the comparative ease with which they retain it, is something quite marvelous. I doubt whether any toy would be as acceptable to young children as a vivarium of the same kind as, but of course on a smaller scale than, those admirable devices in the Zoological Gardens." * * * "Leave out the physiological sciences from your curriculum, and you launch the student into the world undisciplined in that science whose subject-matter would best develop his powers of observation; ignorant of facts of the deepest importance for his own and others' welfare; blind to the richest sources of beauty in God's creation; and unprovided with that belief in a living law, and an order manifesting itself in and through endless change and variety, which might serve to check and moderate that phase of despair through which, if he takes an earnest interest in social problems, he will assuredly sooner or later pass."

Fourteen years later, in an address on "A liberal education, and where to find it," before the London Working Men's College, he said:

"Suppose it was perfectly certain that the life and fortune of every one of us would, one day or other, depend upon his winning or losing a game at chess: Don't you think that we should all consider it to be a primary duty to learn at least the names and the moves of the pieces; to have a notion of a gambit and a keen eye for all the means of giving and getting out of check? Do you not think that we should look with a disapprobation amounting to scorn, upon the father who allowed his son, or the State which allowed its members, to grow up without knowing a pawn from a knight?

"Yet it is a very plain and elementary truth that the life, the fortune and the happiness of every one of us, and more or less of those

who are connected with us, do depend upon our knowing something of the rules of a game infinitely more difficult and complicated than chess. It is a game which has been played for untold ages, every man and woman of us being one of the two players in a game of his and her own. The chess-board is the world, the pieces are the phenomena of the universe, the rules of the game are what we call the laws of Nature. The player on the other side is hidden from us. We know that his play is always fair, just and patient. But also we know, to our cost, that he never overlooks a mistake or makes the smallest allowance for ignorance. To the man who plays well, the highest stakes are paid, with that sort of overflowing generosity with which the strong shows delight in strength. And one who plays ill is checkmated without haste, but without remorse.

"My metaphor will remind some of you of the famous picture in which Retsch has depicted Satan playing at chess with man for his soul. Substitute for the mocking fiend in that picture, a calm, strong angel, who is playing for love, as we say, and would rather lose than win—and I should accept it as an image of human life.

"Well, what I mean by education is learning the rules of this mighty game. In other words, education is the instruction of the intellect in the laws of Nature, under which name I include not merely things and their forces, but men and their ways; and the fashioning of the affections and of the will into an earnest, loving desire to move in harmony with those laws." "That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does, with ease and pleasure, all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold logic engine, with all its parts of equal strength, and in smooth, working order; ready, like a steam engine, to be trained to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of Nature and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience, who has learned to love all beauty, whether of Nature or of art, to hate all vileness, and to respect others as himself." So far short, in his judgment, do the English schools come of his ideal, that he says English fathers must say to their sons: "At the cost of from one to two thousand pounds of our hard-earned money, we devote twelve of the most precious years of your lives to school.

There you shall toil, or be supposed to toil; but there you shall not learn one single thing of all those you will most want to know, directly you leave school and enter upon the practical business of life."

In 1855 Prince Albert recommended the teaching of physiology in schools, in a speech delivered at Birmingham. In the same year Dr. Hodgson taught it to a large number of teachers and pupils in Heriot's Hospital, Edinburgh, using Lovett's Diagrams. These lectures were said to have "marked quite an era in the spread of physiological knowledge." In 1858–9 he also gave courses on it to working men and others in various places. In 1859 Herbert Spencer published his article on "Physical Education" in the *British Quarterly*, which has since appeared in his "Education," published by Appleton, in this country, in 1860. In the latter admirable and most suggestive work, Mr. Spencer classifies the leading activities which constitute human life in the order of their importance, thus: "1. Those activities which directly minister to self-preservation. 2. Those activities which, by securing the necessaries of life, indirectly minister to self-preservation. 3. Those activities which have for their end the rearing and discipline of offspring. 4. Those activities which are involved in the maintenance of proper social and political relations. 5. Those miscellaneous activities which make up the leisure part of life, devoted to the gratification of the tastes and feelings." Hence he infers the rational order of subordination of various kinds of knowledge, or education, to be correspondingly: "That education which prepares for direct self-preservation; that which prepares for indirect self-preservation; that which prepares for parenthood; that which prepares for citizenship; that which prepares for the miscellaneous refinements of life." He remarks, "we do not mean to say that these divisions are definitely separable. We do not deny that they are intricately entangled with each other in such a way that there can be no training for any that is not in some measure a training for all. Nor do we question that, of each division, there are portions more important than certain portions of the preceding divisions; that, for instance, a man of much skill in business, but little other faculty, may fall farther below the standard of complete living than one of but moderate power of acquiring money, but great judgment as a parent; or that exhaustive information bearing on right social action, joined with entire want of general culture in literature and the fine arts, is less desirable than a more moderate share of the one joined with some of the other. But, after making all qualifications, there still remain these broadly marked divisions; and it still continues substantially true that these divisions subordinate one another in the foregoing order, because the corresponding divisions of life make one another *possible* in that order.

"Of course the ideal of education is complete preparation in all these divisions. But failing this ideal, as in one phase of civilization every one must do, more or less, the aim should be to maintain *a due proportion* between the degrees of preparation in each. Not exhaustive cultivation in any one, supremely important though it may be—not even an exclusive attention to the two, three or four divisions of greatest importance; but an attention to all—greatest where the value is greatest, less when the value is less, least when the value is least. For the average man (not to forget the cases in which peculiar aptitude for some one department of knowledge rightly makes that one the bread-winning occupation), for the average man, we say, the desideratum is a training that approaches nearest to perfection in the things which most subserve complete living, and falls more and more below perfection in the things that have more and more remote bearings on complete living." * * * "If any one doubts the importance of an acquaintance with the fundamental principles of physiology as a means of complete living, let him look around and see how many men and women he can find in middle or late life who are thoroughly well. Occasionally only do we meet with an example of vigorous health continued to old age; hourly do we meet with examples of acute disorder, chronic ailment, general debility, premature decrepitude. Scarcely is there one to whom you put the question who has not, in the course of his life, brought upon himself illness which a little knowledge would have saved him from. Here is a case of heart disease consequent on a rheumatic fever that followed reckless exposure. There is a case of eyes spoiled for life by over-study. Yesterday the account was of one whose long enduring lameness was brought on by continuing, spite of the pain, to use a knee after it had been slightly injured. And to-day we are told of another who has had to lie by for years because he did not know that the palpitation he suffered from resulted from overtaxed brain. Now we hear of an irremediable injury that followed some silly feat of strength; and again of a constitution that has never recovered from the effects of excessive work needlessly undertaken. While on all sides we see the perpetual minor ailments which accompany feebleness.

"Not to dwell on the natural pain, the weariness, the gloom, the waste of time and money thus entailed, only consider how greatly ill health hinders the discharge of all duties; makes business often impossible, and always more difficult; produces an irritability fatal to the management of children; puts the functions of citizenship out of the question; and makes amusement a bore: Is it not clear that the physical sins—partly our forefathers' and partly our own—which produce this ill health, deduct more from complete living than anything else? and to a great extent make life a failure and a burden instead of a benefaction and a pleasure?

"To all which add the fact that life, besides being thus immensely deteriorated, is also cut short. It is not true as we commonly suppose, that a disorder or disease from which we have recovered leaves us as before. No disturbance of the normal course of the functions can pass away and leave things exactly as they were. In all cases a permanent damage is done—not immediately appreciable it may be, but still there; and along with other such items which nature in her strict account-keeping never drops, will tell against us to the inevitable shortening of our days. Through the accumulation of small injuries it is that constitutions are commonly underminded, and break down long before their time. And if we call to mind how far the average duration of life falls below the possible duration, we see how immense is the loss. When to the numerous partial deductions which bad health entails, we add this great final deduction, it results that ordinarily more than half of life is thrown away.

"Hence, knowledge which subserves direct self-preservation by preventing this loss of health, is of primary importance. We do not contend that possession of such knowledge would by any means wholly remedy the evil. For it is clear that in our present phase of civilization men's necessities often compel them to transgress. And it is further clear that, even in the absence of such compulsion, their inclinations would frequently lead them, spite of their knowledge, to sacrifice future good to present gratification.

"But we do contend that the right knowledge imparted in the right way would effect much; and we further contend that as the laws of health must be recognized before they can be conformed to, the imparting of such knowledge must precede a more rational living, come when that may. We infer that, as vigorous health and its accompanying high spirits are larger elements of happiness than any other things whatever, the teaching how to maintain them is a teaching that yields

in moment to no other whatever. And therefore, we assert that such a course of physiology as is needful for the comprehension of its general truths and their bearings on daily conduct, is an all-essential part of a rational education.

"Strange that the assertion should need making! Stranger still that it should need defending! Yet are there not a few by whom such a proposition will be received with something approaching to derision? Men who would blush if caught saying Iphigénia instead of Iphigeñiá, or would resent as an insult any imputation of ignorance respecting the fabled labors of a fabled demi-god, show not the slightest shame in confessing that they do not know where the Eustachian tubes are, what are the actions of the spinal cord, what is the normal rate of pulsation, or how the lungs are inflated. While anxious that their sons should be well up in the superstitions of two thousand years ago, they care not that they should be taught anything about the structure and functions of their own bodies—nay, would even disapprove such instruction. So overwhelming is the influence of established routine! So terribly in our education does the ornamental override the useful!"

In 1860 Mrs. Bray published her "Physiology for Schools." In 1861 physiology is specifically named in the list of the Science and Art Department in England for which grants are offered. In the same year it was recommended for schools in the report of the Educational Commission of that country.

In 1871 it was included and paid for by the English government as a specific subject in the common schools. In 1872 the same took place in Scotland. From about 1860, text-books, charts and the means of instruction in this subject rapidly increased in England, and some few were issued, though not as numerously, in this country. Still, abundant, cheap and valuable resources are now easily to be had for the study and teaching of those important subjects. In December, 1880, at the meeting of the American Public Health Association, at New Orleans, Hon. John Eaton, United States Commissioner of Education, in an able address on the subject of "Sanitation and Education," warmly advocated the teaching of hygienic or sanitary science in all our institutions of learning.

Much more of the same tenor, and equally valuable in support of this subject, might be adduced from the writings of Drs. Routh, Edward Smith, Lankester and Angell, of England, but enough has been given to indicate clearly the importance which all thoughtful

men, who have given any attention to the subject of education, attach to this vital matter.

It may be well to define, at the outset, a little more clearly what we mean by saying that there should be systematic instruction, in all grades of schools and educational institutions, in anatomy, physiology, hygiene and general sanitary science. By systematic, we do not mean exhaustive, but conducted upon a basis of reason and judgment, and at the same time, continuous.

To be systematic at all, it must be adapted not only to the present capacities, but to the future wants of those taught. It should, therefore, not be of such minute and detailed character as is fitted to prepare persons for medical graduation, but rather a simple description in popular language, though scientifically correct, of all the organs of the body, their functions, relations to each other, and the conditions which increase or impair their efficiency. The organs should be illustrated and exhibited, so far as possible, by anatomical preparations, by specimens from the animal kingdom, or by plates and diagrams. A slaughter-house, so easy of access from every school, a rat or mouse trap, a barn yard and a fish pond, would furnish abundant material for the study of the bones, muscles, nerves, joints, skin, hair, brain, eye, ear, nose, tongue, digestion, circulation, respiration and excretion, with all their attendant organs. In these the youngest child would be interested, the most advanced pupil find ample stores of knowledge and full scope for the exercise of his highest powers of observation, comparison, deduction and verification.

The field is so immense that it is only limited by the capacities of the pupil and teacher; so fascinating that to the great majority of students, no other subject in the whole school course would present attractions comparable to it. Children crave facts, they delight in sensible, tangible objects; hence, those studies which put them upon the use of their faculties in a natural, healthful way, which offer them knowledge, so to speak, in concrete rather than abstract forms, give them objects to handle rather than laws to endeavor to comprehend, are the ones which they most enjoy and pursue with the greatest avidity. Just in this meeting of the wants of young minds lies the peculiar attractiveness and fitness of these studies. No mind so young, of ordinary school children, but can appreciate something of the beauty which resides in mere animal forms. In proof of which see how tenderly and admiringly one such will handle and caress even a dead bird or mouse which it has found; how it will watch by the hour

the motions of its pets, how keenly their habits are observed, and how, oftentimes, their peculiarities are pointed out, for the first time, to parents who had not before noticed them. From external form and movement the mind naturally seeks to peer within, as witnessed by the multitudes of broken toys sacrificed in early years to find the hidden spring or wheel which contains the mystery; hence nothing will so delight them as to search out the secrets of the life, the motion, circulation, nervous actions, the wonderful complexity of parts that go to make up the living organism.

The study of physiology, then, in primary schools, prosecuted in this way with all the aids of animal life brought in both by teacher and pupil, the latter stimulated to observe, to collect specimens, to ask questions, to investigate on his own behalf, and thus in his turn quickening the teacher to increased activity in preparation for each day's work, becomes no longer a matter of dry drudgery and mere memorizing of names, but a living pursuit, rousing into keenest action every faculty of the child's nature, storing his mind with facts of immense practical value for all time, and so disciplining his powers of observation, attention, reflection, inquiry and comparison that whatever his after-occupation in life he will be the better student, the more efficient worker, and in all probability the more accomplished and successful man. In connection with this kind of study there are abundant opportunities for inculcating the simple rules of hygiene as to cleanliness of person, bathing, friction, the care of the teeth, hair, nails and clothing. From observation of the habits of animals and their peculiarities of constitution, useful lessons in the kinds of food best suited to man may be derived and impressed. Combined with this instruction, which we hope soon to see given in buildings properly constructed, furnished, lighted, heated and perfectly ventilated, there should be such alternation of rest and study, such use of light gymnastics on the basis of what is known as "Ling's System of Free Movements" without apparatus, that their young frames, instead of being cramped, bent, round-shouldered and narrow-chested, should all be erect, full-chested, with vigorous circulation, free and deep respiration, and the muscular system throughout harmoniously developed. So the primary school room becomes a miniature world, receiving instruction from all outside life that may be made helpful for future usefulness.

Passing to schools of intermediate and higher grade, the range of instruction becomes more widely extended. Here is possible a more

thorough and careful study of parts, a more comprehensive view of their functions and interdependence, more varied comparisons with other animal forms, bringing into greater prominence the marvelous unity in variety existing in the whole animal creation. As the study becomes more minute, the aid of the microscope or the simple lens may be invoked at a trifling expense, revealing a new world hidden beneath the one exposed to ordinary gaze, showing not merely in the structure of each part something wonderful and before unsuspected, but how, upon and within each part, dwell myriads of lower orders of existence, dormant, yet ready, upon the decline in vigor of that part, to start into new activity of their own and complete the destruction which bad habits or unwise mode of life in the subject may have begun. Thus at the outset of his career the student may be guarded against some forms of disease which the latest and most improved methods of scientific investigation have revealed, in the shape of germs, to the comprehension and perception of all observers.

With these enlarged views of anatomy and physiology thus taught would go hand in hand more complete hygienic counsel, reaching to all the details of individual habits—such as care of eyes and ears, times of study, recreation and outdoor exercise, amount of sleep, quantity and quality of food and drink, times of eating and drinking; also clothing for head, feet and body. In addition to these matters which pertain to the individual, should come instruction at this period, or as the children are able to understand it, in matters pertaining to collections of persons, as in the house, the village, town and city, the school, the church and the public assembly.

In this way much practical information in regard to lighting, heating and ventilating dwellings, churches and public halls; the proper arrangements of cellars, dining, sleeping and sitting rooms, kitchens, bath rooms and water closets, house drainage, water supply, and the thousand matters especially which go to make home and social life healthful or disease-producing.

Thus may be laid the foundation of general sanitary science in minds prepared by previous habits of observation and reflection to estimate their worth and importance. It is not to be supposed that this instruction can be complete or very minute; but it may be sufficiently so to arouse an interest in the subject, to set these young minds to inquiring, reading and investigating for themselves, and thus reveal to them how much is to be learned and how immense may be the value of such knowledge.

Accompanying each day's study and discipline of mind in this grade, may be introduced a wide range of calisthenics, a greater variety of exercises with or without simple apparatus, increasing muscular power, and perfecting the development begun in the primary schools. These, judiciously used during school hours, rest the mind, draw the blood from the crowded brain, inflate the lungs, quicken the circulation, destroy worn-out tissue and make a demand for new material, an increased supply of blood and plenty of good food; appetite and digestion are improved, and mind and body are strengthened together.

In the higher institutions it need hardly be said that the study of biology, or physiology in its wider application to all animal life, with anatomy, human and comparative, gives scope for the fullest exercise of the best disciplined minds, and is itself, according to the testimony of the greatest living teachers of those sciences, not only knowledge of the very highest value but a discipline unsurpassed. Here may be used every variety of gymnastic exercise fitted to develop manly and womanly forms in their greatest perfection, and to lay up a store of strength and constitutional vigor which may suffice to carry the possessor well forward in the work of future life, and above all establish habits of daily attention to those matters which, with very little consumption of time, shall secure the most perfect growth, the fullest employment and the most continuous health and durability of all the faculties of mind and body.

At this part of the course the most complete and scientific instruction in personal hygiene, together with sanitary science, as it affects not only individuals, but general society in cities, towns and villages, should be given. The great questions of food, air and water, refuse, soil, drainage, buildings, quarantine, and all the vital matters affecting the public health, which, in their variety, complexity, yet beautiful harmony, are now universally recognized as constituting a science, should receive the fullest attention.

Such instruction as has now been barely outlined or hinted at, we regard as subserving the public health in the most radical and thorough way possible. Each pupil in his measure and capacity becomes a sanitarian, an observer, a student of the laws of health and right living, and, above all, an obedient servant of those laws, so far as is possible, from his earliest years. Each one becomes an instructor of others in the daily intercourse of life, and so the knowledge is diffused. Each home founded by such a student is constructed and conducted more

nearly in accordance with the principles of health than has ever before been possible. *Therefore, we hold it incontrovertible, that to labor for the bringing about of this most desirable condition of the educational institutions of the State is one of the highest and most imperative duties of the State Board of Health.* In no other way can the work of the Board be so efficiently carried on to the consummation of making each individual in the community self-helpful. By it both mind and body are harmoniously developed; many forms of sickness now due to indiscretion, lack of knowledge and unsanitary surroundings, are prevented; disease when once introduced into the system is intelligently combated; the efforts of the physician are ably and conscientiously seconded by persons who have given thought and study to the care of the health. The instruction is given under circumstances to make it most lasting, since early impressions are, as a rule, the deepest, most vivid and most enduring; the faculties are then most acute, and the judgment least biased by considerations of a selfish or pecuniary sort which might interfere with the carrying out of reforms. It is continued through a period of from one to fifteen years, made alive by dissection and experiment, forced upon the conviction by numerous and varied illustrations, and in every way brought home to the pupils in the activities of every-day life. In no other way can such vast numbers be reached; since about two hundred thousand children and youth attend school a part or the whole of each year, a larger and more constant class than is instructed by any other agency. In this large body of pupils are found representatives from all ranks in life, the high and low, rich and poor, learned and ignorant, all of whom would be alike taught what is wisest and best in sanitary matters. So a most powerful influence would be exerted, not only on the future well-being of these, but they in turn would be instructors of their parents, and thus extend the reforming influences over all the existing homes in the State. Many of the latter could only be reached otherwise, by the direct visit of a public inspector, which comes so infrequently as to make it, for all purposes of a thorough renovation, practically worthless.

Consider again that in a period of ten to twenty years, these pupils are to become the heads of families, and in new homes this knowledge, reproduced, will become operative in every household, at the cradle, the fireside, the table, and dealing with the minutest affairs of every life, will produce its results in a stronger race, freer from inherited taint, and better fitted to carry on active work to a vigorous old age.

The London Spectator, in a recent issue, commenting on the condition of sanitary science in that country, asks pertinently: "Do we live longer, or are we only slower in dying?" Learning that the expectancy of life in London had "risen a whole year within the last decade," it remarks, "But we want to know accurately a little more, and what is the kind of life which is increasing—whether it is young life or mature life, or aged life which is being enlarged? Are we young longer, or mature longer, or old longer? * * * Do we live longer, in fact, or are we only a little slower in dying?" He observes, "We should ourselves say, with a very strong conviction, that in England nearly the whole gain had been made between sixty and seventy; that the number of men who 'failed' between sixty and seventy, that is, who became old, lost their eyesight, or were otherwise impaired, was decidedly less; that a man of sixty-five was visibly younger than he would have been at the same age forty years ago."

The London Lancet, commenting on this article, remarks: "If to the prolongation of lives which have been trained in the school of experience can be added a diminution of casualties among those who are entering life or passing through its most critical stages, the ultimate result may be an army of more trustworthy veterans and more vigorous recruits, together forming a community such as the world has not hitherto witnessed.

"It is one thing to live long, another to die slowly. If it could be shown that men were not so well able to fight the battle of life at a mature age as they used to be, there would be room to question the value of such an improvement of human health as has been effected. Confessedly, the community could not be held to be advantaged by the prolongation of useless or powerless lives. To drag out a joyless and purposeless existence would be a curse rather than a blessing: but so far as the facts are set out in the remarkable article on which we are commenting, there is nothing to show that human health has not been substantially improved, while death has been deferred."

On the other side of this question, however, Dr. J. M. Granville, an eminent English physician, in a letter to *The Spectator*, says: "In result of a somewhat large acquaintance with the facts held to indicate the state and progress of 'human health,' I fear my testimony must be given to show that the improvement effected by science consists in a prologation of the passive endurance of life, rather than an exten-

sion of the period of true vitality, or any increase of the opportunity for good work and real intellectual enjoyment. We may 'live' longer, but our lives are not either happier or more useful, for the excessive energy recently devoted to the conservation of health, or the inordinate and laborious means taken to avoid disease and death. It may, doubtless, be possible to raise humanity to the level of one of those scientific toys which approximate perpetual motion, but expend their whole force in moving themselves. Whether longevity purchased at the price of passing a lifetime in running from death would be worth having, I must leave to be determined by the judgment of those who set a value on our so-called sanitary progress, which I, for one, fail to recognize.

"I think men were happier and better, and lived nobler lives, before the pursuit of health and the yearning for longevity became a craze, almost amounting to madness. What to eat, drink, and avoid, what to wear, where and how to live, by what means to avoid infection, to keep off disease, and to escape death for a few weary and worried years, are questions which so engross the thoughts, if they do not embitter the lives of the multitude, that the proposition, 'Is a sanitary life worth living?' has come to be a subject of serious contemplation, and one which the taxed and harassed community will sooner or later be compelled to entertain."

We have quoted thus at length from these three authorities to show clearly the state of feeling among thoughtful men, medical and otherwise, as to the results thus far attained by sanitary science. *The Spectator* and *The Lancet* hope and believe that good has been already accomplished; Dr. Granville evidently thinks the results not worth the pains.

In my judgment, sanitarians have begun at the wrong end of the course, or in the middle, rather than at the beginning. As well might we expect to teach a party of men who had no knowledge of arithmetic, geometry and trigonometry, properly to construct a railroad through a mountainous country, with all its difficulties and dangers of curves and grades, embankments and cuts, bridges and trestles, culverts and tunnels, as adequately to guide and direct, in the intricacies of modern civilization, one who had received absolutely no instruction at all in the fundamentals of living. What wonder that there should be a dragging through "weary and worried years," an embittering of the "lives of the multitudes," a "taxed and harassed community," over questions unsolved, doubts raised only to be partially met and answered, and numerous perplexities for the disentangling of which there has been no previous training or discipline?

A child trained from earliest years in obedience to law, be it parental or civil, finds no worry or fret in later life in conforming thereto.

Just so a community, rightly instructed in matters of health from infancy, will find it as natural and easy to live rightly, as another, untrained, to live wrongly. Who can doubt that such education, carried on conscientiously and persistently for a generation, will add to the individual length of years, and markedly delay the period of decay of vital powers, so that lives would thus be greatly increased in efficiency and happiness?

The reforms in the individual life and the household, of which we have been speaking, would reach, also, to collections of individuals, the workshop, all trades and professions, the village, town and city. Unsanitary conditions being removed from the homes, the schools and the places of business and recreation, what would prevent the growth, in intellectual and physical vigor, of the whole people of the State? Were the same plan pursued in every State in the Union, who can measure the national benefits conferred thereby? The bulletins issued weekly by the National Board of Health show an average mortality, for most of the cities reported, of from 20 to 30 per thousand for the year. Some of the best living sanitarians believe that, even with the present condition of our people, by proper attention to hygiene, this might be reduced to even less than 10 per thousand. With a population of 50,000,000, this would effect an annual saving of about 500,000 lives. Can any one doubt that in a generation this economy of life would even be increased, by reason of the gradual improvement wrought in the condition of all classes? The productive power, and so the cash value, to the nation, of these lives alone, would be many millions of dollars; the saving due to the avoidance of the greater part of the preventable sickness which now afflicts so many thousands in the country would amount to many millions more. Thus, in time of peace, the health, wealth and life of the nation are vastly increased. In time of war, should such dire necessity ever arise, the power of attack or resistance is thereby multiplied many fold. For, not battle, but disease, induced by physical weakness and ignorance, is the source of greatest mortality to armies. Other things being equal, therefore, that nation is most invincible which puts into the field the wisest and healthiest troops. Every

consideration, then, of individual and social welfare, of State and National progress and development, demands the closest attention to this most vital matter of education.

It remains to consider briefly the objections to this scheme, the difficulties to be overcome in its application, and some plans for a beginning, at least in the way of the introduction of these subjects to the schools of the State.

The most serious objection to the adoption of the plan, at present, lies in its impracticability. And for this three causes may be urged: First, to make the study effective it should be compulsory in all grades of schools. By the school law of New Jersey, as it stands at present, the course of study is determined by the Board of Trustees of each school district for itself. In cities this office is performed by a Board of Education; in the higher institutions by the faculty. Now it may safely be said that except, perhaps, in the case of the latter class, these boards not only have no interest in, nor appreciation of the subject, but no knowledge to guide them in a wise adoption of what would be judicious. Evidently, therefore, it would be folly to expect at once such enlightenment as would be necessary to bring about perfect unanimity of feeling and action in this matter. So, too, there is no public sentiment behind them urging them on to give the matter serious consideration, for the public are more densely ignorant than they.

Again, even if we suppose the boards by some magical transformation to have decided upon this change, the great majority of the teachers of the State are entirely unfitted to carry it out, having given, in nine cases out of ten, absolutely no preparatory study to the subject.

Lastly, were the teachers ready, it may be said the schools have no apparatus, of books, diagrams, charts and models, wherewith to conduct such classes properly and make the study effective.

In addition to the grave charge of impracticability it may be said that errors are liable to be taught in a subject so changeful and one so progressive that what might have been considered knowledge a few years ago has now been outgrown.

Others would urge that such instruction is unnecessary, it being only needful, in order to live aright, to follow the dictates of common sense and nature.

Still others would say the scheme is fanciful, and would ask, where

it has been tried in some portions of this country and in England and Scotland, Has it realized the expectations of its friends and advocates?

In answer to these objections, briefly, and in reverse order, it may be said that nowhere has the experiment been tried, either fully, as here outlined, or for a sufficient length of time to test its capabilities. In Massachusetts and in the English schools it is optional rather than compulsory, and in very few is it pursued with completeness, accompanied by physical exercises for the full development of the body. Where this has been done its results have been most gratifying, as may be seen by the testimony of Dr. Routh and Mr. Maclaren, of England. It may safely be said that where even an approach to thoroughness has been reached in this direction its advocates have no wish to abandon it, but rather enthusiastically ask for more time and attention to its pursuit.

As to the all-sufficiency of nature and common sense as guides, a moment's reflection will show that we are living in a highly artificial state of civilization which has created new wants, desires and means of gratification, and at the same time dangers so insidious, secret and complicated, that one who should trust his unaided powers to carry him through life would almost certainly meet an untimely fate.

Respecting the liability to the teaching of error, it may safely be said that the present state of our knowledge in these sciences insures the inculcation of a hundred well-known, reliable, far-reaching and valuable truths, to one insignificant and trifling possible error. Even where there is a possibility of mistake the best scientists in these particulars do not state as fact what is merely probable or possible, but leave to future investigation to determine accurately what is now merely conjectured.

In reference to the supply of materials, books, charts, models and the like, it is safe to say that all the essentials may be purchased for each school district at a very trifling expense, and these, with the aid of good text-books, many of which are published both in this country and in England, may be made very instructive and valuable if only the living teacher be apt and filled with enthusiasm in and for the work.

And here is the most serious objection to the speedy introduction and prosecution of these studies in our schools—the teachers are themselves untaught. Very few, comparatively, have even studied these matters in their own school courses; still fewer have pursued them in mature life with reference to teaching them to others. How are

these defects to be remedied? Let the State Board of Health appeal at once to the State Board of Education, under whose care is placed the State Normal School, urging that no teacher be permitted hereafter to go out from that institution unless thoroughly qualified to teach, in the best manner, the subjects under consideration. To be thus qualified they must be taught by the most approved methods, and it would need but a few lessons on the part of a professor of physiology to show both how this should be done and how full of living and absorbing interest is everything pertaining to these subjects when once properly handled. The State Board of Education might also be urged to use its influence for the passage of a law making some instruction in these subjects compulsory, if not at once, at least after the lapse of a few years, so as to allow time for the necessary changes to secure its enforcement.

Meantime there are about 3000 teachers in the State to be fitted for this work.

By law each county in the State must hold a Teachers' Institute, at least annually, for mutual conference, assistance and instruction; make the attendance compulsory; urge upon the State Superintendent of Public Schools, and upon the county superintendents, the imperative necessity of likewise attending these gatherings. Ask them to call in at every such meeting the assistance of physicians or sanitarians who have given special attention to these matters, in order to arouse enthusiasm in the teachers, to inform them of the best text-books, charts, diagrams and models for their own guidance, and to give them illustrative examples of how these subjects may be taught.

In large cities having local boards of education, superintendents and normal schools, the progress may be more rapid in preparation for this work, as the educational machinery is more manageable, the facilities are greater, and the appreciation of its value more likely to exist.

At the same time, however, that a united and persevering effort is made with the teachers, the general public must not be neglected. Appeals should be made to local boards of trustees, setting forth clearly the importance of these subjects, and urging them to require a study of them on the part of all teachers in their employ. Local boards of health, of which there are now over 200 in this State, with the aid and co-operation of the State Sanitary Association, could do no more useful work than to enlighten the people of their respective neighborhoods by means of addresses, lectures and social conferences

in respect to the value of this kind of knowledge, and the importance to them and their children of getting it through the schools, where it can be most successfully taught.

The press, always anxious to be foremost in every good work, would be glad to report these meetings, to endorse their action, and to support the scheme by earnest advocacy of all rational measures for carrying it out. Thus a much larger audience would be reached than could possibly be gathered at any one assembly.

The pulpit of all denominations would be found to encourage it, likewise, and the injunction, "Glorify God in your bodies which are His," might form the theme of many a practical discourse.

In these ways, then, the general public is aroused; boards of trustees are set to thinking and planning for a better teaching in the schools under their charge; State and county superintendents and the State Board of Education are made alive to the overwhelming importance of these as compared with any other possible branches of learning; teachers are quickened into active prosecution of a new study or earnest brushing-up of what has grown rusty from disuse; the demand for improved means of instruction creates a supply of the needed apparatus, in greater abundance and of less expensive construction; and all interested in the great matters of the health, wealth, happiness, education and moral condition of the people, are stimulated to new activity for the attainment of these most desirable ends.

Of course it would be folly to expect that all, or even a large share, of these results could be secured at once. No doubt many years of persevering effort, of discouragement, of trial and failure, must pass before even a tithe of them can be realized. A beginning may be made, however, and one improvement after another suggested and carried into effect as opportunity offers.

What is chiefly needed is some energetic man, or body of men, whose enthusiasm is unbounded, whose love for the work is unselfish, whose knowledge is limited only by the present state of these sciences, to press these matters seriously, earnestly, vigorously and continuously upon the attention of all the parties concerned—educational officers, teachers and the general public. Twenty years of faithful application of the plan here sketched would do more, we firmly believe, for the welfare and progress of our State in all that pertains to right living, than it is possible now to estimate.

TYPHUS FEVER AT CAMDEN COUNTY ALMSHOUSE.

E. M. HUNT, M. D.

After the report of the Board for 1880 had gone to press, an outbreak of fever occurred in the Camden county almshouse. A memorandum relating thereto (pp. 181–183) was added to the report, but the fever and incidents connected therewith demand a more extended notice.

Typhus fever is a disease which has seldom become largely epidemic in the United States, and is regarded as belonging chiefly to the ill-housed and famished poor of older countries. The epidemics in Ireland and at Liverpool after the famine of 1848 illustrate how it is originated and fostered by crowding and destitution. It has, however, so much a specificity of its own, that, like cholera, it has not been regarded as occurring here save by importation. If this were its only source, our State would need to be on guard against it. At one time Perth Amboy suffered by direct importation. Proximity to ports such as those of New York and Philadelphia exposes us to all diseases consequent upon immigration. Now, with increasing numbers of arrival, persons soon find their way from New York and Philadelphia to our country roads and to our almshouses, or, as laborers, become inmates of our dwellings. Besides this, the prevalence of typhus fever last year in Philadelphia has not been satisfactorily traced to foreign origin. Prof. Janeway, in his paper on "Typhus Fever in New York," as read before the Academy of Medicine, May 19th, 1881, seemed to entertain the idea of its spontaneous development there amid cheap lodging-houses, foul air, over-crowding and filth. Dr. J. C. Peters stated that of 318 cases he had noted, none had been traced to importation. While for the last ten years the disease has shown itself rarely in this country, cases occurred at several points last year. There were 490 cases in all in New York

city, and 121 died. The contagion is one of the most decided, persistent and fatal with which we have to deal. Our crowded populations are beginning to be quite comparable in their conditions, and so will be in their diseases, with those of other countries. Both because of our State location, of our proximity to sea-ports and our late experiences, we have occasion to study any epidemic of this disease, and notably the one now under consideration.

Fevers of a remittent character had been so prevalent at the almshouse in the summer and fall of 1880, that the case of Brown, who was brought there sick and delirious, November 24th, only seemed to vary therefrom in presenting more of a typhoid character. As he became convalescent about two weeks after admission, it was not until the middle of January that his relation to the prevalent fever came to be fully appreciated. It was then noted that not only did his two room-mates become affected with a similar form of fever, but that it next invaded a room directly opposite, and affected persons in adjoining rooms until each room on that floor had one or more cases. These, as the returns show, were not regarded as distinctively typhus fever. It was especially unfortunate that owing to an accident to the heating apparatus the already over-crowded part of the old almshouse was made to hold the entire crowd of inmates. The fact is thus stated by one of the attending physicians:

"The steward was obliged to transfer, by reason of insufficient bedclothing, those who slept in the large and commodious sleeping-rooms of the new building, to the old building, which already contained its full quota. Necessity compelled the packing together of old, middle-aged and young. Bedsteads occupied all available space, and straw beds were improvised on the floor. A large coal stove was in the center of one of the large rooms, with 35 persons sleeping in the room and scarcely any ventilation. Not more than 15 persons should have slept in the room. All windows were closed down to protect those sleeping near them. The stove was kept at red heat, consuming all the oxygen; and the crowded inmates, inspiring the polluted and confined air, made good subjects for the rapid development of the fever poison already imported."

The average number in all had been about 180, but at this time 275 were crowded into the old apartments.

January 12th, the following letter was received from Drs. McCullough and Branin, the attending physicians of the almshouse and the county asylum, which adjoins it:

BLACKWOODTOWN, N. J., January 10th, 1880.

E. M. Hunt, M. D., State Board of Health, Metuchen, N. J.:

DEAR SIR—About a fortnight since there occurred at the Camden county almshouse a serious and malignant epidemic, marked with the characteristics of typhoid, typhus and malarial fever. We have had, since its inception, forty-seven cases and twelve deaths. The causes which have prevailed to produce this unprecedented number of cases, and the consequent mortality, remain, to a certainty, obscure.

The medical officers have made the most strenuous endeavors to hold it within proper limits. Our sewerage system has been carefully examined and found faultless. The water tank has been drained and all sediment removed, the water not supposed to contain any organic matter; sleeping apartments cleaned, whitewashed and thoroughly disinfected. All our cases were last week removed into our newly completed hospital, with its improved ventilation and steam heat. Since the 6th instant, no new cases have developed, and our patients seem, generally, to present a more favorable aspect and convalescing, with the exception of four or five, who will probably die.

The Philadelphia newspapers have for several days contained lengthy articles reflecting on the management of the institution, and assign improper ventilation, the crowding of too many inmates into narrow, contracted apartments, and abundance of filth, as the cause of the fever poison.

Our almshouse committee, on the 4th instant, authorized the physicians of the institution to make a searching investigation, to announce the fact to the State Board of Health, if, in our judgment, we deem it necessary.

We therefore feel ourselves unwilling to assume the responsibility of deciding positively in reference to the causes which have induced this prevalent fever, and invite you to come down personally and assist in our investigation, when all the facts will be made known to you, with history and treatment of all the cases. * * *

I immediately communicated with the Board, and arranged for a visit January 17th.

The physicians, the steward, and Mr. L. De Rousse, on the part of the freeholders, gave every facility and afforded valuable assistance in the inquiry.

The medical history of the cases, and an examination of some of them, left no doubt in my own mind that the fever was distinctly typhus. As there had been some cases of a pernicious remittent type, it seemed wise to have, in case of other deaths, expert post mortem examinations made. The result left no doubt as to the distinctly typhus character of the fever.

I sought the history of the first ten or twelve cases that had occurred. The first patient was living and was able to give an intelligent account of himself immediately previous to his attack. He had been working during the summer at Ellisburg. About the 4th or 5th of November he went to Philadelphia, where he remained about a week, with very indifferent self-care. He lodged in two

lodging-houses which he describes as of the lowest kind. The crowded rooms were occupied by about twenty others, and a few days after his return home, he became ill, and was brought in a semi-unconscious condition to the almshouse, November 24th, and placed in a small room, about 12x12, with three persons in it. On December 6th, one of his room-mates was taken sick with the same fever, and the other soon after. In the next room on the left, occupied by two persons, both were taken sick. Cases soon followed in the two rooms on the opposite side, across an eight-feet hall. The first ten or twelve cases were just in this section. In the two adjacent rooms, and in the three opposite, very few escaped.

As the first cases were not of so uniformly severe a type as the later ones, and it became important to inquire into the conditions which had promoted the spread or intensified the severity of the disease, the water supply was carefully examined. It was found that this was derived from surface springs, which, although not valuable sources where the ground is rich in organic matter, or where there is much decaying woody matter, are often resorted to without apparent injury.

In the present instance this supply was unusually good. The water, after being conducted to the building, was stored in tanks, one of which had an overflow into the sewer pipe, which might thus serve as a conveyance of sewer gas to the water in the tank. Careful chemical examination of the water by Prof. H. B. Cornwall, of Princeton, did not seem to show sufficient probability of serious contamination from this source. An examination of the sewer system showed that chief reliance is placed on out-door methods. The ventilation of the sewer pipe was defective. Some errors in construction were noted and corrected, but only as a part of the general improvement, rather than as having any causative relation to the outbreak.

The general keeping of the house also showed much care and great effort to secure cleanliness amid embarrassment. The one intense and apparent evil was that of over-crowding. We found seventy men in two adjacent sitting-rooms, not adapted for half that number. At the very time one was stretched out upon a table and examination showed the characteristic spots of typhus fever. In the bed-rooms the evil, as expressed by Dr. Branin, was still more marked. Another, a careful and candid observer in the vicinity, wrote thus:

"With regard to the disease that has been so fatal, I think that while perhaps it did not originate in the institution, some of the conditions were favorable to its becoming an epidemic. Many of the men by exposure and improper and scanty living before they came there were very much enfeebled, and in right condition to take any disease. Most of them were necessarily filthy in their habits. There ought to be large bath-rooms (warmed) where every tramp should be required to go and wash himself when he enters the building. The clothes of most of these men were saturated with filth, and were of themselves disease-breeding. Having no knowledge of sanitary laws, they would shut up their rooms in the night and thus have them filled with a poisoned and poisonous atmosphere. The bursting of the boiler, preventing the heating of the new part of the building, and the huddling of such large numbers of men into small rooms, was a very important factor in the increase and virulence of the disease."

These men, whether sick or well, were received in a most informal manner for a longer or shorter period, and packed together without any of that accurate sanitary and police discipline which such an institution requires. While it may be that the want of method here was only by circumstances made more conspicuous than similar or worse conditions in other almshouses of the State, the example should suffice for a warning to all the counties of the State, through the present century at least.

The crowding of these inmates together and the increase made by an accident to the furnace could not justify so palpable a breach of sanitary propriety. All the less because before this was done eight cases of the fever had occurred. It is not surprising that after the next week 31 new cases occurred, and that typhus fever declared itself in a more malignant form. But for this increased over-crowding it is probable that the disease would have been a typhus of a much milder grade. While the course worked out and agreed upon with the attending physicians was clearly understood and approved, yet for causes not here necessary to enumerate there was delay in execution and much imperfection in the isolation and quarantine attempted. Even this was attended with some good results. It was not, however, until another visit of a committee of this Board, consisting of Prof. Brackett, Dr. Gauntt and myself, on February 3d, that we succeeded in securing anything like a satisfactory system of discipline.

The letter of Dr. McCullough, a few days subsequently, now seems all the more heroic, because he fell a sacrifice to his devotion. He says:

"Since your visit to our almshouse we have exercised our best efforts to carry into effect every instruction we received, and put in force every suggestion that would thoroughly disinfect and isolate our classes of inmates. To perform this with any degree of success has required much of our time and constant vigilance to prevent a violation of established rules. Last week I gave my personal attention to executive duties, whilst my colleague confined himself to medical treatment of patients. We had no responsible head. Our steward was deceased, and in obedience to your request and by order of our committee, I assumed full command. In this vocation I felt

myself successful, for I instituted reforms which had not before been heard of since the institution was built. I organized a scrubbing and whitewash force, who were kept under my surveillance until all work of this kind was performed to my satisfaction. * * *

"We have now a first-class male and female nurse, who have, with our co-operation, aid and counsel, established hospital discipline and materially improved the condition of our patients. Male and female departments have been well provided with necessary supplies and assistant nurses, who are receiving a good training under experienced chiefs. We have had an average admission daily of one case. Ninety cases since first outbreak. Twenty-five deaths. The females continue to have the fever of that mild type; only three cases of severity; one death (colored), and one case with coma-vigil on the eighteenth day." * * *

The disinfection, isolation and discipline which were instituted had a marked effect in diminishing the severity of the disease. In the female department the officers were able to anticipate the disease, and although its occurrence was not prevented, the effect was apparent in the greater mildness of most of the cases.

The record of cases, so far as we have them, is as follows:

To December 25th, 8 cases.
To January 10th, 1881, 47 cases; 12 deaths.
Up to February 16th, 90 cases; 25 deaths.
At date of February 16th, there were in hospital: Male patients (white), 20; colored, 4; assistants, 5. Female (white), 7; colored, 2; assistants, 3.

The report February 26th is as follows:

Total number treated to this date—male, 80; female, 13.

Of these, 29 had died, 33 had been transferred, 4 were convalescent assistants, and 27 remained in hospital.

About February 5th, by arrangement, one of the physicians had taken the sanitary administration directly and personally in charge.

The last letter of Dr. McCullough, under date of February 28th, is as follows:

CAMDEN COUNTY ALMSHOUSE, February 28th, 1881.

Dr. E. M. Hunt, Metuchen, N. J.:

DEAR SIR—Yours of 23d instant received, and contents fully satisfactory to myself and colleague. Enclosed please find report for 28th inst. We have on hand, in hospital, only one serious case, the remainder making good recoveries, and it is hoped we have experienced the worst, and the disease will soon subside. We have had no deaths for a week, and no new cases since 23d inst. Our inmates are eloping, which affords better opportunities for distribution and cleanliness.

With kind regards, &c., yours truly, J. W. MCCULLOUGH.

The improvement made in sanitary arrangements, with the earnest co-operation of both of the physicians, continued to give favorable

results to the poor sufferers; so that the census of March 15th showed only 12 males and 4 females in hospital.

March 21st. There were but 9 cases in hospital, with but 2 deaths since last report.

The report of March 26th showed only two cases of typhus fever remaining.

The report of April 4th says: "No new cases of typhus fever have occurred since the 22d of last month," although up to May 7th two or three convalescents were under care.

This Board cannot speak too highly of the assiduous co-operation of both of the physicians, and of the earnest and assiduous work of the surviving one after the death of his colleague.

Weekly reports and frequent correspondence were continued until about June 1st. Hospital and almshouse disinfection was considered in all its details, and applied to a fuller extent than has ever before been secured in the State. While the typhus poison is one of the most persistent, it is hoped that the old building, as well as the new, is entirely rid from any particles which might revive the disease. The following note of May 16th, 1881, describes the mode of conducting the final restoration of the institution:

CAMDEN COUNTY ALMSHOUSE, May 16th, 1881.

H. E. Branin, M. D., Physician in Charge Camden County Almshouse:

SIR—In compliance with your request I have the pleasure to lay before you the *modus operandi* we have been pursuing in cleansing, disinfecting and renovating the house.

After having the walls, floors, &c., well scraped, the ceilings and walls were repeatedly washed, by means of a hand-pump, with the following preparation: To each bucket of water was added a spoonful of carbolic acid (crystals), one ounce of sulphate of zinc and about a handful chloride of lime. The floors were next thoroughly soaked for 48 hours with the same preparation, when finally the rooms were whitewashed, each room receiving three or four coats of whitewash. The whitewash was prepared in small quantities. The lime was slackened to a proper consistency in each bucket separate, when to each bucket of fresh-slackened lime one pint of a strong solution of blue vitriol and a handful of salt were added.

After the whitewashing, each room and entry was daily disinfected by means of a steam-atomizer—a strong solution of carbolic acid being used—for two weeks.

While we were proceeding with this work in the old building it was unoccupied, the inmates having been previously removed to the new building.

It is the intention to allow the old building to remain empty for some time, and continue the daily use of the steam-atomizer.

We are engaged at present in disinfecting and cleaning the steward's apartments, also situated in the old building, after which we shall put the new building through the same process.

Very respectfully,

FRED JOHNSON.

Although the county asylum is in the same inclosure and under the same medical management, the fever did not spread to it. While the mortality was large, and the possibilities of the extension of the disease in the vicinity were at one time imminent, we feel that its limitation and removal give new evidence of the effectiveness of sanitary measures applied in the midst of a pest, as well as a great warning against that sort of executive looseness and that imperfect provision of accommodation which leads to the crowding of such masses into too narrow quarters. It so happened that before this outbreak the attention of our State Board had been drawn to the insanitary condition of many of our county and town buildings. An outline as to some of the same appeared in our last report, and reveals a state of affairs that shows the need of more careful sanitary oversight of the dependent classes in many of our public institutions. Taking the Camden almshouse as an illustration of what may readily occur in other similar county or town-houses, we may well consider whether forethought is not better than afterthought; whether prevention is not better than stir and treatment amid the perils and disasters of disease. Were it a mere question of financial policy or economy, the thousands of dollars that such an epidemic costs the locality ought to warn others against similar risks. The demoralization which is caused by the methods of crowding, and by the imperfect care as to details in many of these houses, is worthy of State inquiry, as it affects the social condition of the people. If inmates are allowed to wear soiled clothing; if they are indulged in filthy habits and allowed to remain unwashed; if they spend their days in crowded rooms in which the air is suffocating, and their nights in bed-rooms in which air-space is not thought of, the results are not only personal, but involve the interests of the entire county and of the State. More than once has it occurred that the Legislature has found it necessary to investigate local abuses, and thus to assert its common protection of the citizen, even in those matters which generally fall only under the jurisdiction of local authorities.

As in several other cases in which the Board has been called upon to aid, our co-operation with the local authorities has been cordial and complete, and we have been able to secure the application of methods tending to permanent relief. We only ask that the lessons of Jamesburg and Camden, of Princeton and Bound Brook, may not be forgotten, and that we may not need other outbreaks to remind us that penalties for the breach of physical laws involve social, civic and

state interests to such a degree as to imperil the welfare of our common citizenship. The remedy is in a general diffusion of sanitary knowledge, a recognition of the evils resulting from neglect, and that exactness of administration which will prevent such sickness and death, instead of illustrate its vigor and energy only amid the evils which neglect and delay have caused.

November 2d, 1881, the Secretary, on behalf of the Board, made a careful examination into all the details of reconstruction and renovation. The entire building has been cleansed, no proper expense has been spared, and the building and its appointments are now such as are unequaled in most of the counties. There is no longer need of over-crowding. Better than all, a thorough discipline has been established, and the whole institution will be run on the basis of the best almshouse management. The county owes a debt of gratitude to some of its most active and efficient freeholders. Would that some other counties whose almshouses are fitted to perpetuate pauperism and to manufacture disease, might make similar improvements, both in construction and regulation, and not wait for the warnings of an epidemic in order to secure proper accommodations and management. The fact that Camden city was compelled to quarantine against the fever, and that so many of the officers and attendants contracted the disease and died, shows how much our common welfare is involved in the proper care of the indigent. It is all the more sad because the loss of Dr. McCullough was not only a loss to his profession, but to the State; a loss incurred not so much in the discharge of his medical service as in the fact that he stationed himself at the post of danger, and, by the necessities of sanitary police, contracted the disease.

FACTS AS TO THE ABATEMENT OF THE BOUND BROOK MALARIA.

BY C. M. FIELD, M. D.

CHARACTER OF THE STREAMS AND OBSTRUCTIONS.

The pond, known as the mill pond, is formed by Ambrose brook, which flows through Piscataway township, Middlesex county, and, uniting with Green brook, which flows along the base of mountains north of Bound Brook, forms the stream, Bound brook, which empties into the Raritan river just east of town of Bound Brook. Years ago a dam was placed across Bound brook. Then the Central Railroad of New Jersey, and finally the Lehigh Valley railroad, placed their road-beds in the line of the dam, and so left but a small way for the passage of water during heavy rains, thus damming it up and allowing the deposits of alluvium, and leaves and wood, and such debris as was carried from the regions above, to cause the pond to fill to such an extent that, in order to get water for mill power, the Lehigh Valley railroad raised the dam, at the mouth of Bound brook, from one foot to eighteen inches. This backed the water over some sixty to seventy-five acres of land, and this extra obstruction, added to the sluggish flow of the streams, made thus a large morass, from sixty to seventy-five acres, and was filled with dying, dead and decaying vegetation, on which the water stood to the depth of only a few inches. The vegetation and debris had destroyed the channels of the streams, so that the water, instead of flowing, for most part percolated through this mass of vegetation. In addition to this, the flow of water was of such limited amount that the owners of the water-power, in order to use it, dammed up the water during the night, and then, in using it during the day-time, would draw off the water and leave some sixty acres of this morass of festering vegetation and slimy mud exposed to the hot rays of the sun. The result was that a most disagreeable odor

arose and was borne all over the neighborhood, and throughout the town of Bound Brook and vicinity. The odor, that of decaying vegetation, damp, offensive and penetrating, was a concentrated extract of that with which most are familiar, as arising from vegetation situated under similar circumstances.

ACTUAL SICKNESS.

The people of Bound Brook and vicinity began to suffer from the group of symptoms generally classed under the head of malaria, intermittent and remittent fevers and fearful neuralgia of different regions of body, and this continued, under the use of quinine and the usual anti-periodic treatment and remedies, until, out of the whole population of Bound Brook, there was but *one* person known not to have suffered, and decidedly so, from malaria in some form. Let it be remembered that Bound Brook shows itself to have been a healthy place by its death-rate, and the remarkable longevity and robustness of its old families. Yet, in spite of all care and persistent treatment, it was impossible for the inhabitants to remain in the town or vicinity and be well. The population is between 1,000 and 1,300.

Such being the condition of the health of the place, the citizens, with the advice and assistance of the State Board of Health, and General Vielé, of New York, presented the following indictment, and the case came up for trial at Somerville, Somerset county, N. J., during the September term of 1880, Mr. R. V. Linaberry, Esq., now of Elizabeth, and John Shaw, Esq., of Finderne, having charge of the case.

The case was thoroughly sifted, many of the prominent physicians and sanitarians of the State being called to the stand, and the verdict was rendered against the pond. The judge's charge I am unable to send you, but the parties owning the pond were "ordered to abate the nuisance forthwith."

WHAT WAS DONE.

The Lehigh Valley railroad began by removing the dam and then cutting a ditch, wide and deep enough to carry off the water from the streams. This was made straight and the former winding and partial courses filled up. The citizens then employed men and thoroughly removed the deeper portions of the dam and drained the region of the former pond. The result of the drainage of pond, upon the land formerly occupied by it, has been perfectly satisfactory. It was "*limed*," and this year used for pasturing cattle. The noxious odors have entirely disappeared, and the land, in place of being covered by a mass of stinking, decaying vegetation, is a fertile meadow. The result on the health of citizens I will mention later.

In addition to thorough draining of this region, the citizens formed a citizens' sanitary committee (a copy of which I enclose), which inspected all the premises of the town and compelled all persons to keep their property in a perfect sanitary condition. The following is their circular:

HEADQUARTERS CITIZENS' SANITARY COMMITTEE,
BOUND BROOK, N. J., ..., 188... }

Mr.....

DEAR SIR—At a public meeting, held in Bound Brook hall, November 23d, 188C, a committee of eight citizens were appointed to examine the sanitary condition of the town and vicinity, and the following resolution of instructions was unanimously adopted:

"*Resolved*, That the Citizens' Sanitary Committee be, and they are hereby, instructed to make a thorough sanitary inspection of the towns of Bound Brook, Bloomington and Middle Brook, and wherever nuisances are found to exist, the committee are requested to use all persuasive measures within their power to have the same abated forthwith. In case of neglect or refusal of any one to comply with reasonable recommendations, the committee are further instructed to lay the cases before the first Grand Jury that meets."

In accordance with the foregoing resolution, the Citizens' Sanitary Committee have made a careful examination of your premises, and would recommend that

.....

If allowed to remain in its present condition through another season of hot weather, the committee believe that it will be very detrimental to the health of the town. Your early compliance with the foregoing recommendation is earnestly requested. The committee would also suggest that care be taken not to allow vegetable and other refuse matter to decay in and around your premises; by so doing you can remove a fruitful source of disease.

Yours, respectfully,

....,
....,
Citizens' Sanitary Committee.
....., *Secretary.*

The places known as the gravel-pits, situated at the west end of town, have been filled in and drained. This has just been completed, and will remove all troubles which arose from their condition.

PRESENT RESULTS.

As regards the result of the removal of nuisance, the present condition of our town must speak for itself. The year has been remark-

ably healthy in the town proper. The foul, noxious odors have entirely disappeared. Strangers from a distance have enjoyed good health here. I have not attended, *nor heard of* (and I have given due attention to the subject by inquiry), as many people suffering from intermittent and remittent fever during the whole year of 1881 as I *saw* during one month of 1880. Very few of the citizens living in the region of the former pond, have had any trouble at all. Those of whom I know had their trouble cured by a few small doses of quinine and cinchonidia. This is the same region, where all were ill last year, and continued so in spite of treatment, in the vicinity of the old pond. In this same region, during 1880, I saw for days as many as an average of 140 cases of malaria a day, *i. e.*, I saw daily, for months, an average of 140 cases in the same region, where this year the cases which I attended, or heard of, would not average a day more than two to five at the outside. The peculiar season must be taken into consideration, and the extreme prevalence of malaria throughout the United States, in forming any rational opinion of the probable result of removal of pond. Again, the people are beginning to know how to treat themselves for malaria, and by taking quinine and cinchonidia, etc., etc., avoid the full effects of the disease. How much this increased knowledge may account for in the restored health of the region, it is impossible to say. But that the removal of the morass and draining of the noxious region has been instrumental in abating the disease, a few facts in other localities would naturally lead one to conclude.

Following the course of the brooks, Ambrose and Green brook, wherever we found a morass, the people suffered, and badly so, from malaria. The same is true, following the course of the Raritan river on towards New Brunswick. Again, the gravel-pits were not in a sanitary condition until the present time. The people in the vicinity of these pits and ponds had the marsh fever universally and severely and continuously during the year. These people had the fever or malaria last year, and understand the use of quinine. They suffered in spite of increased knowledge, under the same general conditions and treatment which those who live in the region of the drained pond, but who this year escaped free. This certainly speaks for itself. The present condition is the evidence the case gives that malaria was manufactured *then and there.*

I have not had a case of typhoid fever in my practice during the past year, but one of diphtheria, and the town of Bound Brook is in a very healthy condition.

We append a copy of the indictment under which the case was tried:

INDICTMENT.

SOMERSET OYER AND TERMINER,
September Term, 1880.

SOMERSET COUNTY, *ss.*—The grand inquest for the State of New Jersey, in and for the body of the county of Somerset, upon their oath present: that ....., late of the township of Bridgewater, in county of Somerset, and State of New Jersey, being seized and possessed of a certain tract of land, to wit, forty acres, and appurtenances, situate near and adjacent to the dwelling-houses of divers of the good citizens of the State, and being partly in township of Piscataway, in county of Middlesex, partly in township of Bridgewater, in county of Somerset, through which, on the boundary line between the said counties of Middlesex and Somerset, there ran, and still runs, an ancient and common stream or water-course, called Bound brook, did, on the 1st day of July, in the year of our Lord one thousand eight hundred and eighty, and from that day until the day of the taking of this inquisition, with force and arms, at the township of Bridgewater aforesaid, and within the jurisdiction of this court, willfully and knowingly, unlawfully and injuriously, keep and maintain, and permit and procure to be kept and maintained, a certain dam, that had been theretofore erected on the said tract of land across the channel of the said stream or water-course, by means of which the water flowing in the said stream or water-course was stopped, dammed up and flowed back, and still is stopped and dammed up and flowed back, in and upon the surface of large tracts of land, by means whereof the mud, soil, wood, leaves, brush, and the animal and vegetable substances, and other filth, collected and brought down the channel of said stream or water-course by the natural flowing of the water, then became and were, during all the time aforesaid, and still are, collected and accumulated in large quantities in the channel of said water-courses, and on the lands overflowed as aforesaid; and the said mud, soil, wood, leaves, brush, and the said animal and vegetable substances and other filth, so there collected and accumulated, became and were and still are very offensive, and the waters became and are corrupted, and said tracts of land overflowed became and are covered with noxious weeds and putrid vegetation, by means whereof divers nauseous, unwholesome and deleterious smells, stenches and vapors did arise, etc, and so that the air was, and still is, corrupted and infected, to the great damage and common nuisance, not only of all the inhabitants of the said township of Bridgewater, but of all other good citizens of this State thereby passing and repassing, dwelling, inhabiting, etc., and the said nuisance, so caused and maintained as aforesaid doth yet continue, contrary to the form of the statute in such case made and provided, against the peace of this State, the government and the dignity of the same; and the grand inquest aforesaid, upon their oath aforesaid, do further present: that said ....., being seized and possessed of a certain other mill-dam, with its appurtenances, situate near and adjacent to the dwelling-houses of divers of the citizens of this State, did, on the 1st day of July, in the year of our Lord one thousand eight hundred and eighty, and on divers other days and times between that day and the day of the taking of this inquisition, at the township of Bridgewater aforesaid, in the county aforesaid, and within the jurisdiction of this court, unlawfully and injuriously so use and occupy the said other mill-dam, with its appurtenances, as unlawfully and injuriously to cause and permit the waters of the stream obstructed by said dam and its appurtenances, to overflow,

by night a large tract of adjacent land, to wit, one hundred acres, lying above the dam and extending thereto, and to run off therefrom by day, by means whereof the said land so overflowed by night was exposed to the rays of the sun during a large part of each day, whereby miasma was generated in large quantities, which infected and corrupted the air, to the great damage and common nuisance, not only of all inhabitants of the said township of Bridgewater, but of all other good citizens of the State, contrary to the form of the statute in such case made and provided, against the peace of this State, the government and dignity of the same.

And the grand inquest aforesaid, upon their oath aforesaid, do further present: that said ....., being seized and possessed of a certain other mill-dam, with its appurtenances, also situate near and adjacent to the dwelling-houses of divers of the good citizens of this State, did, on the 1st day of July, in the year of our Lord one thousand eight hundred and eighty, and from that day until the day of the taking of this inquisition, at the township of Bridgewater aforesaid, in the county aforesaid, and within the jurisdiction of this court, unlawfully and injuriously use and occupy the said other mill-dam, with its appurtenances, as unlawfully and injuriously to cause and permit the waters of the mill-pond, formed and created by said other mill-dam and its appurtenances, to overflow the adjacent land, as well of others as of his own, by means whereof the land so overflowed was, and still is, rendered and kept marshy, and filled and covered with noxious weeds and putrid vegetation, whereby the air became and still is infected and corrupted, to the great damage and common nuisance, not only of all the inhabitants of the said township of Bridgewater, but of all other good citizens of this State; and the said nuisance so caused as aforesaid doth yet continue, contrary to the form of the statute in such case made and provided, against the peace of this State, the government and the dignity of the same.

SOME CITATIONS FROM THE LAW RELATING TO NUISANCES.

BY E. S. ATWATER, COUNSELOR AT LAW.

The principle upon which the law protects against nuisances is, that one man has no right to use his property in such manner as to injure another. The legal maxim is, "*Sic utere tuo ut alienum non lædas.*" Public nuisances are defined to be such as "result from the violation of public right, and producing no special injury to one more than another of the people—may be said to have a common effect, and to produce a common damage."

The courts take cognizance of nuisances affecting the public health. Indeed, it has been held that interference with the physical comfort of the people is a sufficient ground on which to invoke the action of the court.

In Wood on Nuisances, § 76, it is said: "In order to render a person liable for a public nuisance by carrying on a noxious trade or maintaining anything that produces noxious smells, it is not necessary that the smells should be injurious to health. It is sufficient if they are of such an offensive character as to be materially offensive to the senses, and such as impair the physical comfort of those who come within their sphere."

In the case of Attorney General *vs.* Steward & Taylor, reported in 5 C. E. Green, page 417, &c., Chancellor Zabriskie said: "Any trade or business, however lawful, which, from the place or manner in which it is carried on, materially injures the property of others, or affects their health, or renders the enjoyment of life physically uncomfortable, is a nuisance which it is the duty of this court to restrain."

The same Chancellor, in the case of Ross *vs.* Butler, 4 C. E. Green, page 298, says: "The law takes care that lawful and useful business shall not be put a stop to on account of every trifling or imaginary annoyance, such as may offend the taste or disturb the nerves of a

fastidious or over-refined person. But, on the other hand, it does not allow any one, whatever his circumstances or condition may be, to be driven from his home, or to be compelled to live in positive discomfort, although caused by a lawful and useful business carried on in his vicinity."

WHO ARE RESPONSIBLE FOR MAINTAINING A NUISANCE.

Not alone is the person who originates a nuisance liable therefor, but also he who continues it or who suffers it to remain on premises in his occupation. In this State it has been held that if the nuisance is simply continued, there must be notice to abate before a liability for damages will be incurred. See the case of Morris Canal and Banking Co. *vs.* Ryerson, 3 Dutcher's Reports, p. 468, which is a leading case. In Addison on Torts the principle is laid down that "a landlord of premises on which a nuisance exists is responsible if the nuisance existed at the time he let them or relet them, or continued the tenancy after he had the power of determining it."

The same author also says: "The action may be brought against all the persons doing or ordering the doing of the wrongful act, as well as against the occupier of the land on which the nuisance exists; but instead of bringing his action against all jointly, the plaintiff may, as we have seen, sue one or more of them, at his election."

In Wood on Nuisances, § 31, the principle is laid down: "That it is not necessary, in order to charge a person with criminal liability for a nuisance, that he should commit the particular act that creates the nuisance; it is enough if he contributes thereto by his act, either directly or remotely."

OF NUISANCES AFFECTING THE AIR AND WATER.

The right of the public to have a pure atmosphere and to have its water supply kept free from contaminating and unwholesome substances is asserted and protected by the law. Quotations from some of the authorities on these subjects are submitted: "The corruption of the atmosphere by the exercise of any trade, or by any use of property that impregnates it with noisome stenches, has ever been regarded as among the worst class of nuisances, and the books are full of cases in which any use of property producing these results has been regarded as noxious and a nuisance, whether arising from the exercise of a trade or business, or from the ordinary or even necessary uses of property.

As has been before observed, the right to have the air float over one's premises, free from all unnatural or artificial impurities, is a right as absolute as the right to the soil itself." Wood on Nuisances, § 494.

From the same volume, § 487, we quote: "The collection of water in artificial ponds or trenches, or the setting back of water by means of dams or other artificial devices, whereby the water becomes stagnant and emits unpleasant odors, or unwholesome or injurious gases, is a great nuisance, and equally as actionable or indictable as are furnaces for the smelting of lead, copper or other substances that send out destructive or injurious vapors."

"A mill-dam becomes a nuisance when it obstructs the water to such an extent that it overflows its banks and the surrounding country, and stagnates and becomes dead in pools, whereby the air along the highways and around the dwellings is infected with noxious and unwholesome vapors, and the health of the adjoining country is sensibly impaired. Nor is it a defence to such a nuisance to say that the dam was built long before any one lived on the margin of the stream, or there were any settlements about it."—Archbold's Crim. Practice and Pleadings, Vol. II., p. 1762.

In the case of Holsman *vs.* Boiling Springs Bleaching Co., reported in 1 McCarter, p. 342, Chancellor Green, said: "Every owner of land through which a stream of water flows, is entitled to the use and enjoyment of the water, and to have the same flow in its natural and accustomed course without obstruction, diversion or corruption. The right extends to the *quality*, as well as to the quantities of the water. If, therefore, an adjoining proprietor corrupts the water, an action upon the case lies for the injury."

"The right of the riparian owner, says Chancellor Kent, to the use and enjoyment of a stream of water in its natural state, is as sacred as the right to the soil itself. 2 Johns. Chancery Reports 166. A disturbance or deprivation of that right is an irreparable injury, for which an injunction will issue. If the deprivation of the use of the water by diversion constitutes such an irreparable injury as will be restrained by injunction, the deprivation of its use by so corrupting it as to render it unfit for use, is an equally irreparable injury entitling the party injured to the like preventive remedy." "Where the nuisance operates to destroy health or to diminish the comfort of a dwelling, an action at law furnishes no adequate remedy, and the party injured is entitled to remedy by injunction."

"It is clearly the duty of riparian proprietors upon a water-course

to refrain from erecting upon its banks any works which render the water unwholesome or offensive."—Angell on Water Courses, § 136.

"The right of a riparian owner to have the water of a stream come to him in its natural purity, is as well recognized as the right to have it flow to his land in its usual flow and volume. But in reference to this, as with the air, it is not every interference that imparts impurities thereto that is actionable, but only such as imparts to the water such impurities as substantially impair its value for the ordinary purposes of life, and render it measurably unfit for domestic purposes, or such as cause unwholesome or offensive vapors or odors to arise from the water, and thus impair the comfortable or beneficial enjoyment of property in its vicinity, or such as, while producing no actually sensible effect upon the water, are yet of a character calculated to disgust the senses, such as the deposit of the carcasses of dead animals therein, or the erection of privies over a stream, or any other use calculated to produce nausea or disgust in those using the water for the ordinary purposes of life, or such as impair its value for manufacturing purposes."

A PUBLIC NUISANCE CANNOT BE VALIDATED.

The authorities are ample to show that no right is acquired to maintain a public nuisance from the fact that it has been in existence a long time.

"No length of time legitimates a nuisance."—Wharton's Criminal Law, § 1415.

"There is no such thing as a prescriptive right or any other right to maintain a public nuisance. Thus, if the damming of water, though in accordance with a prescriptive right, creates or causes such annoyance as seriously to interfere with the comfortable enjoyment of property, or has a direct tendency to create sickness in the immediate neighborhood, it constitutes a nuisance to which a claim for prescription is no defence."—Wait's Actions and Defences, Vol. IV., p. 782.

"There can be no prescription for a public nuisance of any kind or description."—Wood on Nuisances, p. 743.

"Neither is it a defence in any measure, that the business is a useful one, that it is necessary, or that in its products and operations it is a public benefit and contributes largely to the enhancement of the wealth, prosperity and commercial importance of the community; for, if it is really a nuisance or operates as such upon the public, no

measure of necessity, usefulness or public benefit will protect it from the unflinching condemnation of the law."—Wood on Nuisances, p. 28.

It is to be remarked, however, that courts will not needlessly interfere with a business of the kind referred to in the last quotation. A case of nuisance must be clearly made out, and even then, before finally restraining the carrying on of a business, a court of equity will give the parties concerned an opportunity to see whether some other method cannot be devised by which the business can be so carried on as not to be a nuisance. This principle was applied in this State, in the case of Cleveland *vs.* Citizens' Gas Light Co., reported in 5 C. E. Green, p. 201, &c. That there are other nuisances in the immediate vicinity of the nuisance complained of, is not in general a defence to proceedings had for its removal. In Wood on Nuisances, § 491, it is said: "The mere fact that other nuisances exist in the locality, that produce similar results, is no defence, if the nuisance complained of adds to the nuisance already existing to such an extent that the injury complained of is measurably traceable thereto. It is not necessary that all the injury should be the result of the nuisance sought to be charged; if it is of such a character and produces such results that, standing alone, it would be a nuisance to the plaintiff, the fact that it is the *principal* though not the sole agent producing the injury, is sufficient, at least, as evidence of the plaintiff's right."

In the case of Meigs *vs.* Lister, reported in 8 C. E. Green, p. 205, Chancellor Zabriskie said: "The position taken by counsel, that the complainants were entitled to no relief from this nuisance, because the locality was surrounded by other nuisances and dedicated to such purposes, has no foundation in law or in fact. If there were several nuisances of the like nature surrounding them, they must seek relief from each separately; they cannot be joined in one suit, nor need the suits proceed *pari passu*."

REMEDIES.

The legal remedies for nuisances are concisely stated in Wood on Nuisances, § 815, as follows: "The remedies for nuisances may be divided into three classes: preventive, compensatory and by punishment. The preventive remedy is secured by two methods: by the intervention of a court of equity to prevent the erection or use of the thing complained of, and by the act of the party injured by an abate-

ment of the nuisance with a 'strong hand,' of his own motion. The compensatory remedy is by an action at law for a recovery of damages resulting from the nuisance, and the remedy by punishment is that sought on behalf of the public by indictment."

The following is an extract from the opinion of Vice Chancellor Dodd, of this State, in the case of Manhattan Manufacturing and Fertilizing Company *vs.* Van Keuren, reported in 8 C. E. Green, page 255, in regard to the abatement of nuisances: "At common law it was always the right of a citizen, without official authority, to abate a public nuisance, and without waiting to have it adjudged such by a legal tribunal. His right to do so depended upon the fact of its being a nuisance. If he assumed to act upon his own adjudication that it was, and such adjudication was afterwards shown to be wrong, he was liable, as a wrong-doer, for his error, and appropriate damages could be recovered against him. This common law right still exists in full force. Any citizen, acting either as an individual or as a public official under the orders of local or municipal authorities, whether such orders be or be not in pursuance of special legislation or chartered provisions, may abate what the common law deemed a public nuisance. In abating it property may be destroyed and the owner deprived of it without trial, without notice and without compensation. Such destruction for the public safety or health is not a taking of private property for public use without compensation or due process of law, in the sense of the Constitution. It is simply the prevention of its noxious and unlawful use, and depends upon the principles that every man must so use his property as not to injure his neighbor, and that the safety of the public is the paramount law. These principles are legal maxims or axioms essential to the existence of regulated society. Written constitutions presuppose them, are subordinate to them and cannot set them aside. They underlie and justify what is termed the *police power* of the State. By virtue of that power numerous and onerous restrictions and burdens are imposed upon persons and property, which, for other purposes or on other grounds, would be prohibited by the constitutional limitations sought to be applied in this suit."

That courts of equity have full power to restrain and prevent public nuisances it is unnecessary to argue. The books are full of cases illustrating the exercise of this power.

It may be added that, where the remedy by indictment is pursued, the result of a conviction is not merely punitive upon the offender.

"Regularly, a part of the judgment upon conviction for a nuisance is that the nuisance be abated."

In Stewart's Digest of the Decisions of the Courts of New Jersey, the cases decided in our courts on what are considered nuisances, their continuation and remedy, are fully digested, under the title of Nuisance, on page 848 *et seq.*

REPORT OF THE COUNCIL OF ANALYSTS.

I.—ADULTERATION OF FOOD, DRINK AND DRUGS.

BY PROF. ALBERT R. LEEDS, PH.D., MEMBER OF COUNCIL OF ANALYSTS.

In a previous report, which I prepared at the request of my colleagues of the N. J. State Board of Health, and which was published in the annual report of the State Board for 1879, I have given the results of an examination of many articles of food, and have no occasion, in this place, to modify the conclusions and recommendations therein made. Since that time, however, a very great amount of labor has been expended upon this subject by chemists in various parts of the country, and it appeared desirable, in repeating this work upon adulteration, to give a greater permanent value to the results by stating, in every case where practicable, the percentage composition of the substances analyzed. This necessitated a great amount of labor, and in many cases a critical study of the methods of analysis and of the practical value of the data so obtained. The space herein afforded is too short to discuss or state those methods, and I have attempted merely to give, in the most concise manner, the figures and results of analyses. The classification is according to Hassall's work on food adulteration, so far as it could be followed:

CLASS IV.—TEA.

NO.		TANNIN.	ASH.	REMARKS.
109	Black Tea.....	17.97 per cent.....	.....	Stomata on the under surface visible. Pure.
84	Mixed Tea.....	13.28 "	6.00 per cent.....	Pure.
25	.....	12.16 "	6.10 "	Pure.
34	Green Tea.....	11.78 "	5.50 "	Pure.
66	Green Tea.....	12.71 "	7.04 "	Pure.
30	Green Tea.....	11.03 "	6.23 "	Pure.
91	.....	13.28 "	5.80 "	Pure.
78	Mixed Tea.....	9.17 "	6.10 "	Mixed with exhausted leaves.
96	Black Tea.....	9.54 "	6.00 "	Pure.
125	Black Tea.....	12.70 "	5.62 "	Some foreign leaves were found.
116	Black Tea.....	12.70 "	5.08 "	
121	Mixed Tea.....	.....	.....	.....

It will be seen that most of the samples of tea were pure. The admixture of foreign leaves and the use of exhausted tea-leaves were the worst adulterations in the samples examined. The theine was determined in most of the samples, but as further study showed that the determinations were erroneous in consequence of the inaccurate methods at present followed, the figures obtained were omitted as being without scientific value, and misleading.

CLASS V.—COFFEE. (THE WHOLE BERRIES.)

NO.	SOURCE.	ASH.	REMARKS.
24	Albro Bro., 156 Bowery, N. Y.....	4.13 per cent.	Pure.
35	163 Newark Avenue, Jersey City.....	4.82 "	"
38	R. Domstedt, 288 Grove street, Jersey City.....	4.70 "	"
76	30½ Dank street, Newark.....	4.06 "	"
92	119 Newark avenue, Jersey City.....	4.31 "	"
138	Oetjen, 125 Newark street, Hoboken.....	3.77 "	"
140	McCourt, 137 Newark street, Hoboken	4.18 "	"
144	Adam street, near First, Hoboken.....	4.21 "	"
149	Därmann, 125 First street, Hoboken.....	5.46 "	"
152	Hencken, Clinton street, Hoboken.....	4.65 "	"
159	Henry Proche, Willow street, Hoboken.....	3.76 "	"
165	Gidgon, 38 Willow street, Hoboken.....	4.50 "	"
169	Stover, 56 Willow street, Hoboken.....	3.84 "	"
175	Würdermann, 122 Bloomfield street, Hoboken.....	4.14 "	"
177	" " " " " "	4.01 "	"
178	" " " " " "	4.57 "	"
183	J. B. Proto, 133 Adam street, Hoboken.....	4.72 "	"
187	Podesda, 135 Adam street, Hoboken.....	3.77 "	"
196	Marco Durlat, ——— ——.....	4.39 "	"
202	McBride, 143 Washington street, Hoboken.....	4.28 "	"
203	" " " " "	4.09 "	"
204	" " " " "	4.50 "	"
205	" " " " "	3.63 "	"
207	Third street and Willow, Hoboken.....	4.30 "	"
208	" " " "	4.14 "	"

No adulterations of the samples of coffee, which consisted of the whole berries, were found.

CLASS VI.—CHICORY.

Samples 37, 79, 133, 132, 181, 46 and 186 were found to be pure.

COFFEE-ESSENCES.

Samples 194, 158, 156, 173, 105 and 162 were the most adulterated articles which we encountered, inasmuch as they contained no coffee whatsoever, but consisted entirely of chicory, liquorice and caramel. There may be coffee-essences made of coffee, but after failing to find any evidence of such being the case in the six samples examined, further search was abandoned.

CLASS VII.—COCOA AND CHOCOLATE.

NO.	ASH.	FAT.	STARCH.	SUBST. SOL. IN H_2O	MANUFACTURER.
5	3.87	29.86	28.07	13.22	McCobb.
53	4.64	35.57	11.80	9 34	Baker.
.....	6.40	14.53	36.10	12.92	Baker.
22	1.39	21.83	25 60	*39.26	Baker's Broma.
10	1.25	21.32	27.64	†35.40	Taylor.
170	3.94	33.72	20.21	6 37	Griffin.

* Cane sugar, 9.47 per cent.
† Cane sugar, 24.55 per cent.

The analysis of No. 10 shows that it is not a cocoa, but a chocolate, and in this case it must be regarded as an adulteration, because the article is labeled "cocoa." No. 22 contains, also, a certain quantity of cane sugar, which properly is a constituent of chocolate.

The determination of the value of the cocoa is connected with some difficulties, since the percentage of fat can not serve as an absolute measure of value. From a medical standpoint the cocoas deprived of fat are to be recommended as being very easily digestible, and so such cocoas are properly made and used. The more fat is abstracted from a cocoa, the larger must be the relative percentage of starch. In the case of cocoas very poor in fat, the ash must increase in the same measure—otherwise the probability would be that the low percentage of fat was derived from added starch. An addition of starch may be easily detected (according to Willstein) if the cocoa is boiled with

water (1:10) and filtered. The filtrate of the pure cocoa does not give any starch reaction. Treated in this way, all filtrates from my samples gave a reaction with iodine. No. 53 was less colored than the rest.

CHOCOLATE.

ASH.	FAT.	INVERT SUGAR.	CANE SUGAR.	STARCH.	MANUFACTURER.
1.95	18 92	3.05	45.44	9.54	Griffin.
3.00	52 84	.....	*.....	14.64	Baker.
1.93	21.74	.....	†40.33	9.68	German.

*Substances soluble in water, 6.24 per cent.
†Substances soluble in water, 51 54 per cent.

The value of chocolate is determined by the amount of cocoa present, as the cane sugar stands much lower in price. One-half to two-thirds of sugar are generally present in the commercial products. The analysis must give the percentage of ash, fat, starch and sugar. The determination of the cane sugar involves in the same time an examination, and, if necessary, a quantitative analysis, of glucose. Chocolates containing glucose were not found by us, but in case they are made they should be marked as adulterated articles.

In making the analysis, a weighed quantity of pulverized chocolate is extracted with ether, the residue treated with water and filtered to a known volume. The insoluble residue is then inverted, and the starch determined als inverted sugar. A similar inversion of the filtrate with a previous examination of glucose gives the amount of cane sugar.

CLASS VIII.—SUGAR AND SYRUPS.

90. Sugar.	Granulated.	10c. lb.	No glucose.	
88. Sugar.	Brown.	9c. lb.	3 09 per cent. glucose.	
40. Sugar.	Brown.	9c. lb.	7.51 per cent. glucose.	
80. Sugar.	Brown.	8c. lb.	8 66 per cent. glucose.	Dust.
74. Sugar.	Granulated.	10c. lb.	4.58 per cent. glucose.	
87. Sugar.	Granulated.	10c. lb.	No glucose.	
32. Sugar.	Brown.	8c. lb.	3 21 per cent. glucose.	
45. Sugar.	Brown.	8c. lb.	3.57 per cent. glucose.	
70. Sugar.	Granulated.	13c. lb.	No glucose.	
71. Syrup.	1 pint 9c.		28.20 per cent. glucose.	11.94 per cent. cane.
73. Syrup.	1 pint 10c.		18.45 per cent. glucose.	40.85 per cent. cane.
55. Syrup.	1 pint 9c.		33.30 per cent. glucose.	18.19 per cent. cane.
81. Syrup.	1 pint 10c.		24.19 per cent. glucose.	22.13 per cent. cane sug.
77. Syrup.	1 pint 10c.		26.02 per cent. glucose.	29.73 per cent. cane sug.

60. Syrup.	1 pint 9c.		23.26 per cent. glucose.	41.47 per cent. cane sug.
100. Syrup.			26.69 per cent. glucose.	35.36 per cent. cane sug.
99. Syrup.			26.42 per cent. glucose.	31.28 per cent. cane sug.
89. Sugar.	Brown.	9c. lb.	9.08 per cent. glucose.	
129. Sugar.	Brown.	10c. lb.	2.24 per cent. glucose.	
113. Sugar.	Brown.	10c. lb.	3.16 per cent. glucose.	

CLASS IX.—CANDIES.

308. Yellow Cocoa or Cakes,	Glucose.
309. Red Cocoa or Sticks,	Glucose.
310. Peppermint Sticks,	Glucose.
311. Conversation Lozenges,	Glucose and Starch.
312. Lemon Cocoanut,	Glucose.
313. Musk Lozenges,	Glucose and starch, and fluorescent body colored with cosine.
314. Burnt Almonds,	Glucose.
315. Lemon Drops,	Glucose.
316. Liquorice Drops,	Glucose.
317. Mixed Candies,	Glucose.
318. Sarsaparilla Drops,	Glucose (cochineal).
319. Cocoanut Balls,	Glucose.
320. Cinnamon Balls,	Glucose (cochineal).
321. Liquorice Sticks,	Starch and Glucose.
322. Cayenne Pepper Lozenges,	Starch and Glucose.
323. Colored Eggs,	Glucose.
324. Colored Sticks,	Glucose.
325. Colored Sticks,	Glucose.
326. Lemon Cocoanut,	Glucose.
327. Colored Cocoanut Cream,	Glucose.
328. Conversation Lozenges,	Glucose and Starch.
329. Molasses Sticks,	Glucose.
330. Colored Balls,	Glucose.
331. White Balls,	Glucose.
332. Chocolate Balls,	Glucose.
333. Musk Lozenges,	Starch and Glucose.
334. Conversation Lozenges,	Starch and Glucose.
335. Conversation Lozenges,	Starch and Glucose.
336. Conversation Lozenges,	Starch and Glucose.
337. Conversation Lozenges,	Starch and Glucose.

CLASS X.—HONEY.

No. 13. L. Wiedemann, Washington street, Hoboken:

Total Invert Sugar	52.27 per cent.
Natural (?) Glucose	41.15 "

No. 49. Newman, 306 Grove street, Jersey City:

Total Invert Sugar	62.34 per cent.
Natural (?) Glucose	28.31 "

The difference between the amount of glucose before and after the inversion was in both numbers very high. No. 49 was very sweet, showing that the difference was probably caused by an addition of cane sugar. The difference being 34.03 per cent. of glucose, 32.33 per cent. of cane sugar was added.

Following the same calculation we find in No. 13 an addition of 10.56 per cent. of cane sugar. If the honey was adulterated with glucose, this difference could be produced by impurities (dextrine) of the glucose. Planta Reichenau finds the difference between pre-existent and inverted glucose in good honeys always very small and below 10 per cent.

CLASS XI.—FLOURS.

All numbers 39, 130, 137, 145, 150, 154, 163, 166, 171, 180, 206, are free from foreign cereals.

No. 36, marked "Corn flour," was Tea Mais Starch.

CLASS XV.—SAGO.

361. 1st and Garden, Hoboken. 362. Bishops, 176 Garden street, Hoboken. 363. 2d and Garden, Hoboken. 364. Coning, 6th and Park avenue, Hoboken. 365. Maas, 3d and Garden, Hoboken. 366. Kohlman, 6th and Garden, Hoboken.	All numbers did not contain any Sago Starch; only Tea Mais.

CLASS XVI.—TAPIOCA.

358. Hasselbrock, Bloomfield and 5th, Hoboken. 359. Wordermann, Hoboken. 360. Bloohm, 6th and Bloomfield. 367. Fehrens, 7th and Park avenue, Hoboken. 368. Ward, 40 Hudson, Hoboken. 369. Menzel, 42 7th street, Hoboken.	Tea Mais Starch, apparently caked together with Wheat Starch.

The results of the examinations of the articles included in Classes XI., XV. and XVI., are strikingly different. For while none of the samples of wheat flour were adulterated, or contained any admixture of foreign cereals, none of the samples of sago or tapioca were genuine, the former consisting of corn starch only, the latter of a mixture of corn starch and wheat starch.

CLASS XVIII.—MILK.

Since the 25th of April, a constant inspection of the milk in Jersey City and Hoboken has been in progress, and along with it an examination of the various methods of testing and analysis. The first analysis was made by the methods of Van Baumhauer, upon Reynolds' milk, 174 Clinton street, Hoboken, April 26th.

Specific gravity (corrected)	1.0293
Water	87.88 per cent.
Fat	4.04 "
Sugar	3.24 "
Caseine	4.14 "
Ash	0.70 "
Total solids	12.12 "

The second analysis was of milk from T. C. Pupke, 9th and Park avenue; the third from milk No. 208 Railroad avenue, Jersey City; the fourth from P. Connelly, 597 Grove street, Jersey City; the fifth from Reynolds, April 29th; the sixth from the milk of an Alderney cow belonging to Mr. John Stevens. These were all made by the customary methods of analysis, as given in Cairns' Manual.

	II.	III.	IV.	V.	VI.
Specific gravity	1.0281	.....	1.0242	1.029	1.02813
Water	87.86	89.02	90.15	89.26	84.96
Fat	3.64	1.49	2.81	2.58	5.56
Sugar	3.58	3.70	2.24	3.81	4.81
Caseine	4.08	.....	3.95	3.65	4 54
Ash	0.72	.....	0.70	0.70	0.21

No. II. was watered milk; III., IV. and V., both skimmed and watered. No. IV. contained 15 per cent. of water. No. VI. was of great interest, because this milk, according to the lactometer, stood at 97°, a result due not to its being very bad milk, but unusually good milk, the amount of fat being as high as 5.56 per cent. The methods of analysis thus far employed, not being altogether satisfactory, they were abandoned in favor of those devised by Ritthausen and other recent authors, with certain modifications in our own practice. These methods admit of the same degree of precision as in a mineral analysis, and have been pursued in all the work which follows.

MILK ANALYSES—Hoboken and Jersey City.

Number.	DEALER.	STREET AND NUMBER.	CITY.	Solids by Evaporation.	Density at 15°.	Lactometer.	Temperature.	Ash.	Fat.	Sugar.	Albuminoids.	TOTAL.	REMARKS.
1	.....	65½ 6th street.....	Hoboken ..	.....	1.0326	114°	13°	.70	.....	.....	.....	.....	.....
2	.....	Washington, ab. 6th st...	Hoboken ..	.....	1.0299	99°	20°	.65	.....	.....	.....	.....	.....
3	Harken	Sussex street.....	Jersey City	12.82	1 0306	100°	22°	.65	4.04	4.44	3.21	12.34	.....
4	Blakey	— Warren.....	Jersey City	12.02	1.0306	100°	22°	.64	3.25	3.75	3.91	11.55	.....
5	.....	371 Grove.....	Jersey City	11.12	1.0302	100°	20°	.60	3.03	3.86	3.37	10.90	.....
6	Guinard	Milkman.....	Jersey City	.....	1.0306	96°	27°	.....	.....	.....	.....	.....	.....
7	.....	491 Grove street.....	Jersey City	10.55	1.0285	92°	24°	.58	2.24	4.53	.....	.....	.....
8	.....	455 Grove street.....	Jersey City	11.47	1.0313	102°	23°	.71	4.72	.....	.....	.....	.....
10	Guinard	Milkman.....	Jersey City	12.22	1.0297	97°	22°	.63	3.58	4 39	3.34	11.94	July 8th.
11	Fred. Maas.....	3d and Garden.....	Hoboken ..	10.89	1.0265	88°	20°	.60	3 26	3.78	2.66	10.30	July 8th.
12	Middleton	N. E. cor. 3d and Garden	Hoboken ..	10.72	1.0284	93°	21°	.52	2 81	3.99	3.01	10.33	July 8th.
13	Fred. Maas.....	3d and Garden.....	Hoboken ..	10.28	1.0271	90°	20°	.63	2.91	3.84	3.07	10.47	July 11th.
14	.....	176 Washington	Hoboken ..	10.91	1.0312	100°	24°	.61	2.92	3.98	2.79	10.30	July 11th.
15	John Bodenstein.....	Washington and 3d.....	Hoboken ..	10.96	1.0261	83°	25°	.61	.....	.....	.....	.....	July 11th.
16	A. Puder.....	Gregory and Henderson..	Jersey City	12.50	1.0338	112°	20°	.70	4.	4.38	3.94	.....	July 12th.
17	.....	146 Montgomery.....	Jersey City	12.12	1.0310	102°	21°	.71	3.80	5.14	3.09	12.74	July 12th.
18	J. H. Bodenstein.....	3d and Washington.....	Hoboken ..	10.93	1.0272	90°	20°	.52	3.53	3.66	2.73	10.44	July 12th.
19	Kampen	S. E. cor. 1st and Clinton	Hoboken ..	11.51	1.029	92°	25°	.65	3.68	3.97	2.94	11.24	July 13th.

MILK ANALYSES—Hoboken and Jersey City.—*Continued.*

Number.	DEALER.	STREET AND NUMBER.	CITY.	Solids by Evaporation.	Density at 15°.	Lactometer.	Temperature.	Ash.	Fat.	Sugar.	Albuminoids.	TOTAL.	REMARKS.
20	Wahlen	Foot 2d and 3d, East Side	Hoboken ..	.....	1.0295	95°	24°	.62	2.79	4.36	2.81	10.58	July 13th.
21	Fred. Maas.....	3d and Garden.....	Hoboken ..	10.07	1.0253	85°	24°	.62	3.48	3.56	1.98	9.64	July 13th.
22	H. Grothensen.....	87 Washington.....	Hoboken ..	10.63	1.0286	92°	24°	.52	.....	.....	.....	.....	July 14th.
23	J. H. Bodenstein.....	3d and Washington.....	Hoboken ..	9.71	1.0286	92°	24°	.55	.....	.....	.....	.....	July 14th.
24	H. A. Fischer	Milkman.....	Union Hill	10.84	1.0248	79°	24°	.45	.....	.....	.....	.....	July 14th.
25	Fred. Maas.....	3d and Garden.....	Hoboken ..	.....	1.0302	100°	20°	.....	.....	.....	.....	.....	July 18th.
26	J. H. Bodenstein.....	3d and Washington.....	Hoboken ..	.....	1.0270	87°	24°	.....	.....	.....	.....	.....	.....
27	J. C. Voss.....	.....	Secaucus....	.....	1.0337	110°	22°	.....	.....	.....	.....	.....	.....
28	Fred. Konig.....	10th and Garden.....	Hoboken ..	.....	1.0295	94°	24°	.....	.....	.....	.....	.....	.....
29	H. A. Fischer.....	Milkman.....	Union Hill	10.23	1.0251	79°	25°	.51	3.29	3.22	2.92	9.94	Sold this milk after being informed it was adulterated.
31	Nich. Okleis.....	149 Park avenue.....	Hoboken ..	10.91	1.0280	90°	24°	.54	2.75	3.56	3.57	10.42	.....
34	G. N. Bates.....	D. L. & W. R. R. train...	.....	10.41	1.0344	121°	12.5°	.69	1.26	4.17	3.75	9.87	.....
35	Bates and Howell.....	D. L. & W. R. R. train...	.....	10.32	1.0331	113°	13°	.66	1.76	4.38	1.96	.....	.....
36	H. A. Fisher.....	Milkman.....	Union Hill	.....	1.0240	79°	20°	.69	3.20	3.24	2.96	10.09	Emptied ab't 10 qts.
37	Bryan and Luthkins...	Washington.....	Hoboken ..	.....	1.0256	90°	12°	.....	.....	.....	.....	.....	Emptied about 3 pts.
38	2d Duchess of Oxford, R. H. Allen, proprietor	.....	.....	14.09	.....	31°	17°	.79	5.48	4.52	3.52	.....	4th milking, taken at Waverly Fair.
39	Ayrshire Flora, 48. Lindsay, proprietor...	.....	.....	12.40	.....	32.5°	19°	61	3.58	5.00	3.10	.....	.....
40	Woltjen.....	Cor. 4th and Bloomfield..	Hoboken ..	10.70	.....	.....	.....	.....	.....	.....	.....	.....	Fined $50. The milk was watered more than 20 per c.

An inspection of these figures will show the composition of the milk usually sold in Jersey City and Hoboken. Legal proceedings for adulteration should have been taken in Nos. 7, 11, 12, 13, 15, 18, 21, 22, 23, 24, 26, 29, 31, and 37. But prosecution was attempted only in case of No. 40, in which judgment was given at once by the justice, and a fine of $50 imposed. It will be noted also that the milk of the Ayrshire cow Flora, 48, which was on exhibition at Waverly Park, and which I had milked under my personal supervision, contained only 12.4 per cent. of total solids.

Some specimens of olive oil were examined, with the following result:

192. Olive oil, pure.
59. Olive oil, with cotton-seed oil, sold for olive oil.
Cotton-seed oil, pure, sold for olive oil.

CLASS XIX.—BUTTER AND OLEOMARGARINE.

A Mr. Pelzer, a dealer, in Union Hill, who was charged with selling oleomargarine, had his stock of butter examined. Determinations of the fat acids in two samples, according to the methods of Hubner and Angell, showed that the samples were butter.

CLASS XXI.—LARD.

Three specimens of lard were examined, of which one contained no water; one sample, 0.23 per cent., and a third 1 per cent. There were no other impurities, and in these cases we failed to obtain instances of the intentional addition of water.

PRESERVING CANS AND ENAMELED VESSELS.

A number of the analyses of the tomatoes contained in cans, showed, in many instances, the presence of both tin and lead. Pickles prepared in white porcelain-lined iron vessels, showed the presence of large quantities of lead, and I doubt not that this is a far greater source of danger than is generally supposed. I have forbidden the use of such vessels in my own household.

CLASS XXX.—MUSTARD.

Number of sample.	Moisture.	Ash.	Fixed oil.	Mustard calculated according to Blythe's formula.	
9	6.93	5.08	15.69	40.27	Wheat flour.
14	3.04	4.81	18.75	49 26	Wheat flour and turmeric.
29	8.05	7.56	15.00	38.24	Wheat flour, terra alba and turmeric.
41	9.49	5.69	9.82	23.00	Wheat flour and turmeric.
57	6.81	5.41	25.44	68.94	Trace of flour and some turmeric.
61	8.27	5.17	11.03	26.56	Wheat flour and turmeric.
136	9.81	3.93	5.13	9.21	Wheat flour, turmeric and cayenne pepper.
67	7.74	3.62	8.39	18.80	Wheat flour and cayenne pepper.
143	8.96	7 59	14.07	35.50	Wheat flour, turmeric and terra alba.
155	9.13	15.19	15.16	37.82	Wheat flour, turmeric and terra alba.
148	7.69	27.85	12.69	31.44	Wheat flour, terra alba.
195	3.86	28.36	9.00	20.59	Wheat flour, turmeric and terra alba.
141	9.18	4.40	17.18	44.65	Wheat flour and turmeric.
161	9.18	4.90	11.83	28.91	Wheat flour.
164	6.64	3.10	20.43	54.51	Flour and turmeric.
168	8.90	11.86	14.82	34.76	Flour, turmeric and terra alba.
176	9.83	4.18	9.65	22.50	Flour.
185	9 51	16.69	10.26	24.29	Flour, turmeric and terra alba.
201	9.54	4.01	10.36	24.59	Flour and turmeric.
210	8.18	6.83	15.75	40.44	Flour and turmeric.
375	.....	4.60	17.77	44.74	Flour.
376	.....	11.67	24.00	63.40	Flour, turmeric and terra alba.
377	.....	4.64	21.30	55.60	Flour and turmeric.
378	.....	18.38	20.28	52.70	Flour and terra alba.
379	.....	3.78	30.14	81.10	Flour.
.....	8.60	4.91	22.70	.....	
.....	7.10	5.10	22.83	70.92	

These samples, being to a greater or less degree unsatisfactory, I was glad to receive from Dr. W. K. Newton, a sample of mustard which he had obtained from the manufacturers as a perfectly pure article. It contained—

Moisture..... 8.60 per cent.
Ash..... 4.91 " (1st anal.), 4.71 (2d anal.)
Fixed oil..... 22.70 " " 21.55 "

There was no starch or any other impurity present. Learning that this sample came from H. K. & F. B. Thurber, I obtained from a shop a quarter-pound package of their mustard, labeled E. G. Mustard, and analyzed it, with the result of finding—

Moisture	7.10 per cent.
Ash	5.10 "
Fixed oil	22.83 "
Mustard after extraction of oil (direct determination)	70.92 "

This makes the oil removed from the seed, in process of manufacture, 12.47 per cent. The manufacturers stated that it was necessary to remove as large an amount of oil as this, to prevent the mustard becoming rancid. Admitting this to be the case, then the above sample was pure, unadulterated mustard.

CLASS XXXI.—PEPPER.

Number.	DEALER.	ASH.	REMARKS.
1	Koch, Washington and Myrtle ave., Brooklyn	7.14	Contains sand.
15	L. Wiedemann, Washington street, Hoboken	6.75	Contains sand and flour.
36	Corner Coal street and Railroad avenue, Jersey City	6.00	Contains mineral impurities and flour.
41	Wilson & McGeness, 2d and Erie, Jersey City	4.36	Contains much flour.
48	69 York street, Jersey City	3.59	Contains sand and flour.
75	Grocery, opposite 275 Halsey street, Newark	5.43	Contains sand and much flour.
97		5.12	Contains a little sand, otherwise pure.
198	Ernst, 158 Park avenue, Hoboken	6 11	Contains sand and much flour.
226	Hasselbrock, Bloomfield and 5th, Hoboken	3.54	Contains sand and flour.
231	Bishop, 176 Garden street, Hoboken	4.69	Contains sand and flour.
238	Park avenue and 7th street, Hoboken	3.59	Contains sand and much flour.
240	C. Wendt, Willow and 6th, Hoboken	5.65	Contains sand and flour.
241	Koning, Park avenue and 6th street	6.17	Contains sand and flour.
242	H. Kohlmann, Garden and 6th street	5.13	Contains sand and much flour.
247	Rosenberg, Washington street, Hoboken	4.66	Contains sand and flour.
248	Maas, Garden and 3d, Hoboken	4 88	Contains sand and flour.
251	Nehr, Park avenue and 4th, Hoboken	4.48	Contains sand and flour.
254	Moses Black	4.33	Contains sand, otherwise pure.
257	Pupke, Washington and 5th streets, Hoboken	3.69	Contains sand, otherwise pure.
260	Peters, Washington and 6th, Hoboken	3.74	Contains sand, otherwise pure.
265	Tom Ward, 40 Hudson street, Hoboken	5.46	Contains sand and little flour.
271	Manzel, 42 7th street, Hoboken	3.81	Contains sand and flour.
274	—— 10th and Willow, Hoboken	6.96	Contains sand, otherwise pure.
278	Vogler, 8th and Bloomfield	7.25	Contains sand and mineral impurities, otherwise pure.
282	Rugge, 8th and Garden	5.34	Contains sand and flour.
293	Fink, Newark and Washington	4.48	Contains sand and flour.

From the foregoing, it will be seen that the presence of sand and other mineral matters, due to unclean pepper-corns, is very common. Various kinds of flour and starch were very frequently present. Search was made for the hulls of mustard and buckwheat, for the woody tissue of cocoanut shells and ground charcoal, but without success.

CLASS XXXII.—GROUND CAYENNE PEPPER.

42. Wilson & McGeness, Second and Erie, Jersey City:
Ash, 5.17 per cent.; red Fe_2O_3; micr. pure.

58. James Love, Newark avenue, Jersey City:
Ash, 5.10 per cent.; ash white; micr. pure.

62. McDonald's cheap cash store, Jersey City:
Ash, 5.85 per cent.; ash red Fe_2O_3; micr. much ordin. pepper.

69. Love Bros., Market and Washington, Newark:
Ash, 6.20 per cent.; ash red Fe_2O_3; micr. addition of Tea Mais.

216. Park avenue and Fifth, Hoboken:
Ash, 5.10 per cent.; ash red Fe_2O_3; micr. addition of pepper.

233. Hasselbrock, Bloomfield and Fifth, Hoboken:
Ash, 8.13 per cent.; (sand and impurities;) micr. pure.

233. H. Bishop, 176 Garden street, Hoboken:
Ash, 5.54 per cent.; (sand;) micr. pure.

249. Mars, Garden and Third, Hoboken:
Ash, 3.65 per cent.; micr. no foreign addition.
Ash red Fe_2O_3.

253. Moses Black, Hoboken:
Ash, 5.50 per cent.; ash red Fe_2O_3; micr. addition of Tea Mais.

261. H. N. Peters, Washington and Sixth, Hoboken:
Ash, 5.42 per cent.; micr. pure.

281. Rugge, Eighth and Garden, Hoboken:
Ash, 5.16 per cent.; ash red (impurities); micr. addition leguminous flour.

297. Fink, Newark and Washington, Hoboken:
Ash, 4.82 per cent.; micr. no foreign addition.

Sand and red oxide of iron or red clay, together with corn starch, ordinary black pepper and pea and bean flour, were the adulterants present.

CLASS XXXIII.—CLOVES.

4. Ash, 7.37 per cent.; impurities; micr. pure.
19. Ash, 3.93 per cent.; micr. addition of flour.
63. Ash, 3.57 per cent.; micr. pure.
56. Ash, 7.30 per cent.; micr. leguminous flour.
68. Ash, 5.77 per cent.; micr. pure.
200. Ash, 5.22 per cent.; micr. pure.
217. Ash, 4.67 per cent.; micr. addition of flour.
227. Ash, 8.22 per cent.; (sand and Fe_2O_3;) micr. no foreign addition.
230. Ash, 4 30 per cent.; micr. pure.
244. Ash, 3.46 per cent.; micr. pure.
262. Ash, 7.03 per cent.; (imp.) micr. pure.
268. Ash, 6.22 per cent.; micr. pure.
286. Ash, 7.30 per cent.; sand and Fe_2O_3; micr. pure.
298. Ash, 7.03 per cent.; (imp.) micr. no foreign addition.

The flour is stated to be derived from ground crackers. We did not find evidences of ground cocoa shells, said to be sometimes used.

GINGERS.

The ash of all the gingers contained more or less sand and impurities. Microscopically, they were all without addition of flour.

21.	Grassmann, 161 Washington, Hoboken,	Ash, 4.90 per cent.
52.	Newman, 306 Grove street, Jersey City,	Ash, 4.20 "
65.	McDonald's cheap cash store, Jersey City,	Ash, 5.19 "
259.	H. N. Peters, Washington and Sixth streets, Hoboken,	Ash, 1.68 "
85.	Sheridan & Fagan, 7 Ferry street and Newark, Hoboken,	Ash, 4.18 "
107.	———	Ash, 4.98 "
188.	Podesda, 135 Adam street, Hoboken,	Ash, 7.18 "
215.	A. H. Blohm, Sixth and Bloomfield, Hoboken,	Ash, 4.58 "
229.	H. Bishop, 176 Garden street, Hoboken,	Ash, 6.96 "
255.	Moses Black,	Ash, 5.98 "
222.	Hasselbrock, Bloomfield and Fifth, Hoboken,	Ash, 4.32 "
267.	Menzel, 42 Seventh street, Hoboken,	Ash, 4.54 "
276.	Claus Iagls, Tenth and Willow, Hoboken,	Ash, 4.62 "
277.	Vogler, Eighth and Bloomfield, Hoboken,	Ash, 4.47 "
288.	Köhler, Ninth and Park avenue, Hoboken,	Ash, 6.68 "
283.	Tenth and Garden, Hoboken,	Ash, 6.70 "
294.	Fink, Newark and Washington streets, Hoboken,	Ash, 4.98 "

MACE.

The maces were examined with the microscope, and the ash, for mineral impurities, by chemical analysis.

270. Ash, 1.70 per cent. Adulterated with corn starch.
72. Ash, 20.19 per cent. Adulterated with corn starch, terra alba and ochre, besides containing much sand.
220. Ash, 3.06 per cent. Adulterated largely with corn starch, besides containing some sand and ochre.
287. Ash, 2.47 per cent. Adulterated with corn starch and wheat starch.
213. Ash, 3.19 per cent. Adulterated with wheat flour.
252. Ash, 2.01 per cent. Pure.
289. Ash, 2.28 per cent. Adulterated with corn starch and turmeric.
103. Ash, 2.21 per cent. Adulterated with corn starch.
197. Ash, 3.29 per cent. Adulterated with wheat flour and a little ochre.

ALLSPICE.

The examination was made by the microscope and by determining the ash.

269. Ash, 4.91 per cent. Adulterated with wheat flour.
17. Ash, 3.86 per cent. Pure.
219. Ash, 3.57 per cent. Adulterated with foreign woody tissue and starch.
191. Ash, 3.31 per cent. Adulterated with wheat flour.
50. Ash, 3.99 per cent. Adulterated with wheat flour.
234. Ash, 5.48 per cent. Adulterated with wheat starch and foreign woody tissue. Contains some sand.
291. Ash, 4.24 per cent. Pure.
199. Ash, 6.45 per cent. Contains foreign woody tissue and a little sand.
232. Ash, 2.66 per cent. Pure.
243. Ash, 6.68 per cent. Pure, except a little sand.
296. Ash, 3.34 per cent. Pure.
214. Ash, 4.81 per cent. Contains foreign woody tissue and some rice flour.
266. Ash, 4.06 per cent. Adulterated with corn starch and foreign woody tissue.
3. Ash, 5.00 per cent. Adulterated with corn starch and foreign woody tissue. Contains a little sand.

CINNAMON.

In the case of cinnamons the ash was determined in order to detect mineral adulteration, the rest of the analysis being made by the microscope.

82. Ash, 4.13 per cent. Normal. Adulterated with corn starch.
189. Ash, 3.20 per cent. Normal. Pure.
64. Ash, 3.51 per cent. Normal. Adulterated with corn starch.
16. Ash, 3.98 per cent. Normal. Pure.
2. Ash, 3.60 per cent. Normal. Adulterated with wheat starch.
295. Ash, 3.72 per cent. Normal. Adulterated with wheat starch and corn starch.
184. Ash, 4.98 per cent. Above normal. Sand. Otherwise pure.
236. Ash, 1.89 per cent. Below normal. Adulterated with corn starch.
225. Ash, 4.29 per cent. Adulterated with starch.
235. Ash, 2.54 per cent. Adulterated with wheat starch and corn starch.
264. Ash, 3.36 per cent. Normal. Pure.
31. Ash, 3.35 per cent. Normal. Pure.
292. Ash, 4.96 per cent. Above normal. Some sand, and adulterated with starch.
272. Ash, 2.47 per cent. Adulterated with starch.

CLASS XXXVIII.—VINEGAR.

The vinegars were examined for foreign mineral acids, and for metallic impurities, especially copper and lead. In testing for H Cl, H_2SO_4 and H NO_3, a dilute solution of methylanilin violet was

employed. When these acids are present in vinegars, a blue or green coloration is produced on the addition of the violet. The amount of acetic acid in each vinegar was determined by estimating the specific gravity of the destillate.

1. C. Kerr, 147 Grove street, Jersey City, 3.06 per cent. acetic acid; source not noted; acetic acid, 4.50 per cent.
2. Newark avenue, Jersey City, 4.38 per cent. acetic acid; source not noted; acetic acid, 4.20 per cent.
3. 69 York street, Jersey City, 3.42 per cent. acetic acid; source not noted; acetic acid, 4.10 per cent.
4. Source not noted; acetic acid, 3.4 per cent.

In none of the above vinegars was any foreign mineral acid present. Very slight traces of lead, however, were found in each.

5. White vinegar, Fincken's, Newark street, Hoboken, contained 4.18 per cent. acetic acid.
6. Cider vinegar, Drescher's, Fourth and Washington streets, Hoboken, contained 3.90 per cent. acetic acid.
7. White wine vinegar, Brückner's, Washington street, Hoboken, 7 48 per cent. acetic acid.
8. White wine vinegar, Stretch's, Grand and Second streets, Hoboken, 6 89 per cent. acetic acid.

Nos. 5 to 8 contained no foreign acid or deleterious substance. 7 and 8 contained, however, a much larger percentage of acetic acid than the others, and were correspondingly more valuable.

CLASS XXXIX.—PICKLES.

Of the seventeen samples of pickles exampled, all but four, samples Nos. 342, 346, 350 and 354, contained copper. These last were, in every case, of different appearance from those containing copper, being of a yellow color instead of green.

CLASS LI.—DRUGS.

375. Rad. tarax., badly adulterated, 20.08 per cent. ash (ochre and clay).
376. Powd. jalap root, 1.80 per cent ash and 20 25 per cent. extract; resin, 15.18 per cent.
377. Senega, 4.77 per cent. ash.
378. Lobelia, 7.33 per cent. ash (sand and imp.)
379. Serpentaria, 13.90 per cent. ash (sand and clay).
380. Lera, no paraffin.
381. Sapo.
382. Oleum bergam., not adulterated.
383. Balsam Peruv., not adulterated.

384. Balsam tolu, not adulterated.
385. Benzoë, not adulterated.
386. Ipecac., 3.35 per cent. ash.
387. Saffran, not adulterated.

388. Extract of pineapple,
389. Extract of raspberry,
390. Extract of strawberry,

} Artificial ethers.

7. Extract of lemon,
8. Extract of lemon,
6. Extract of bitter almond,
12. Extract of lemon,
11. Extract of bitter almond,

} No extracts, but essences of oils, more or less diluted.

391–396. Aniline colors (for confectionery use).
393. "Yellow" was a nitro-compound.

CLASS LII.—CREAM OF TARTAR.

In making the quantitative analysis of the different samples, the cream of tartar ($C_4 H_5 K O_6$) was calculated from the amount of normal soda solution used. A qualitative analysis was also made to determine whether starch, terra alba, &c., were present or not.

258. Cream of tartar present, 89.03 per cent. No starch or terra alba. ($Ca S O_4$.)
245. Cream of tartar present, 71.66 per cent. Adulterated with starch and terra alba. ($Ca S O_4$.)
237. Cream of tartar, 26.51 per cent. Adulterated very largely with starch and terra alba. ($Ca S O_4$.)
246. Cream of tartar, 97.56 per cent. Pure.
256. Cream of tartar, 93.75 per cent. Pure.
218. Cream of tartar, 52.12 per cent. Adulterated principally with terra alba. ($Ca S O_4$.) No starch.
250. Cream of tartar, 30.57 per cent. Adulterated with terra alba and starch.
234. Cream of tartar, 97.86 per cent. Pure.
239. Cream of tartar, 15.78 per cent. Adulterated with terra alba. ($Ca S O_4$.)
224. Cream of tartar, 89.43 per cent. No starch or terra alba.
279. Cream of tartar, 43.25 per cent. Adulterated with starch and terra alba.
263. Cream of tartar, 93.09 per cent. Pure.
285. Cream of tartar, 13 63 per cent. Adulterated with starch and terra alba.
275. Cream of tartar, 85.17 per cent. Adulterated with terra alba.
290. Cream of tartar, 10.88 per cent. Adulterated with starch and terra alba.
309. Cream of tartar, 88.59 per cent. No adulterants found except a little terra alba.
330. Cream of tartar, 91.55 per cent. Pure.

II.—REPORT OF PROF. H. B. CORNWALL.

The Council requested me especially to examine flour, bread, baking powders, vinegar, spices, flavoring extracts, canned vegetables, and drugs. The time allotted to the examination being necessarily limited, I thought it best to examine, chiefly, such articles as admitted of rapid tests, and thus to go over a larger number of specimens, without entirely neglecting those requiring more tedious processes.

It is not the design of this report to occupy much space with discussions of the deleterious effects of any adulterations found, but rather to state the results of the tests.

Unless otherwise stated, all the articles were purchased by me, in this State, in different towns.

Flour.—One specimen was tested for all mineral impurities, and none were found.

Bread.—Three loaves, from different bakers, were tested for evidences of the addition of alum. Two showed evidence of its addition by the presence of considerable quantities of alumina in the ash. The third was found to contain alumina corresponding to the addition of 3.82 grains of alum per pound of bread.

This is only about one-fifth of the quantity which Hassall states as frequently used by English bakers, but the amount added by them varies from none to twenty grains, according to the nature of the flour used. A very few authorities have maintained that the moderate use of alum is beneficial, because it makes the bread lighter, but its use by bakers doubtless depends upon its making a better looking bread from an inferior flour. In so far as this is true, it constitutes an imposition on the public, while there are good grounds for fearing that alum is often used in quantities that exert a decidedly injurious effect. The following are the chief arguments against its use: that it renders the gluten less digestible; probably forms compounds of difficult solubility with the phosphates of the flour, thus depriving the consumer of one of the most valuable constituents; and finally, sets free sulphate of potash in quantities liable to derange, at least, weak digestive systems.

CANNED VEGETABLES.

Canned Vegetables were examined for tin, lead and copper.

The tin of every can, eight specimens in all, was tested for lead and copper, and found to be of excellent quality; one can alone showing the slightest trace of copper.

Apples.—One can was found to contain tin, dissolved in the contents, in the proportion of .23 grain per quart can.

Peaches, Corn and Peas.—One can of each were found to contain only traces of tin; in the peas, traces of lead were detected.

Asparagus.—One quart can contained 4.13 grains of dissolved tin, with very evident traces of lead.

Tomatoes.—One quart can contained 1.28 grains of tin; a second, 3.39 grains, the contents of this can being slightly sour when first opened, although the can was tight; the third contained 1.3 grains of tin and .1 grain of lead per quart of contents, the total contents weighing 17,150 grains, or nearly 2½ pounds avoirdupois, as estimated after a portion had been removed.

With the exception of the asparagus and the slightly sour tomatoes, there is no reason to suppose that the tin in any of these articles would be injurious to health, but it would be well to ascertain whether certain vegetables act much more strongly than others on tin. It is doubtless also true that sour canned vegetables may contain an undue amount of tin, as might be readily inferred without analysis.

With regard to the lead found in suspiciously large quantity in one can of tomatoes, and in several cans of other articles in traces, it must have come from the solder. The tomato can showed a band of solder, very thin indeed, about one-quarter of an inch wide all around both the top and bottom of the inside of the can, and a similar, but generally narrower band, was found inside of nearly all the cans. It seems unfortunate that, after selecting pure sheet tin, the manufacturers should not avoid so evident a source of danger in making up the cans, for there is no doubt that the free and constant use of some vegetables so canned may expose the consumer to the risk of taking too much lead into his system. I have no hesitation in mentioning these facts, since there seems to be a remedy for the evil.

In analyzing the canned goods and bread, I have received valuable assistance from Mr. L. D. Ricketts, of Princeton.

CREAM OF TARTAR.

Cream of Tartar.—Six specimens were examined. One bought at a first-class grocery and one at a drug store, proved to be reasonably pure cream of tartar, the first specimen containing a very moderate

quantity of tartrate of lime, a natural impurity, which was present only in traces in the other. One specimen received from Dr. Newell was equally good, but a second was very bad, containing more flour and plaster of Paris than cream of tartar. Two other specimens from second-class groceries were tested. One was good, the other was composed chiefly of alum and flour, with some cream of tartar. The flour was easily recognizable under the microscope, and in polarized light the alum and cream of tartar were readily distinguishable, although even ordinary light showed most of the alum plainly. Analysis revealed its presence also, and probably less than one-third of the mixture was true cream of tartar. I have no doubt that this article is subject to very extensive adulteration. Apart from the discouraging results to the cook, who in one case may be adding alum and in another true cream of tartar to his cakes, there is a serious objection to the sale of alum in such a guise. The food prepared with it must be less digestible and will certainly contain more or less sulphate of soda, a very undesirable salt to take into the digestive system.

Mustard.—Seven specimens were examined. One had much wheat flour, and was very weak, its yellow color being maintained by addition of turmeric; another was a more than ordinarily good mustard, having little flour, no turmeric and a strong flavor; the third and fourth (one of them from Dr. Newell) were weak and contained much flour, but no turmeric; the fifth contained much flour, plaster of Paris and white clay, with a large quantity of turmeric, as might have been expected would be necessary, and its taste was very weak; the sixth had much starch, little turmeric, and was weak; the seventh had a moderate quantity of flour, much turmeric, and was strong. It was received from Dr. W. K. Newton, the person giving it to him having warranted it pure.

Flour, starch and turmeric are considered by the trade as legitimate additions to mustard. It may with reason be claimed, perhaps, that the first two do mollify the flavor in an agreeable way, but addition of turmeric is nothing but a fraud, being practiced solely to render the mustard more attractive in appearance, and thus serving as a convenient means of concealing, from the eye at least, an undue addition of flour. It is certainly desirable that if the flour is added it should be honestly done. A mustard plaster made from some of the above specimens would be of very little use.

Red Pepper (*Cayenne*).—Four samples were examined. No mineral impurities were found except red oxide of iron, but the results show universal adulteration. One specimen was very weak in flavor, gave much ash, containing oxide of iron in quantity, and had been freely mixed with deliquescent chlorides (of potassium certainly, and probably of magnesium,) apparently to give it a bright, fresh color, and perhaps to add to its pungency.

A second specimen gave rather more than a legitimate quantity of ash, otherwise it was good; a third contained considerable oxide of iron, and it, as well as the fourth, had been mixed with a large quantity of tasteless, reddish brown, woody fibre, the exact nature of which I have not yet tried to ascertain. In the fourth sample this had been added in the grossest way, apparently without any attempt at intimate mixture, but it appeared in aggregated masses as large as a chestnut. All the samples were bought at groceries.

The following drugs were tested, partly for adulteration, and partly for accidental impurities due to imperfect purification.

Rhubarb.—Six specimens of powdered rhubarb, all from drug stores, the best quality being specified whenever the question was asked. They were examined especially for fraudulent coloring with turmeric. None showed this, but one contained much chalk, and one or two were of very inferior quality.

Copaiba Balsam.—Five specimens were tested for the commonest adulterations. Two were pure; one contained a fat oil as an adulteration, although its appearance was excellent; a specimen from Dr. Newell contained a fat oil, and another, also from him, contained turpentine and oil. Both of these last were wretched-looking specimens, in which the foreign admixtures were apparent to the most inexperienced observer.

Bismuth subnitrate and *bismuth carbonate.*—Six specimens of the former and four of the latter were examined, eight of them being from Dr. Newell. All were free from lead, arsenic and antimony in appreciable quantities, although traces of arsenic were found in nearly all. This fact is not regarded as interfering with their usefulness.

Scammony (*powdered Virgin.*)—One specimen was excellent; another contained much starch. Scammony is very expensive, and probably often adulterated.

Calomel.—Four specimens were examined, especially for corrosive sublimate. Two were from Dr. Newell, and all were pure.

Citric acid.—Two specimens from Dr. Newell were examined,

especially for tartaric acid, which was not found. One of the specimens contained a small quantity of some sulphate, probably sulphate of lime, resulting from imperfect purification.

Potassium bromide.—Four specimens, including one from Dr. Newell, examined especially for chlorides, were found pure.

Tartar emetic.—One specimen, from Dr. Newell, was free from any ordinary impurities.

Manna.—Two specimens were pure.

Gum arabic.—Two specimens were pure.

Magnesium carbonate and *magnesia.*—One specimen of each, examined especially for lime, were practically free from it.

Quinine sulphate.—Three specimens were tested for the cheaper allied alkaloids, but found to be of standard quality.

Cinchona sulphate.—Three specimens were found to be of standard quality.

Peruvian balsam.—Three specimens were received from Dr. Newell. One contained a fat oil, and looked very bad; another contained alcohol and a fat oil; the third was a very poor specimen in appearance, and smelled strongly of turpentine. It scarcely seemed possible that such specimens could be sold to any intelligent druggist.

Olive oil.—One specimen, bought of a respectable druggist as "olive oil," was cotton-seed oil, pure and simple.

It is evident that adulterations are to be found among articles sold as drugs by druggists.

In my next report I hope to be able to give results of further investigations of canned vegetables and some of the drugs requiring more elaborate tests, both as to quality and officinal strength of solutions, etc., as well as of some others of the articles assigned to me, which could not be examined in time for this report.

III.—REPORT OF PROF. F. C. VAN DYCK.

(MICROSCOPIC EXAMINATION OF SEVEN SAMPLES SUBMITTED BY PROF. LEEDS.)

TEAS.

No. 1.—No foreign leaves were identified in this specimen. The quality seemed to be very fair, the absence of excessive amount of stems and of discolored leaves being noticeable.

No. 2.—Consisted of blackish, badly-rolled leaves, mixed with a quantity of bluish green leaves of unnatural appearance. Gave the impression of spent tea, dried and mixed with fresh of poor quality. Full of stems.

No. 3.—Mostly bluish green, containing less stems than No. 2, but "glazy" looking. No foreign leaves were identified in either No. 2 or No. 3.

No. 4.—Marked "Green Tea, VI–18." Not examined in detail.

COFFEE.

Marked "Essence of Coffee, VI–18."

Under the microscope none of the marks of coffee could be found, not even oil globules. Nor was chicory present. The brownish, translucent scales or flakes which composed the insoluble residue were not identified.

MUSTARD.

Marked "Mustard, No. III."

The bulk of this sample consisted of wheaten flour.

ARROWROOT.

Marked "Arrowroot, VI–18."

A very careful examination, including measurements of the starch grains, failed to discover anything but starch granules of Bermuda arrowroot (Maranta).

IV.—REPORT OF WM. H. NEWELL, M. D.

ARTICLES EXAMINED MICROSCOPICALLY.	Number of Specimens Examined.	Amount Pure.	Amount Adulterated.	Number of each kind.	SUBSTANCES ADULTERATED WITH
Coffee	42	0	42	12	Chicory.
				6	Chicory, roasted corn and beans.
				5	Chicory and beans.
				8	Chicory, potato flour and corn.
				4	Chicory and corn.
				3	Chicory and rye.
				4	Chicory and potato flour.
Cocoa	21	4	17	3	Wheat flour.
				1	Wheat flour and potato flour.
				3	Wheat flour and sago.
				4	Sago.
				5	Arrowroot.
				1	Potato flour and tapioca.
Arrowroot	19	3	16	16	Potato starch.
Mustard	35	0	35	5	Wheat flour.
				6	Wheat flour and turmeric.
				10	Wheat flour, cayenne and turmeric.
				5	Rape seed.
				9	Starch, cayenne and turmeric.
Pepper	26	0	26	9	Wheat flour.
				4	Rice flour.
				5	Rape seed and dust.
				8	Linseed meal and dust.
Cinnamon	10	5	5	5	Cassia.
Sago	15	9	6	6	Potato starch.
Tapioca	14	8	6	6	Potato starch.
Tea	52	21	31	6	Foreign leaves.
				10	Foreign leaves and dust.
				4	Lie tea.
				6	Lie tea and dust.
				5	Dust.
Cayenne	16	4	12	5	Rice and turmeric.
				7	Corn.
Ginger	28	3	25	5	Rice flour, turmeric and cayenne.
				1	Rice flour.
				7	Potato flour.
				4	Potato flour, turmeric and cayenne.
				5	Wheat flour.
				3	Wheat flour, turmeric and cayenne.
Licorice	25	5	20	3	Wheat flour.
				8	Wheat flour and turmeric.
				7	Arrowroot.
				1	Arrowroot and wheat flour.
				1	Arrowroot and turmeric.

V.—REPORT OF SHIPPEN WALLACE.

I would report that, according to the arrangement we made last spring for the examination of articles of food, I have examined samples of sugar, syrups, confectionery and baking powders, and have also tested a number of burning fluids.

SUGAR.

The adulterant in sugars and its compounds is, as is generally known, what is termed glucose or grape sugar. This article is prepared at the present time on a very large scale, from corn or starch, by the action of acids, and there has probably never been an article which has had more written about it, showing the dense ignorance of the writers on the subject, than it has had. In the method of manufacture it is not possible for any *free* acid to exist in it. Traces of lime, in combination with sulphuric acid, forming sulphate of lime, are found, but this I should not consider injurious in the amount found, and dextrin, caused by the imperfect decomposition of the starch, is always present in glucose syrup to a large extent, and in the grape sugar to a lesser. The uses are numerous, but for our purposes we will confine it to its use as an adulterant for sugar. In all my experience, and I consider I have had considerable, I have never found what is known as "loaf," "crushed" and "granulated" adulterated with it. What are known as "coffee grades" are largely mixed with it, and are sold in the market by the name of "new process sugar," and this is known not only to the wholesale dealer, but also to the retailer, but not to the purchaser, who buys with the idea that he is obtaining cane sugar. Molasses or syrups are largely adulterated with it, the object being to produce a fine-looking, running, and (to some persons) tasting article; the commercial name of the unadulterated article being known as "straight syrup," the other "mixed." The adulterated article is now sold in groceries to a larger extent than the straight goods, and this is owing to the people preferring it, and consequently the retailer supplies it.

Confectionery, we may state, is, as a rule, largely composed of "grape sugar," certain candies being composed entirely of it. Besides, we have found "terra alba" (a fine, white earth), starch and flour, and gelatin, together with the coloring agents—some of which are harmless, others not.

BAKING POWDER.

The article which enters largely into household use, and which is probably adulterated to the greatest extent, is baking powder. I have found as much as forty per cent. of flour in one sample I examined. Alum is also found, and in one sample, owing to the materials used, I found over three per cent. magnesia, in the form of "epsom salts."

KEROSENE.

One article of house use, but with which our council has nothing to do, is one which I consider of the greatest importance, and that is "burning fluids." There is a statute at present bearing on the subject, but it is a dead letter. I have examined twenty-three samples at the request of various persons, and found fifteen to ignite at the ordinary temperature, three at 92°, two at 97°, and the other three at 108°; all of these were unsafe and dangerous to use, and in one case caused a loss of several hundred dollars. There should be a law, properly drawn and enforced, prohibiting the sale of kerosene which has a lower flashing point than 115°, at least. Accidents are constantly occurring from the use of the cheap oils, causing the loss of life and property in many instances, and I consider there is nearly, if not quite, as much danger to the community from this cause, as from adulterated food and drugs.

GLUCOSE.

The term "glucose," I do not like, and should prefer to use the true chemical one of dextrose, or dextro-glucose, as we find the same substance existing naturally in all molasses and syrups, the only difference being that in the latter case its action on polarized light is to the left, whence its name "levulose," or levulo-glucose, and the term "glucose" is often used indiscriminately for both, in which case the community, not being posted, cannot tell which is meant. I should, therefore, suggest that in all reports which we may hereafter make, we use the term dextrose, with the commercial name in parentheses. Commercially, "glucose" is the syrup, and "grape sugar" the sugar, also known as corn or starch sugar. One person has suggested the name "amylose," from its being made from starch; this, however, is only increasing the number of names for the same substance.

MILK.

I have also made a number of milk analyses for Dr. Newton, of the milk condemned by him in Camden, and found he was thoroughly justified in his action, despite the opinions expressed by interested parties, in the newspapers, to the contrary.

This report is qualitative rather than quantitive, as I understood we were to examine, in a general manner, articles of food, and learn as to the amount of adulteration. Having now looked the field over, we can the coming year enter more into detail, and obtain the percentage of adulteration in the more common articles of food, and, I have no doubt, obtain valuable information for not only our own use, but also for that of other councils similar to our own.

VI.—REPORT OF WILLIAM K. NEWTON, M. D.

OLEOMARGARINE.

The manufacture of oleomargarine, or butterine, as it is sometimes called, has, within the past four years, grown to vast proportions. There are six factories in New York making this material; one factory in New York city alone producing about 30,000 pounds daily. The total amount sold and consumed in our State is not known, but it must be enormous. It is sold in all our cities, but we know of but few instances where the purchaser is informed as to the character of the article sold him—he being led to believe that it is genuine butter that is offered for sale.

The process of manufacture is as follows: Fresh beef fat is melted at as low a temperature as possible, never higher than 126°–128° F. All membrane and tissue is then removed, and the resulting clear fat is put into presses, where the stearine is extracted. The liquid fat, free from tissue and with nearly all its stearine removed, is known as "oleomargarine oil." The next step in the process is "churning." The oil is allowed to run into churns containing milk and a small quantity of coloring material (annatto), where, by means of rapidly revolving paddles, it is churned for about an hour. When this part of the process is complete, the substance is drawn off, from the bottom of the churn,

into cracked ice. When cool it is taken from the ice, mixed with a proper amount of salt, and is then worked like butter and put into firkins for the market. It is also moulded into attractive prints, in imitation of dairy butter.

In a well-conducted factory all the steps of the process are devoid of any offensive smell, and when fresh, clean fat is used, the resulting "oleomargarine" is a substance having an uniform color, taste and consistence, and well calculated to deceive any person, except he be an expert. So many improvements have been made in the process of manufacture that even the chemist may be misled when he seeks by analysis to determine whether or not it be true or imitation butter.

Oleomargarine is sold for butter, is used to adulterate butter, and in various ways is employed to sophisticate dairy products.

In the process of manufacture, cotton-seed oil and peanut oil are substituted by some makers for a portion of the beef fat.

The "oleomargarine oil," previously described, is made in large quantities, and is rapidly becoming one of the great adulterants. It is exported to Europe, and is used in this country to mix with butter, or to add to the cream in the churn before churning.

Instances have been brought to our notice where farmers have bought this article, added it to the butter, and sold the butter as a pure article. Mr. Shippen Wallace relates a case where a farmer in the western part of this State sends to Philadelphia butter put up in attractive pound prints, selling for a high price, the purchaser thinking that it is an article superior in taste and appearance and of undoubted purity, yet the "butter" is made from this oil, bought at the Philadelphia factory, and which is churned up with the milk at the dairy.

This oil has been used in cheese-making, but lard is now employed in its place. The oil is also added to ice cream as a substitute for cream.

When all the steps of the process of making oleomargarine are conducted with a due regard for cleanliness, a perfectly healthful product is made, but in New York one or two factories have produced an article not answering the requirements of a healthful food; the material they made, however, did not meet with a ready sale, and the work was suspended. To produce a merchantable article it is absolutely necessary that none but sweet fat be used; any taint or any trace of putridity or bad odor will stop the sale. Thus a possible

evil has its own remedy. Some manufacturers are in the habit of adding cotton-seed oil to the fat, before churning, thus increasing the profits of an already profitable business. While there is nothing injurious in cotton-seed oil, yet the fraudulent practice should not be allowed.

The question of the possibility of tuberculosis being introduced into the human system, by the use of fat from cattle affected with this disease, has come up recently for discussion. We are inclined to think that the danger is very small. The temperature, in the process, is never raised to a degree high enough to destroy the activity of tubercle, but as this neoplasm is rarely or never found in the adipose tissue, even the fat of animals affected with this disease may be eaten without much risk. The same may be said of the entozoa. Trichinæ are never found in the bovine species, unless introduced for experiment, and even if they did infest cattle they are never found in the fat.

We may sum up by saying that the manufacture of oleomargarine should be very carefully conducted, and, to insure absolute safety, the fat should not be used from unhealthy cattle or from swine.

May oleomargarine be classed as a healthful article of food? The substance is closely allied, chemically, to butter, and it contains about the same proportion of soluble fats. Taking these facts into consideration, and notwithstanding the popular prejudice against it and the many conflicting opinions concerning it, we are forced to answer this question in the affirmative, and to state that we know of no reason why oleomargarine made from fresh, clean beef fat, obtained from healthy cattle, should not be deemed a proper and healthful article of food. How far its use shall extend is a question for the palate to decide.

We would suggest that the sale of this article be permitted in this State, but that the packages containing it be branded conspicuously with the name, and that the name of the person or company making it be also attached to the package. The public should also be informed by means of signs displayed at the places where it is sold. We would also suggest that the factories where it is made be frequently inspected by proper health officers, in order that the process may be kept under supervision and that it shall be properly conducted.

BUTTER.

In the note on oleomargarine we have described how butter is adulterated with that substance, and we may say this is the sole adulterant used in this country. It is claimed that lard and starch are added to butter, but we have never seen any specimens thus adulterated.

In butter that is improperly made we find often an excess of water, buttermilk or salt, and as these substances increase the weight they may be considered fraudulent.

CHEESE.

It is stated that arsenic, corrosive sublimate and other poisons are applied to the outside of cheese to kill parasites, and that persons have been poisoned by eating the rind of cheese so treated. We have not been able to find a single sample to substantiate this charge.

"Lard cheese" is the only fraudulent article we have found to place in the class of cheese adulteration. A patent was granted to a New York manufacturer for an improved process in cheese-making; the improvement consisting in the substitution of a foreign fat for the cream in cheese, and it enables the maker to produce cheese rich in fat from milk poor in fat.

The manufacturer states that he is able to produce from one hundred pounds of milk, four and three-quarters pounds of butter and eight pounds of cheese, by the addition of one and a half pounds of lard. The cheese has about the same amount of fat as a full cream cheese, and sells for about a cent a pound less than the latter article.

Skimmed milk is used, and to it is added about fourteen per cent. of lard—this brings it up to about the proper percentage of good milk. In the place of lard, oleomargarine has been used, but was not found to work well. This "lard cheese" industry has grown to such proportions that in New York State there are about twenty-five factories, turning out over 700 "lard cheeses" a week.

There is nothing harmful in this article, but the manufacturers should be compelled to brand the packages containing it.

MILK.

The subject of the adulteration of milk has been thoroughly gone over, and the report published in the fourth annual report of the State Board of Health, at page 209.

We can only repeat what was there said—there is no article of food that is so frequently adulterated, and of the samples to be analyzed by the Council of Analysts at least eighty per cent. will be milk. The long list of adulterants, published by authorities on this subject, cannot be verified in this State.

The only methods of sophistication that we have been able to find are the following: The addition of water, salt or sodium bicarbonate, and the abstraction of cream. We have analyzed samples containing from three per cent. up to forty-five per cent. of added water, and samples of skimmed milk that have had from five per cent. to ninety per cent. of the cream removed.

VII.—SUMMARY AS TO THE WORK OF THE COUNCIL OF ANALYSTS.

WM. H. NEWELL, M. D.

The earnest movements now on foot in Congress and in different States in favor of stringent measures to regulate the adulteration in food and drugs which exists in this country, have come none too soon when we consider the revelations that are made concerning the amount of adulteration which exists.

Traffic in this class of goods in this State has attained a condition of development which the institutions of Europe are wont to assume in this atmosphere of freedom.

Our principle of government and legislation assumes that many of minor evils of life remedy themselves, and that a tradesman who is fraudulent in his dealings will soon lose his custom, and the more scrupulous merchants in the neighborhood must thrive in consequence; whereas, the truth is, that fraud succeeds, and honesty is obliged to

close its doors. The theory that the people can take care of themselves is exploded; it has too long prevented legislation that, in other countries, has been adopted and carried out successfully. The rogue has practically his own way here. There is scarcely an article commonly used on the table, that can be guaranteed to be pure at all times.

Drugs which are pure are very costly, there being a constant demand for those which are cheap. Pharmaceutists supply the demand by furnishing goods inferior in quality, which they have purchased because they were cheap. Wholesale and retail druggists assert that they cannot pay their expenses if they keep none but pure drugs. It is not the intention of the druggist to deliberately affect in an injurious manner the public health, or to perpetrate a fraud, but he none the less has done so, and in many cases has caused the death of the patient by furnishing adulterated drugs. The different civilized nations are becoming gradually convinced that their food and drugs are adulterated in a poisonous and fraudulent manner, and to such an extent does it exist that interference is demanded and thorough investigations are being made. The European governments have long exercised restrictive measures. The German government, in 1878, had 231,478 samples of different articles analyzed, and obtained 3,352 convictions; in 1879, Great Britain analyzed 16,772 samples, 2,978 adulterations were found; 7,000 chests of adulterated tea were burned last year in British India by the government. In Paris, London, Berlin, Vienna, and in all European cities, food adulteration and traffic in substances sold for the purpose of enabling retail dealers to prepare articles which are adulterated themselves, is carried on with great secrecy and fear of the police, who are continually searching for violators of the laws which exist in those cities to prevent adulteration. In this country it is impossible for the United States government to regulate this traffic in the individual States; they must see to the proper enforcement of their own laws, and it is the duty of the New Jersey Legislature to not allow the best and most efficient law that has ever been passed by any government to prevent the adulteration of food and drugs, to become a dead letter on the statute books, on account of the want of an appropriation sufficiently large to enable our Council to carry out the law properly.

The reports of the different members of our Council exhibit a great amount of work done in the past six months in the analyzation of food and drugs, chiefly for the purpose of proving, as far as possible, the class of articles sophisticated and the nature of their adulteration. Five thousand dollars would be a moderate professional charge for the amount of work done, as shown by the accompanying reports. That the actual expenses of the investigations would necessarily exceed the very limited amount appropriated for their performance, was anticipated by the Council at the beginning of their labors, as may be seen from the extract taken from the minutes of the first meeting of the Council of Analysts and Chemists of New Jersey, held at Trenton, at State House, on April 22d, 1880:

Resolved, That the amount of $500 appropriated by the Legislature for the expenses of said Council of Analysts and Chemists of State of New Jersey, is entirely inadequate to make any considerable number of chemical analyses at customary professional charges; and said Council, in carrying out the provisions of said act to their full extent, clearly recognize that in so doing they must be animated chiefly by a consideration of the importance of their labors in protecting the people of the State from the consumption of injurious and debased articles of food, drink and medicine.

REPORT OF THE MILK INSPECTOR.

WM. K. NEWTON, M. D.

I herewith transmit my second annual report to the State Board of Health.

The amended law for the prevention of the adulteration of milk, approved March 22d, 1881, is an improvement over laws previously in force, and, dealing as it does with the various methods employed for the purpose of impoverishing milk, the feeding and housing of cows, and the possible transmission of disease by means of milk, it is a very comprehensive and wise measure; but some legal technicalities in the wording need defining, before the law may be considered perfect in all its details.

Permission is given to the Inspector to appoint deputies, but as no pay is allowed for these officers, it is difficult or almost impossible to induce active men to accept the appointment. Six deputies were appointed, but, excepting Dr. Paul Radenhauser, no work was done by them without my assistance or supervision. Dr. Radenhauser, an assistant in the chemical laboratory of Stevens Institute, was appointed to aid Prof. A. R. Leeds in collecting samples in Hoboken and Jersey City. He is to be highly commended for the zeal and thoroughness with which he did his work. If the office of deputy is to be of any importance, pay must be provided for. Should the milk supply of our cities be inspected by the local health inspectors, as should be done, there will be no necessity for deputies.

The law is both a commercial and a sanitary measure, and has for its objects the protection of our dairy interests and the public health, by checking the traffic in impoverished milk; hence, it is necessary not only to have the co-operation and assistance of our local health authorities, but the health officers in adjacent States must aid us in enforcing the law. We regret very much that the local health boards in our own State, with but one exception, do nothing to aid me in my

work. In Burlington the local supply is inspected by the city Board of Health.

I have been very fortunate in enlisting the aid and co-operation of the New York Board of Health. Early in the year a conference was held with the President of that Board, Dr. Chas. F. Chandler; he not only promised all help in his power, but took a deep interest in the work.

Our thanks are due to him, and to Sanitary Inspectors Drs. White and Munsell, for many favors; working together as we did, a vast amount of good work was done.

The Brooklyn Board of Health has no system of inspection.

The Philadelphia Board of Health was appealed to for co-operation and has been notified whenever seizures were made of impure milk destined for that city. For various reasons, the authorities found it impossible to do anything, but there is a strong probability that something will be done when the Board is relieved of work it now has on hand.

To give a detailed account of my work for the year, and at the same time keep the report within proper limits, is well nigh impossible, hence I must content myself with giving a brief outline of what has been accomplished; my quarterly reports may be referred to for details.

All the important dairy sections in the State have been visited, and the milk examined either at the farms, the creameries, or the stations where it is shipped. It is with pleasure that I am able to report that the result of this system of persistent inspection is very encouraging, and that flagrant cases of adulteration are less common than heretofore.

By pursuing this method we are enabled to fix very accurately the average of a certain section or county. Thus, if we compare the milk produced in Sussex, Essex, Morris, Hunterdon, Burlington and Salem counties, we are now able to state that the milk shipped from Burlington and Salem counties is superior in quality to any in the State; Sussex county being next, Hunterdon next, while Morris and Essex would be placed lowest in the scale. Hence a standard of purity fixed on Burlington or Sussex county milk would be far too high by which to judge milk produced in Morris or Essex counties, and, *vice versa*, the average for Essex or Morris counties would be a poor one with which to compare the milk of Burlington county. The facts accumulated by system are of great value, for we can hold each section of the State responsible for its standard.

From the knowledge gained by this method, I have been able to select at a station one or two lots of milk that were below the average, and by writing to the shipper, accomplish as much as if a suit had been brought against him.

The adulteration of milk by water and the abstraction of cream—either by complete skimming or by partial removal of the cream—are very common practices among farmers, and the custom has been so prevalent that it is very hard to break it up; there is, however, a decided improvement within the past year.

The large milk depots of the Erie, the New York, Susquehanna and Western, and the Delaware, Lackawanna and Western Railroads, at Hoboken and Jersey City, have been several times visited, and over 5,000 quarts of impoverished milk have been condemned and destroyed. Repeated visits to these great distributing depots have had the effect of improving the quality of milk shipped by railroad, and the quantity of inferior skimmed milk has diminished markedly. It is gratifying to be able to quote the opinion of a gentleman who has held a prominent position having to do with the milk traffic. This gentleman says that at no time within the past six years has the milk arriving by train been of such a uniform good quality, and that the quantity of poor milk has never been so small.

The trains arrive at the stations at 12 o'clock, midnight, and to thoroughly investigate the quality of milk it requires the constant attention of the inspector from six to eight hours. An idea of the amount of work to be done may be formed when the quantity of milk brought into Jersey City is known. The Erie Railway carries about 3,600 cans, and the New York, Susquehanna and Western Railroad about 1,900. In many instances my work has been supplemented by the New York inspectors.

In July I was asked to visit Asbury Park and examine the milk brought to that place. Dr. Henry Mitchell, president of the local Health Board, was very anxious to check the sale of impoverished milk. I found, upon investigation, that about seventy-five per cent. of the supply consisted of a poor quality of skimmed milk, which contained only from two to two and a half per cent. of cream, by volume. This large quantity of impure milk was sold by one dealer. Unfortunately there was no redress under the law, for it gave the dealer permission to sell this milk from marked cans, which he did. The law, in this case, operated very harshly. Asbury Park is a popular health resort, having a floating population of from 5,000 to

10,000 people, many of whom are invalids seeking health. A large proportion of the population is composed of infants and children recovering from or sick with diarrhœal complaints, and a liberal supply of pure milk is necessary for their recovery. It is to be hoped that some means may be devised for the protection of the children, before next summer, from the evils of impure milk. Permitting the sale of this impoverished milk is simply legalized murder.

The milk supply of the following cities has been examined more or less thoroughly: Newark, Jersey City, Hoboken, Paterson, Trenton and Camden. I found that in all these cities, Trenton alone excepted, adulterated milk was sold in enormous quantities. As the local Boards of Health do nothing to check the traffic in impure milk, the dealers practiced adulteration unhindered till I made my tours of inspection. On account of lack of time and want of proper assistance it was found impossible to investigate properly the supply in the hands of the retail dealers, hence the wholesale or larger dealers were alone examined. I could complete the story by stating that I never went to a city on a tour of inspection without finding large quantities of impure milk, but as a good example of what it is in other places I will relate in detail the results of visits to a city where local inspection is completely neglected by the health authorities. I will select Newark as an example:—In the early morning of August 11th I visited that city, and, as time would permit, examined the milk as it came in by railroad or by wagon from Morris and Essex counties, with the following result: One dealer, 560 quarts on hand, all condemned as being skimmed; another dealer, 400 quarts on hand, all condemned; a wagon from Morris county, condemned 160 quarts skimmed milk and 640 quarts of milk watered from ten to forty per cent.; another wagon, 120 quarts skimmed milk, 420 quarts watered milk. Total, 2,700 quarts. Visited the city again, August 17th, and condemned 240 quarts of watered milk. Another visit September 3d: Four wholesale dealers from Morris county inspected; one dealer had 200 quarts of watered milk; another, 160 quarts; another, 280 quarts; another, 240 quarts—all watered from ten to thirty per cent. Another visit November 19th: One dealer, 120 quarts; another, 80 quarts; another, 310 quarts—all watered and all condemned.

Total amount of impure milk found in one city by four inspections, 4,330 quarts, all of which was condemned and destroyed. The supply in the hands of the retail dealers was not investigated.

The milk sold in our cities requires the constant attention of local inspectors, for it is very often adulterated.

That portion of the law permitting the sale of skimmed milk requires a word or two of comment. The object of compelling dealers to mark cans containing impoverished milk is, no doubt, to protect the public from being defrauded. But the law does not prevent fraud, for the mark on the can is rarely seen by the purchaser; when the cans are on wagons, or in stores, the label is not visible. In New York the health authorities recognize the fact that skimmed milk is a fraudulent article of merchandise, and forbid the sale, even from marked cans. Shall this State go to this extreme, and rescind the permission given to deal in the article? We have seen how much harm was done at Asbury Park. If skimmed milk is to be sold, it should not be disposed of unless the purchaser is first informed as to the quality of the article he is buying.

The various tests used to detect adulteration were very fully discussed in my article published in the report for 1880. It is hardly necessary to repeat what was there written. Since that report was published I have made many more tests and analyses, but have little to add to the statements already made.

In all cases the lactometer has been used, and tests made by this instrument have, in many instances, been followed by analyses, with the invariable result of proving the reliability of the instrument.

All that is claimed for the lactometer is that it is a proper instrument with which to test the specific gravity of milk. The objections urged against the specific gravity test are made by persons who, from personal motives, wish to mislead, or by those who do not know what is claimed for the lactometer, or by those who have not made many careful tests. One of the arguments often used by those who wish to discourage the use of the instrument, is, that it is not able to distinguish between cream and watered milk. We will grant that it may register the same when placed in cream and when used in milk reduced with water, but we will say that a person who cannot distinguish between these two articles is not competent to use the lactometer in an official capacity.

I will repeat what was said in my report of last year: The lactometer will register the specific gravity of milk. The lowest specific gravity consistent with pure milk is 1.029; hence any milk that has a lower specific gravity than that must be impure. Now, the com-

monest method of adulteration is by adding water, and the water added to milk will reduce its specific gravity, hence a lactometer, properly adjusted and properly used, will detect watering.

I base my opinion on a thorough investigation of the subject. No less than 600 specimens of pure milk have been examined by me to test the reliability of the lactometer, and I have never yet seen a specimen of pure milk with a lower specific gravity than 1.029. In fact, out of the 600 specimens tested by me, only *one* had as low a gravity as that.

The milk produced in New Jersey should show a specific gravity, when tested, of at least 1.030. In Burlington county, milk has been found to register 1.033 on the hydrometer.

This subject has been discussed by gentlemen more competent than the writer, and should any one wish to review the evidence, a full and clear account of the claims made for the lactometer may be found in the evidence in the case of the "People against Daniel Schrumpf." This case was tried in the Court of General Sessions, at New York, in December, 1876.

Unfortunately these facts have not been accepted in this State. In the great majority of cases where I have condemned milk, an analysis has been made, in case any dispute should arise.

For many months I made these analyses myself, but during the past three months the samples of condemned milk have been submitted to chemists who were disinterested parties.

Prof. A. R. Leeds and Shippen Wallace, of the Council of Analysts, have made many analyses for me. I give below a few of the results obtained upon analyzing watered milk. Some of the analyses were made by Prof. Leeds, some by Mr. Wallace, the remainder were the results obtained by myself.

ANALYSES OF WATERED MILK.

Specific gravity at 60° F.	New York Board of Health Lactometer at 60° F.	Total Solids.	Per cent. of Added Water.
1.0251	87	9.85	15
1.0249	86	9.97	16
1.0249	86	9.98	16
1.0234	81	7.97	20
1.0211	73	5.63	30
1.0237	82	6.68	20
1.0232	80	7.77	20
1.0232	80	11.39	20
1.0267	92	10.99	12
1.0287	98	12.33	5
1.0269	92	12.14	9
1.0232	80	9.57	25
1.0188	65	7.78	37
1.0261	90	11.01	12
1.0261	90	11.05	12
1.0261	90	10.92	12
1.0261	90	11.73	12
1.0240	83	10.73	18
1.0237	82	10.60	20
1.0208	72	10.22	31
1.0255	88	11.62	16
1.0261	90	12.09	12

This report has been made brief, and many important details have been omitted, but I think enough has been said to prove the necessity of a law to prevent the adulteration of milk. In my opinion, the law now in force, intended to prevent the adulteration of food, should be made so comprehensive as to take in all the important points in the milk law, and proper means should be supplied to enforce the law rigidly.

It is with great satisfaction that I am able to say that my endeavors to enforce the law have been appreciated by the people; the verdict of the public and the press has always been in my favor. No public officer can so discharge the duties of his office as to escape all adverse criticism, but I have been singularly fortunate in that my labors have been almost uniformly praised, and none have discredited my work, save those involved in the traffic of impure milk.

I am persuaded that the traffic in impure milk can be stopped if our local Boards of Health will do their share of the work and investigate the supply in the cities. Unaided, the Inspector cannot attend to all of the cities.

SECRETARY'S SUMMARY OF REPORTS

FROM LOCAL BOARDS OF HEALTH, WITH EXTRACTS AND COMMENTS.

In order to guide Local Boards as to their duties, and acquaint them with existing laws, under date of May 10th, 1881, a circular was issued, of which a copy will be found in this report under the division marked Circulars.

Early in October the usual blank was distributed to Local Boards with this circular accompanying:

CIRCULAR TO LOCAL BOARDS OF HEALTH.

TRENTON, October 1, 1881.

All Local Boards of Health need to make their annual return to the State Board o Health during the month of October.

All Boards which were constituted under the law of last year are permanently in existence. The law of itself constitutes the township committee, the assessor and the township physician, if there be such an officer, as the Board of Health for each township; and also provides as to Boards of Health in cities.

In some cases complaint is made that Local Boards do not seem to know their precise duties under the law. The general law is to be found: chapter 155 of the Laws of 1880.

On pages 272-282 of the fourth report of the Board (1880) is an explanatory circular as to the law and the duties of Health Boards. That report was sent to each assessor, as a member of the Board of Health, and for its reference and use. If in any instance any Board has failed this year to consider the health matters of its town or township it should at once be called together. It is satisfactory to know that most of the Boards realize the importance of this oversight of the public health. Some, however, take it for granted that no avoidable causes of disease exist, and by their unintentional negligence add to the sickness and to the deaths of their locality.

We ask each assessor or town clerk to state to us any failure on the part of the Local Boards.

The same blanks are furnished as those of last year.

A list of the Boards which reported last year (187 in all), is to be found on pages 178-179 of the fourth report (1880).

Boards which reported last year will not need to report the items in the schedule under A, B, E, F, G, I, L, M, N, O, P, Q, this year, unless some special new fact exists.

Under C, we ask full statements as to the sources and conditions of water supply; as to objections made to it; as to any assured or proven sickness or deterioration of the general health resulting therefrom; also, what plans of remedy are used? also, if cisterns or driven wells are used and found satisfactory? also, if filters, and if so, what kind are relied upon? Has the lowness of the streams and wells the last three months seemed to affect the quality of the water supply?

Under D, we inquire as to any natural or artificial defects in drainage, and as to any sickness attributed thereto by physicians. How has the amount of malarial fever, so-called, compared with that of last year? Are there any serious interferences with natural water-courses? Has the State law as to drainage, or the special one in addition as to the drainage of cities, been applied to any case in your section?

Under D, as to sewerage, specify what towns or parts of towns have sewers, with their size, construction, material, etc. Has the town a sanitary map, showing its underground structures, its contour, etc.? To what extent are brooks or streams made to carry sewage matter, and have any evil results been felt?

Under H, report the situation of water closets in relation to water supply and the modes of disposal of excreta, of refuse and of slop water. Also, cases in which inside water closets, or slop or kitchen sinks are connected with the outside privy vault or with cesspools. Also, as to the common mode of emptying privy vaults and cesspools.

Under J, give particulars as to diseases of animals; especially those regarded as contagious.

Under K, state whether slaughter-houses and abattoirs are situated near to private houses.

Under R, report any sanitary improvements of the past year, and any in contemplation.

Under W, add a general report as to prevalent diseases from July 1, 1880, to July 1, 1881, and make a separate noting as to any special sickness from July 1, 1881, to this date.

Assessors and town clerks in addition should personally report, as is their duty, any neglect in returns of Vital Statistics, and by whom; since the records of the last three years already show how important is exact knowledge as to the marriages, births, deaths and causes of death in each division of the State. Many other matters of importance will no doubt occur to Local Boards, on which report should be made.

We should be glad to have brought to our notice any alleged defects in existing laws. Except that defects of close study of the laws and of judicious enforcement or administration of law are not to be attributed to the laws themselves.

Indifferent attention to duty, dilatory dealing with undoubted nuisances, or promiscuous doubts where legal advice would clearly point out the methods, are not to be taken as defects of law. It is found that the calm judgment of courts and juries is against nuisances prejudicial to the public health; that present laws are applicable to such nuisances, and that where reason and persuasion will not avail, the execution of sanitary law has as good a chance of being sustained as has any other form of necessary litigation.

Let town clerks and assessors see to it that all circulars sent them are read before the Board of Health or township committee, and copies fastened in the Health Book.

By order of the Board.

E. M. HUNT, *Sec'y.*

Where laws, and duties under them, are not understood, it is generally because directions already given have been forgotten. Each Board must preserve its file of reports and circulars, and have some member who keeps himself acquainted with the existing law. There have been several additions to the Boards of last year. Reports have been duly rendered by the most of them. Here and there a Board has failed to meet, because, as in the case of school trustees, there is no provision in the law for pay for time. It was thought that health, like education, is so much a common interest, that it might, in this regard, rest on a similar basis, especially as in townships the meeting can be held the same day as that of the township committee.

The reports of many of the Boards show actual inquiry and administration. Others, that have been able to do little, are of service in educating public opinion. We have to acknowledge the faithfulness of most of the secretaries of these Boards, and the valuable aid assessors render in acquainting us with the general conditions of public health. Only abstracts of the reports are printed, and these necessarily brief. Points of local interest are sometimes omitted, although important, but as not needing the public notice of a State report. The reports of each year are carefully kept on file for reference and comparison. The reports of last year were considered of much value, and these are equally important. We ask careful attention to them, as they reveal local wants and local experience, and help others in their studies of existing evils which need abatement.

ATLANTIC COUNTY.

ABSECON, - - - *Report from* JOHN T. CORDERY, *Absecon.*

The water supply is from wells. Notwithstanding the long-continued drought, there has been sufficient water, and its quality has not been changed.

There have been a few cases of cholera infantum, and at present whooping cough is prevalent.

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

The garbage, night-soil and dish-water is handled thus: The contractor who removes the garbage is compelled to have it removed in iron carts or in sealed demijohns, and removed beyond the city limits,

which is done at present in sealed demijohns, and shipped off on the railroad to the farms in the country, and used to fertilize some of the poor lands. The night-soil is handled in the same manner. The dish-water, especially, at large hotels, heretofore has been a source of annoyance, and the Board found it to be an elephant on their hands, but at length fixed on a plan: by having a *large pit* dug, far off on the meadows and away from the streams, and boarded up tight, with a man to take care of it, so that a great annoyance is averted; but it is hard to get many to dispose of dish-water properly or live anything like clean, many very large hotels allowing it to run under the houses until the grease accumulated to the height of some feet, and became almost unbearable, until the Board found it out and made short work of it by setting a gang of men to work and digging it all out. Many others allow it to run at large until it becomes very offensive, and is very troublesome to the Board.

In addition, the report notices a hospital, costing $200, built away from other houses, for infectious cases. A copy of an ordinance, giving full powers to the Board of Health, and a model in its way, is enclosed. The Board is evidently doing good work. Some facts stated, as to cisterns and the need of greater water supply, are well and forcibly expressed.

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

Measles very prevalent the last year but no deaths.

EGG HARBOR CITY, *Report from* THEODORE H. BOYSEN, M. D.

Some cases of variola occurred last winter. The first case was reported to our Board on the 5th of January, 1881; the same had been imported to this place. On the 10th another case was reported, also imported. The last case was reported to us on the 5th of March, and in the intervening period there were, in all, twenty-three cases reported; of these, five were brought to this place from elsewhere.

A notable feature of the epidemic was the large proportion of deaths which occurred.

According to the most recent statistical tables, smallpox terminates fatally about once in six cases, while of the twenty-three cases occurring in this city, eight ended fatally—more than one-third, and as many again as we should have expected. Although the number of cases is too small for comparison with extensive epidemics which occur

in large cities, yet the number of deaths seems very large in proportion to the total number of cases, and it is but natural to suppose that the extraordinary fatality of the disease must have had some definite cause.

Of the twenty-three cases reported, six were of the hæmmorhagic form, or the so-called black smallpox. By reference to a report of a smallpox hospital, we see that out of two hundred and sixteen cases of variola there treated, only two were of this fatal form.

Of our twenty-three cases, eight were never vaccinated; one case remains uncertain; five were vaccinated in youth; four were vaccinated several weeks before taking sick, and five were vaccinated before taking sick and after exposure to the disease.

In the four cases which had been vaccinated several weeks before being attacked, the result of the operation was imperfect in all; these patients all had the varioloid, or modified form of the disease.

Of the eight who had never been vaccinated, five were attacked by the hæmmorhagic, and the others with more or less severe forms of variola vera, or true smallpox.

Those who were vaccinated after exposure, and who afterwards took sick, all had varioloid.

Of the eight fatal cases, five were never vaccinated, and three had been protected years before; five had variola hæmmorhagica, two variola vera, and one varioloid; the latter was a very old man.

In the families of those who suffered with the disease there were at least thirty-five persons who had never had smallpox, and who were forced to come in contact with them; these were vaccinated after exposure, and none of them took sick.

We believe that the above figures prove conclusively that vaccination does protect. Among all the cases there is not one in which vaccination had been successfully performed within six or eight years previously.

All the cases of "black pox"—the most virulent and deadly form of the disease—occurred in persons who had never been vaccinated.

Without doubt, therefore, the great fatality of the disease in our city is owing to the fact that there are still so many people who consider vaccination as unnecessary, or who directly condemn it.

Experience has taught that the danger of inoculating vile and dangerous diseases by means of unhealthy virus is very small, and that Jenner's great discovery remains as a blessed legacy to mankind.

We would therefore urge every citizen to see to it that his children

are vaccinated before the end of the first year, and that the operation is repeated at least every six or seven years.

We would further recommend that, in case our city should ever again be visited by this dread disease, the Board of Health should be empowered to erect a hospital to which all cases could be removed. By this means much unpleasantness, inconvenience and danger could be avoided.

Several nuisances have been abated. In one respect numbers of our people have been quite careless of their health, and that is in placing privies too near to the wells—cases being seen in which they were only fifteen or twenty feet apart. The mere mention of the danger attendant upon such a state of affairs has, however, generally been sufficient to cause the abatement of the evil.

There is no inspection of houses, stables, slaughter-houses, milk or food—our authorities generally considering such precautions unnecessary. A record of vital statistics has been kept for a number of years, and vaccination was very generally enforced last winter.

In regard to pulmonary phthisis it has been observed that if a person predisposed to that affection removes to this place, and lives properly, he has a fair chance of becoming robust and healthy again; but if the disease is in an active or advanced stage, a residence in this climate is found to be very deleterious and rapidly fatal. This is probably owing to the fact that the air here is often charged with minute quantities of sea-water, which acts as a stimulant, and, where there is no active disease of the lungs, excites them to a healthy action; but where there is an inflammatory action already present, such stimulation is exaggerated into a positive irritation, and results in an extension of the inflammation.

The question has often been asked why we have no malaria, notwithstanding the fact that there are extensive swamps on all sides of us. A possible explanation may be that our soil contains a quantity of iron, which is dissolved in the water as it percolates through the same. Then, again, the water dissolves quantities of terebinthinates and tannin, which, being incompatible with the iron, are precipitated as tannates of iron, and thus form the bog iron, which remains unchanged. Decomposition of the vegetable matter does not take place, and consequently there is no possibility of the formation of bacteriæ, or minute organisms such as the medical science of the present day regards as the cause of malaria.

EGG HARBOR TP., *Report from* CONSTANT SMITH, *Steelmanville.*

There is but one slaughter-house in the township, and there is but little slaughtering done, the most of their meat being brought daily from the city of Philadelphia. There has been a large lot of garbage brought from Atlantic City on the Narrow Gauge railroad, and deposited in a gravel pit above Pleasantville, for the purpose of making compost, and getting rid of it from Atlantic City. The company in charge use carbolic acid and other ingredients to keep the stench down, but still there has been some complaint. I do not think they will be allowed to deposit there another season.

Quarantine we have none, but care is taken to prevent the spread of diseases. We had one case of smallpox, at Linwood, but the patient recovered, and no one took it. There have been several cases of typhoid fever at Linwood and two deaths, but the disease is abating. Effort is being made to put a stop to it by the physicians. Cannot account for the cause of the disease.

GALLOWAY TP., *Report from* A. E. CONOVER and Dr. G. W. ALLEN, *Oceanville.*

Our township has been remarkably, I might say *entirely,* free from malarial fever. By report of 1880, only two deaths from fever are reported, one from typhoid, one from scarlet. So far, from April 1st, not one death, from fever of any kind, has been reported. The Local Board had kept no record of statistics previous to April 1st, 1881. Since that time a record of all certificates and permits is recorded in a township record of vital statistics.

In addition, Dr. Allen notices the uniform healthfulness of the township, and its advantage in tendency to pulmonary consumption. On account of a case of smallpox many were vaccinated, and yet some opposition is manifested thereto.

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

Three smallpox cases are reported, which recovered.

BERGEN COUNTY.

ENGLEWOOD, - *Report from* D. A. CURRIE, M. D., *Englewood.*

Natural drainage good but now needs improving, nothing having been done within the past two years, with the exception of what the

Board of Health has done. Englewood has several extended plans for future drainage, one of which we have examined. It is a growing section and needs this aid to its progress.

The Board of Health has the full confidence of its citizens, and it has a regularly drawn up code as to nuisances and their abatement, and has but little difficulty in its enforcement.

MIDLAND TP., - *Report from* JOHN G. ZABRISKIE, *Arcola.*

The water supply is good but this year deficient in quality. Some malaria along mill-ponds, accounted for by their lowness. Less than last year. Cesspools are not properly emptied. The sanitary improvements of the year have been the cleansing of wells and cisterns and the removal of a dam from a mill-pond. Some of the cases of malarial fever from the former year were very intractable. A few cases of dysentery have occurred.

PALISADE, - *Report from* I. M. SIMPSON, M. D., *Schaalenberg.*

Mild epidemics of measles and roseola are reported, also an epidemic of dysentery, which seemed to be an outcome of malarial conditions.

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

The fact is noticed that a well was found polluted from a sink drain, and was attended to by the Board. Malarial fever has not increased this year.

SADDLE RIVER, - *Report from* JOHN E. KIPP, *Paterson.*

The members of the Board have given their careful attention to a careful investigation of all matters of complaint.

The lowness of the streams and wells the last few months seems to affect the quality of the water supply and cause malaria. A great many have been affected the past year. The report shows how useful a Board can be in a country district by a careful oversight of its health interests, even when there is seldom need of active interference.

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

The Secretary attributes malarial diseases to the lowness of the water and its poor quality.

WASHINGTON TP., - *Report from* SCHUYLER BANTA, *Westwood.*

The report notes the continued prevalence of malarial fevers.

BURLINGTON COUNTY.

CHESTER TP., *Report from* S. C. THORNTON, M. D., *Moorestown.*

The report notices intermittent fever as ubiquitous, although mild.

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

Some increase of malarial fever.

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

The report gives accurate answers to the various inquiries, and reports the township as remarkably healthy.

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

The sanitary improvement of the last year was the removal of a slaughter-house which had been complained of as detrimental to the public health.

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

The water supply has been very low this year, on account of the prolonged drouth throughout the entire township. The people get their water principally from wells dug in the ground; others from cisterns, springs and ponds, forced up through leaden pipes to their dwellings. Many have had to cart their water, and drive their cattle for miles, also. In some cases sickness has been caused by the lowness of the streams, the cisterns and wells not getting their usual supply. There has been more sickness in the township with malarial fever than ever was known, and the causes are traceable to the lowness of the streams and ponds. I noticed it particularly where family residences were situated along the side of ponds that were lower than usual; they were the ones most subject to the attacks of malaria, the water becoming stagnated therefrom, throwing off its malarial poisons, thereby inoculating its victims. There have been some cases of typhoid fever in sections of the township. There has been more sickness for the year just ending than in 1880, that year being very healthy.

People in the township are awakened to the importance of having their premises in cleanliness, and of arranging apparatus in which

they can more effectually carry off the refuse, thereby promoting the welfare of the public health—the community having learned to prize that boon more than riches.

WASHINGTON TP., - *Report from* A. E. KOSTER, *Green Bank.*

More malaria than last year. Much measles and whooping cough the last year, but very little fatal sickness.

EASTHAMPTON, - *Report from* THOMAS L. SHERMAN, *Smithville.*

CAMDEN COUNTY.

CENTER TP., - *Report from* HIRAM E. BUDD, *Mt. Ephraim.*

During the past year the Board has had vaccination performed thoroughly through the township, and has removed several cases of smallpox from thickly settled sections. The report details the prompt measures adopted to prevent the spread of smallpox, several cases having occurred. The cost was about $70.

DELAWARE TP., - - *Report from* A. HILMAN, *Haddonfield.*

GLOUCESTER TP., *Report from* R. B. STEVENSON, *Blackwoodtown.*

The health of the township has been good, except the outbreak of typhus fever which occurred in the alms house of Camden county.

GLOUCESTER CITY, - *Report from* WILLIAM H. BOWKER.

The report makes special mention of the proximity of wells and privies, and of defective surface drainage. The city physicians attribute some prevalence of remittent and typhoid fevers thereto. An ordinance has been passed as to all new vaults constructed, but many of the old are not remedied.

WINSLOW TP., - *Report from* MATHIAS SIMMERMAN, *Tarsboro.*

Three cases of smallpox in March.

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

The water for cooking and drinking purposes is obtained almost exclusively from common wells. So far as I know (C. H. Shivers, township physician,) all the cases of typhoid disease in this town during the last six months have occurred in people who drank water from wells in the vicinity of a cow-yard on Grove street, which the Board of Health declared a nuisance, and had removed and renovated. The water generally is pure, especially in new sections of the borough, where there are very few stables.

The borough of Haddonfield occupies a table-land; its drainage is entirely natural and quite perfect. During the past year there has been more malarial disease than ever before, and this increase is marked at the northeast end of the town, which is surrounded, or rather bounded, by a chain of ponds; one pond (Evans') has filled up at its head very rapidly within three years, and the prolonged drouth this summer presented a seething, broiling mass to the rays of the sun. I cannot find evidence that the dry weather affected the purity of the drinking water to any great extent. I think there should be some measures taken to remedy the rapid filling up of the pond aforesaid.

Very few contagious diseases prevailed during the year. One or two cases of varioloid during the winter frightened almost every one into being vaccinated. The township physician vaccinated a number of poor children, according to law.

STOCKTON TP., - *Report from* P. W. BEALE, M. D., *Wrightsville.*

The report shows that the Board has held regular meetings, and been of much service to the township. During the year there was a marked increase of disease in the township, due partly to the severity of the winter, partly to the increased spread of malaria, and partly to the epidemic of smallpox. We have had malarial fevers to an extent before unknown in Stockton township, assuming mostly an intermittent type. Twenty cases of smallpox occurred, which were promptly attended to, houses being quarantined and fumigated, and vaccination attended to.

MERCHANTVILLE BOROUGH, - *Report from* JOHN HOMER, *Clerk.*

The report shows that the sanitary administration is good.

CAPE MAY COUNTY.

MIDDLE TP., *Report from* STILLWELL H. TOWNSEND, *Cape May C. H.*

The report forcibly shows that drainage and sewerage are too much neglected. From July to July, at periods, whooping cough, measles and roseola were prevalent, but not fatal. Only one nuisance had required the direct action of the Board.

UPPER TP., - *Report from* LEWIS D. WILLIAMS, *Tuckahoe.*

The report notices the good attention given to the records of vital statistics and to vaccination. Malarial fevers have been too common during part of the year.

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

The Board recognizes the importance of sanitary oversight, and looks after these interests in accord with the State law.

CUMBERLAND COUNTY.

BRIDGETON, - *Report from* CHARLES B. MOORE, *Bridgeton.*

The water supply from the East Lake water works is good, although many yet use cisterns and wells, the former chiefly for laundry purposes. Careful supervision is exercised by the Board over nuisances, and many have been abated. Diphtheria and a few cases of typhoid fever have occurred since July 1st.

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

FAIRFIELD TP., - *Report from* JAMES M. CAMPBELL, *Fairton.*

GREENWICH, - *Report from* SAMUEL P. FITHIAN, *Greenwich.*

STOE CREEK, - *Report from* EPHRAIM MULFORD, *Roadstown.*

The disposal of excreta, refuse, slop-water, the situation of outside privy vaults, and drains from kitchen sinks, are in nearly every case bad, but as no sickness is attributed to these causes we would be considered very meddlesome to interfere. The summer just past has been very dry and warm, with a good deal of sickness. The report notices the severity of the past winter, and the fact that the thermometer showed varying intensity of cold at the same time in localities not far from each other. We need to study climatology as varied by locality, exposure, etc., and not merely by instruments.

ESSEX COUNTY.

BLOOMFIELD TP., - *Report from* JOS. K. OAKES, *Bloomfield.*

Less malaria this last year. The Toney's brook nuisance complained of last year has been abated. The Board has closely looked after the health interests of the people. Have generally been able to secure relief without resort to law.

EAST ORANGE, - *Report from* E. M. COWDRY, *East Orange.*

LIVINGSTON, - *Report from* M. S. WILLIAMS, *Roseland.*

MILLBURN, - - *Report from* ISAIAH WILLIAMS, *Millburn.*

ORANGE CITY, - - *Report from* THEO. W. HARVEY, M. D.

I have dilated upon these small brooks, as they have for many years been the source of bad odors during the summer months, and the objects of much study on the part of the city authorities. They are regarded as private property, and not within the jurisdiction of the health authorities, and have been made the receptacle of the refuse and drainage from private houses and factories, from time immemorial. The rapid growth of the city has increased the nuisance until they have become the sewers of the city. The Board of Health has stopped the draining of cesspools and vaults into them, but they still receive the refuse from the factories, and in some instances house drainage. The only effectual remedy for this nuisance will be the introduction of an efficient system of sewers.

It is evident that the limited water-shed that furnishes the water for the plain on which Orange is situated, is no longer equal to supply the demand, and that there is not enough water poured into the soil to supply the present needs of our people.

In the neighborhood of Orange there is a low tract, through which Parrow brook flows. This section has a reputation for malaria, which

is attributed to the influence of the brook. It is very probable that the waters of the brook contain much decaying animal and vegetable matter, and that this may be one of the sources of the malarial poison, but there are, undoubtedly, other causes present. It is an interesting fact, however, that all along the borders of that stream, from the Orange line to the Passaic river, through East Orange, Bloomfield and Belleville, the various forms of disease, grouped under the term malarial, are, and have been for years, markedly prevalent.

Orange has no sewer system. This, however, is a condition that will soon be changed.

The excreta of the citizens are treated in various ways. Privy vaults, or inside water closets connecting with cesspools, or with the downward filtration system. This last system is being introduced in many premises, and is liked very much. It bore the severe test of last winter perfectly, and is, undoubtedly, the best means of disposing of house waste where there is room for it.

The hat shops are interesting from a sanitary point, as they pour their refuse and dye-stuffs into the streams; and they are injurious occupations to the employes where ventilation is not thorough, the dust causing a tendency to consumption, and the vapor of mercury inducing mercurial poisoning. The improved character of the buildings now built is shown by the decreased instances of disease to be attributed to these causes.

The Board appreciates fully the impossibility of the realization of a typical hygeia in the State of New Jersey, but they further appreciate that few citizens will care to have their lives endangered by the cultivation of causes of disease on their premises. Yet they feel that few know or realize the dangers of unsanitary conditions, and still fewer know the remedies. It is therefore the intention of the Board to educate the people in what is proper in the sanitary management of their premises; to point out the evils and the means of remedy, and to gradually bring the community into a proper state of mind regarding sanitation without shocking their ideas of the inviolability of private rights.

The Board, two years ago, established an annual inspection. Circulars were sent to each house, informing the residents of the purposes of the inspection, defining the character of nuisances, and containing the regulations of the city regarding them.

One assistant inspector was appointed in each ward, who should

inspect the premises of each citizen, and report the condition of the house, cellar, privy, cesspool and well to the Board.

This year these reports were made on a regular blank for each house, and remain on file.

Whenever a nuisance was reported, a notice was sent to the owner, requiring its abatement. These notices have been universally attended to. The inspectors make a second tour to see if the orders of the Board are carried out.

During the year 1880–81, 364 nuisances were abated. These consisted of foul and full cesspools and vaults, dirty yards, wet cellars, &c.

Through the influence of the Board, ordinances forbidding the keeping of swine in the city limits, have been passed, and another, making all cesspools and vaults water-tight, is now pending.

SOUTH ORANGE, *Report from* A. A. RANSOM, M. D., *South Orange.*

There is a dam causing the water in the east branch of Rahway river to flow back about one-half mile, receiving the drainage of the valley and part of Orange, without doubt adding to our malarial fevers sixty per cent. the last year. We are now acting through the courts, and will, without doubt, do it away. We are acting under the State law of last year. The above stream receives about one-half the sewerage of the town or village.

Have not resorted to law in any case, but persuaded and educated delinquents, and have made them good helpers.

WEST ORANGE, - *Report from* J. C. MORGAN, *Orange Valley.*

GLOUCESTER COUNTY.

FRANKLIN, - - *Report from* J. C. RICHMAN, *Malaga.*

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

Three cases of typhoid fever are stated to have occurred from waste water and slops soaking into the ground, twelve to fifteen feet from the well.

Much of the land of the township has been reclaimed by the dike and drainage system of the Mantua Drainage Company, greatly to the advantage of the township. Although this year malarial fever

has been more prevalent than usual, it is not more so along the drainage area.

A greater attention has been paid to the abatement and removal of nuisances than ever before. A slaughter-house kept in an unhealthy condition has been greatly improved under legal notice and inspection.

GLASSBORO TP., - *Report from* JOHN E. PIERCE, *Glassboro.*

The report alludes to the abatement of a drain nuisance, and to the prevalence of malarial diseases in the district.

MONROE TP., - *Report from* D. L. DAWSON, *Williamstown.*

Complaint is made of the nuisance arising from hog-pens near to the public streets, and of the refuse of a canning factory allowed to lay near the road; also of the unkempt condition of streets. The report, read alongside that of similar rural districts, shows that the Board of Health, by judicious action, could do much, even if they expended no more than the fifty dollars now authorized as a bill against the township for sanitary improvement.

MANTUA TP., - - *Report from* B. A. CARSON, *Mantua.*

The water supply is good for house use, as it is used from wells and pumps. Great Mantua creek runs along the edge of the village, and on account of the weather being so hot and dry, with very little or no rains to carry off the rotten refuse of tide-water creeks, has caused considerable malarial fever; nearly the whole village has been more or less affected; one family lost four members by the disease; this was the worst case. The health of the town is improving. The general complaint now in Mantua township is chills and fever.

WEST DEPTFORD, - - *Report from* JAMES M. WILKINS.

Malarial diseases have prevailed since August first.

WOODBURY, - - *Report from* R. S. CLYMER, *Woodbury.*

The report shows intelligent comprehension of the needs of sanitary administration and its judicious exercise. The outbreak of smallpox was properly limited by vaccination. There were only five cases, none fatal.

WOOLWICH TP., - *Report from* DANIEL LIPPINCOTT, *Swedesboro.*

Some malarial disease, but otherwise a season of health.

HUDSON COUNTY.

KEARNEY TP., - - *Report from* S. W. CLASON, *Arlington.*

The water supply is, as heretofore, cisterns and driven wells. These have been found inadequate during the dry season, but no steps have been taken to remedy it. Some diarrhœa troubles resulted from the extreme lowness of water.

The drainage is, as last year, defective, nothing having been done. The accursed cesspool being the principal means, which consists, in most cases, of a hole in the ground, filled with stones, or stoned up in some cases and covered over. Arlington has a small drain pipe running through one street and discharging in an open drain in lower part of village, and continues in open drain some five hundred feet before entering a little stream which is supposed to carry it off to meadows below. The sewer pipe at commencement is six inches; at ending about twelve inches. This sewer is never flushed except by an overflow of cisterns, with which it is generally connected as well as the sinks of the respective houses. We need radical changes in this.

There being few wells, have heard of no contamination of any kind. A few inside water-closets are connected to cesspools, which are discharged, by means of pumps, upon the soil; frequently privy vaults are emptied by means of excavating companies. Slop water disposed of by cesspools and sewer, as stated under drainage.

No diseases of animals reported or coming under my knowledge.

Slaughter-houses are not situated near private residences, still we suffer considerably from offensive odors when wind blows to us from their direction. It has been thought to abate them through the State Board of Health.

JERSEY CITY, - - - *Report from* D. W. BENJAMIN.

NORTH BERGEN TP., - *Report from* GEO. BRUCE, *New Durham.*

WEST HOBOKEN, - *Report from* WM. G. SMITH, *West Hoboken.*

UNION TP., - *Report from* JOHN MCGRANE, *Town of Union.*

HUNTERDON COUNTY.

FRANKLIN TP., *Report from* CHARLES M. TRIMMER, *Quakertown.*

HIGH BRIDGE, - *Report from* SAMUEL P. LUNGER, *High Bridge.*

KINGWOOD, - - - *Report from* H. P. SHAW, *Kingwood.*

The drought affected the quantity of water supply. Along the river shore there were many cases of malarial fever. There was much whooping cough in early spring. Measles prevailed extensively in May, June and July.

LEBANON, - - *Report from* A. S. BANGHART, *Glen Gardner.*

There has been less prevalence of typhoid and malarial fevers than the former year.

FLEMINGTON, - *Report from* CHARLES W. HOFF, *Flemington.*

The water supply has been changed, and is now from the south branch of the Raritan river.

The mode of delivery of refuse, through pipes into small streams, will answer only while a city is small. A suggestion is made, that in towns a general law should prevent the erection of slaughter-houses near dwellings.

CLINTON (Borough), - *Report from* H. ALTEMUS, *Clinton.*

Malarial fever has been less prevalent than last year.

WEST AMWELL, *Report from* GEO. H. LARISON, M. D., *Lambertville.*

The year has been one of unusual good health. The report complains that local Boards are not sufficiently aided in their important work, and are too much limited both as to power and pecuniary provisions.

CHAMBERSBURG, - - *Report from* S. D. SOUTH, *Trenton.*

The soil of Chambersburg and its more recent growth, makes its conditions for health more favorable than those of Trenton. Care is taken to remove refuse matter and to prevent contamination of the soil. It is greatly to the interest of the borough to maintain an efficient health inspection, and so prevent evils which will otherwise occur.

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

HAMILTON TP., *Report from* JOSEPH H. WEST, Assessor, *Hamilton Square.*

One death from smallpox is reported, but active vaccination prevented its spreading.

PRINCETON (Borough), *Report from* Prof. J. S. SCHENCK, *Princeton.*

A water company has recently been formed, and it is believed before many months our supply through street mains will be abundant and of the best quality.

A much more general attention to and interest in sanitary matters than formerly.

Statistics fully attended to. Monthly returns forwarded regularly to Secretary of State.

Within the year the Board of Health ordered a general vaccination, at the expense of the borough, of such as were unable to pay for themselves. About 250 were vaccinated under this order.

No case of smallpox has occurred within the year.

TRENTON, - - - - JOHN WOOLVERTON, M. D.

In absence of full reports, we quote as follows from the message of the mayor, Hon. G. D. W. Vroom:

Paramount among the matters to which your attention will be called, must stand the health and cleanliness of the city. At no time has it been necessary to use more forcible language, or to lay before you more urgent recommendations. * * * I am not asserting too much, I trust, in maintaining that too little attention has heretofore been given to this subject. The dread of increasing our bonded indebtedness has prevented even the most essential improvements in the sewage of the city. Laudable as a spirit of economy undoubtedly is, it ceases to be so when its consequences are baneful to the general health. We have no system of sanitary inspection whatever. Save during the summer months, the Board of Health exercises no supervision, and the condition of sinks and cesspools is left entirely to the option of the citizen. Ordinances of the common council prohibiting the pollution of certain streams are openly and notoriously violated. Streams running through populous parts of the city are thus, in direct violation of law, used as sewers. The race-way of the Trenton Water

Power Company is made the receptacle for hundreds of out-houses, and during the hot season, the water being necessarily low and very frequently drawn off entirely, pestilential malaria is the inevitable result. I am informed that the condition of this water-course caused the utmost astonishment to the gentlemen, experts in sanitary matters, who lately visited our city, at the request of council, for the purpose of recommending a plan for sewering our city. I call the attention of the common council to the existence of these evils with all earnestness. I shall endeavor, if in my power, to cause the ordinances to be enforced, but I must rely upon your cordial co-operation and assistance. The ordinance establishing the Board of Health should be revised and made to conform to the decision of the Supreme Court in the Marshall Case. The court there held that where a business was not *per se* a nuisance, power was not vested in the Board of Health, nor could it be delegated to it by council, to determine whether an occupation, lawful in itself, is so conducted as to become liable to abatement. The common council, under the charter, has this power, and the ordinance must be so amended as to define what circumstances of abuse will render such occupation obnoxious, and thereupon liable to abatement. These amendments in the ordinance should be made before the unhealthy season sets in. With the ordinance as it stands at present, the power of the Board is very limited. I would also recommend that this ordinance be further amended by creating the office of Health Inspector. The work of the Board cannot be effectively done by the police force or the street commissioner. It is essential that there should be an officer connected with the Board whose whole time shall be at its service.

Last year an appropriation of $1,000 was made by the common council for the purpose of procuring a map of the city, and, through experts, to obtain a plan, based upon the said map, for sewering the entire city. No part of this sum has yet been expended. The city surveyor should be directed to proceed at once with the preparation of this map, and when completed the plan of sewerage should be adopted, after the examination of the views of those qualified by scientific research and experience to make the proper recommendations. The day has passed, I trust, when permission shall be granted to use the public streets for the purpose of placing therein sinks and cesspools. West State street for a whole block is fairly honeycombed with them. Constructed as they are, without means of ventilation,

there is no escape for the noxious gases save through the pipes communicating with the dwellings. The very fact that this practice of so using the streets exists, calls loudly for the adoption of some plan, at an early day, for the abatement of such an evil.

WASHINGTON, - *Report from* JOHN B. YARD, *Robbinsville.*

A few cases of smallpox and one death therefrom are reported.

HIGHTSTOWN (Borough), - - *Report from* W. W. SWETT.

The report is a careful statement of facts as to undrained land and improper emptying of sewage, and while no results are fully proven, interference with drainage and imperfect methods of refuse removal are sure to record their accumulated results.

MIDDLESEX COUNTY.

MONROE TP., - *Report from* ELIAS D. APPLEGATE, *Cranbury.*

NEW BRUNSWICK (City), - *Report from* Prof. D. T. REILEY.

It has been a season not marked by any special epidemic influences, still the city has suffered severely from the prevalence of certain ailments which should never have occurred.

About only one-third of the city has been sewered (there are about twenty miles of streets and only six and one-half miles of sewers), and this (as noticed in our last report) is of such a defective character that it may well be questioned whether it is not a source of disease rather than a sanitary safeguard. We believe that the emptying of excreta into slack water must ultimately result in the production of disease of dangerous form. The remaining two-thirds of the city is without any proper drainage, the inhabitants emptying their slop-water into the gutters, and the excreta being received by privies, the contents of which percolate through the soil and poison the surrounding wells. The Board of Health would call attention to the condition of our streets, which are never clean, and which in summer are deluged by badly constructed sprinklers, rendering them muddy, and enabling the summer sun to liberate the gases from decaying offal, which must be detrimental to the public health. Our public schools are generally

well ventilated and properly constructed, but are the agents for spreading the communicable diseases of childhood, and should have more stringent regulations regarding the admission of children coming from infected households. In other words, the standard of attendance is held so high that often children are admitted to the schools who should be at home under the care of their parents and medical attendance rather than commingling with their fellows.

Our public health laws are sadly defective; we have but little power to carry out sanitary measures, and great difficulty in enforcing penalties clearly within our jurisdiction. In common with a large portion of the county, we have suffered in a greater degree than usual from malarial tendencies—this substratum of influence showing itself in various maladies. In the early part of this report reference was made to the existence of sickness which should have never occurred, and under this head may be mentioned the prevalence of a number of cases of typhoid fever. Within a limited locality twenty-three cases of typhoid fever existed, nineteen of which could be traced to drinking water from a pump, situated on the corner of Oliver and Nelson streets—this pump is contiguous to a graveyard, say within fifty or sixty feet. But a more potent influence, perhaps, was the existence of three cases of typhoid fever last winter in the immediate proximity, the dip of the shale favoring the percolation of typhoid matter from the out-houses situated near to the pump above referred to. Besides these cases, three cases of typhoid fever have recently arisen near the sewer basin, at the corner of George and Albany streets, from which an insupportable stench is frequently noticed.

Another instance of disease occurring within our city, which might have been largely prevented, was the existence of smallpox. During the month of March, 1881, two cases of varioloid existed at 22 Richmond street. The inmates of the house were promptly vaccinated and a vigorous quarantine enforced, and it proceeded no further, until, in the month of June, a son of Mrs. Moore, living on Washington street, was taken with smallpox (contracted elsewhere). Dr. Shannon immediately vaccinated the family, but the mother refused to comply with simplest sanitary regulations, and from this neglect a number of cases rapidly arose, so that there occurred in all forty-nine cases and nine deaths. These cases cannot be all properly charged to the above neglect, but the refusal to allow the use of disinfectants in a single instance largely aided in fostering the disease. Through the liberality

of common council the city physician was enabled to practice vaccination on a large number of the indigent poor, 735 having received this protection. The Board feel called upon to call attention to the character of the material used for vaccination, which was in all instances from the so-called bovine virus. Many of the sores produced by this agent lacked the typical character of the true vaccine pustule, a raspberry-looking vesicle taking the place of the proper manifestation.

The refuse which accumulates in the streets is removed and deposited in designated places within its limits, for filling up of low places, *once* a week, in carts for that purpose. The excreta is removed from the city in casks, or tight, box wagons, when required by individuals, or by order of the health officer, on complaint; dead animals are removed from the city limits by permit.

The diseases of animals have been through the year of a mild and ordinary character, with the exception of a few cases of splenic fever.

An ordinance giving the Board of Health greater powers in the control of disease prevalent, epidemic or endemic, has been passed during the past year by the common council. The invitation of the State Board of Health to criticise the present general law is timely. We think that the 1st section is faulty in not fixing a time for the exit of the members of the Board. The phraseology is, "not less than three years," but the maximum service is without limit. The provision for penalties in the 8th section is impracticable in most cities, because it is dilatory and indirect. The Board of Health must assume responsibility, pecuniary and legal, besides incurring immediate expense in the expectation of ultimate compensation.

There should be some legislation, marking out distinctly the control which should and can be exercised over the streets by the Board of Health.

During the year the inspector has investigated 44 complaints, made 50 inspections and issued 319 permits. In a number of inspections a committee from the Board, in company with the commissioners of streets and sewers, have inspected together the condition of lots and streets in different parts of the city. In every case of smallpox reported to the inspector, he has visited the house and given instructions as to sanitary precautions to be used, has attended to the removal of patients, and superintended the burial of the dead.

PERTH AMBOY, - - - *Report from* C. L. PARKER.

The water supply has heretofore been by means of wells and cisterns, but we have taken a new departure in the introduction of water under the direction of a water company, the fire-plugs and pipes having been introduced through all the streets and many houses, and water will be turned on during this month.

The sewerage and draining facilities are improving. We have now three parallel or main sewers emptying into the sound, with several connecting ones and private drains running through the streets.

The garbage question is as troublesome with us as in most places. Though the city has contracted for the prompt removal of all garbage, ashes and other filth, the contractor is indifferent to his duties, and the authorities unwilling to enforce the carrying out of the contract.

Privy vaults are generally in a very wretched condition, especially in the old buildings and localities. They are usually full to overflowing, and in some localities the stench arising therefrom is almost unbearable as you pass along the streets.

Public health laws are good enough, but very poorly enforced.

The registration of vital statistics is complete and in good working order.

PISCATAWAY TP., - *Report from* NATHAN VARS, *Dunellen.*

The extreme drouth of the past autumn completely dried up many streams which scarcely ever fail, and in many, if not most sections of the township, these, heretofore considered living streams, have furnished little or no water, and now, December 15th, many of them show but little effect of the abundant rains of the last few weeks.

This condition of affairs seems to have been the cause of more inconvenience than sickness, as the fall has been more than usually free from fevers, and but little opportunity has been afforded physicians to ply the healing art.

In contrast with the fall, the summer was marked by an unusual prevalence of diseases, caused or affected by the malarial influences which seemed to manifest themselves throughout the whole country, while at the same time there was a less tendency to bowel ailments, diarrhœa, dysentery and cholera infantum than usual, especially when we consider the great heat of the summer months.

No epidemics have prevailed. There were two instances, one in Dunellen and another in its immediate vicinity, of evidences of diphtheria contagion, but it seemed difficult to trace it to its source, and the disease was controlled and did not spread beyond two families, in which it originated, in one of which two out of three, and in the other five out of nine cases proved fatal.

A considerable attention has been given to vaccination, but no cases of smallpox have been observed.

I forgot to call attention to the circular issued by the Board last spring to the inhabitants of our township, one of which I enclose. I think its distribution has been of benefit to our township, and has saved the Health Board from work which otherwise they would have been compelled to do. Some few complaints have been made to the Board, but no official action has been necessary.

BOARD OF HEALTH,
TOWNSHIP OF PISCATAWAY.

Your attention is respectfully invited to the action of the Board of Health of Piscataway township, designed to secure the enforcement of proper sanitary measures, to protect, so far as possible, the health of the people of the township, as exhibited in the following circular:

WHEREAS, Malarial diseases were extensively prevalent during the past season, and there being indications that in the coming one the same experiences may be realized; and

WHEREAS, It is believed that these diseases are promoted by, and largely the result of, allowing improper and offensive matter to accumulate on and around our premises, and that the removal of all such material would greatly mitigate, if not entirely eradicate, those diseases;

Therefore, The Board of Health of Piscataway township respectfully request of you, as of every other householder, that you take immediate measures to remove from your premises any and all impure, unhealthy or decaying matter (if such can be found), taking especial care to cleanse any and all privies, cesspools, vaults, &c., and to disinfect them when necessary, and also to secure as perfect drainage of your premises as is possible; and the Board indulge the hope that a due regard for the welfare of yourself and family, as well as of the public generally, will prompt you to accord a speedy and cheerful compliance with this (as it seems to us) very reasonable request; and that a general compliance on the part of all will save the Board the ofttimes unpleasant duty of special action in individual cases.

And, further, While the Board would not encourage complaints of a trivial character, yet under the law making it their duty to abate nuisances and enforce sanitary regulations, all real causes of offence must of necessity command their attention.

NATHAN VARS, *President*,
PISCATAWAY, May 2d, 1881. A. S. TITSWORTH, *Secretary*.

SOUTH AMBOY, - *Report from* A. V. APPLEGATE, *South Amboy.*

Vaccination has been well attended to. A few cases of diphtheria are reported.

WOODBRIDGE, - *Report from* S. E. FREEMAN, M. D., *Woodbridge.*

We have in the township some low, swampy places, where the water has no natural outlet, is stagnant, and becomes a fruitful source of malarial feyer. There was much of it last year, and about the same this year.

One small stream has been made to carry the sewage from several houses standing near it, and likewise the contents of the privies belonging to said houses. Several cases of fever the past season have been attributed thereto.

MONMOUTH COUNTY.

ASBURY PARK, - - *Report from* HENRY MITCHELL, M. D.

During the past year the sewerage system of this borough has been much extended, until at present about nine miles of street mains are in place—all in operation. The general plan of sewerage has been found to be efficient.

The introduction of a public water supply, which it was hoped would be accomplished before this date, has not yet been effected, but a company (the "Neptune Water Works Company") is organized, and immediate steps promise now to be taken to secure the introduction of water.

The streets and public grounds in the borough are kept in a cleanly and healthful condition. Some effort on the part of this Board has been necessary to prevent the deposit in the streets of filthy liquids, &c., but our rule governing that matter is now generally known and observed.

Privy vaults and cesspools which are still unconnected with street sewers are excavated by means of the odorless excavating apparatus, and no difficulty nor any objection is found or offered to this operation. We confidently hope that the day is not distant when no cesspools will exist within our district. From the privy vaults we have little to fear, for all of them are required to be of brick and cement, and to be made water-tight.

Garbage is daily gathered by carts, and carried beyond our limits, so that the borough suffers no inconvenience from this source. But some of the garbage is taken a short distance back into the country

and fed to swine, causing the pens and fields in which it is deposited to be offensive, and rendering the vicinity unhealthful. Garbage gathered by the public carts is all taken to freshly-dug pits and covered with earth. The swine feeding is carried on by individuals who collect the garbage in their own wagons. We deem it essential to the health of neighboring localities that this use of garbage be prevented.

The school buildings in the borough have been frequently inspected during the year, and suggestions have been made as occasion required. The public school building is at present overcrowded, the average number of pupils attending daily being 454, while the total seating capacity is but 426. The total number enrolled is 558.

In January, 1881, free vaccination was offered to all indigent persons, and during January, February and March 259 persons were vaccinated. All primary cases were successful, so far as heard from, and no serious result occurred in any case. Bovine virus was employed.

During the summer several cases of scarlet fever occurred in this district. Isolation, as far as practicable, was secured for those cases which could not be removed. One case was sent to our hospital, outside of the borough limits. No other contagious disease has existed within the borough during the past year. We receive weekly school reports of all pupils who are absent on account of sickness, and require reports from physicians of all cases of contagious diseases which they may professionally attend.

The plan of houses and house inspection has been kept up during the summer months, and all premises found in an unsanitary condition have been required to conform to our ordinances.

Early in the summer our attention was called to the fact that much adulterated milk was being brought into and sold within the borough. Evidence of the fact was obtained by the aid of Dr. William K. Newton, State Inspector of Milk, and in one case the milk was poured upon the ground. Evidence in other cases was presented to the grand jury, but no indictment was found. We have, however, received from the milk dealers an assurance that no milk will hereafter be offered for sale except that obtained from sources approved by the State Inspector of Milk.

Some arrests have been made, and in a few instances fines have been imposed, for violations of our ordinances, but, as a rule, little opposition has been met with in carrying on our work.

EATONTOWN, - - *Report from* ABRAM S. METZAR, *Eatontown.*

The defective drainage of Eatontown is complained of. Mill brook is impeded in its course by willows, rubbish, &c., and to this interference with a natural water-course is attributed the extensive and wide-spread malarial fever that has been universal in this vicinity and in Ocean Port. If we would keep our coast clear from malarial invasion, we must preserve the natural drainage, and add artificial drainage to make up for the changes which population introduces.

FREEHOLD TP., - - *Report from* S. E. THOMPSON, *Freehold.*

It is noticed that the entrance doors of schools, etc., open inward, so as to be dangerous in case of fire.

Vital statistics will be more fully tabulated the next year, and an attempt be made to separate those in the incorporated limits from the rest of the township. The Board has just been arranging its work, and is confident that by another year a more complete and satisfactory report can be made.

FREEHOLD VILLAGE, *Report from* CHAS. F. RICHARDSON, *Freehold.*

The Board of Health of the borough or corporation of Freehold, in the township of Freehold, county of Monmouth, would respectfully submit this, their second annual report.

Though apparently ignored in the annual report of your Board, we feel confident that we were not remiss in any of the duties laid upon us from our appointment by the town commissioners, but have faithfully investigated every complaint, whether verbal or written, made to us, and have cured or remedied the causes of complaint.

From general report, we say that the health of our town has been very good. There have been some rumored cases of malarial fever scattered in different parts of the town, but the question is an open one, from the fact that malaria is now commonly denominated the cause of the majority of "ills that flesh is heir to."

An artificial pond on one side of the town, constructed several years ago, for protection against fire, was thought by some to be injurious to the public health and a developer of mosquitoes. A feeling being worked up against it, the Board examined into the matter and could not honestly condemn it. But, in compliance with the vote of the town, it was drained and discontinued without any visible improvement in the troubles alleged to be caused by it.

In view of the spread of smallpox in the cities within easy communication with us, the Board, last spring, prepared a circular, recommending vaccination, which circular was delivered to every householder, and we believe there were a large number who were vaccinated in accordance with our suggestions.

HOLMDEL TP., - *Report from* H. D. HENDRICKSON, *Hazlet.*

There has been, since July 1st, an increase of malarial diseases over last year.

HOWELL TP., - *Report from* S. S. GARRISON, *Lower Squankum.*

MANALAPAN TP., - - *Report from* L. D. BUGBEE, *Tennent.*

MATAWAN TP., - - *Report from* BENJ. GRIGGS, *Matawan.*

Malarial fevers have been less by one-half than last year. In one case there has been removal of obstructions to natural drainage.

MILLSTONE, - - *Report from* PETER FORMAN, *Manalapan.*

This report we subjoin in full as showing a diligent oversight of the health interests of the township, in a district which has but little sickness to report. We commend it to the notice of the Boards of rural districts, some of which see nothing to prevent, because no diligent attention is exercised.

During the year the Board, by active inquiry and observation, have endeavored to procure all the information possible in regard to the sanitary condition of the people, and are able to report that they have not found it necessary in any instance to institute any formal proceedings in order to discharge the duties incumbent upon them, the few minor cases of nuisance and irregularity which have come to their knowledge, having been promptly abated upon a simple verbal request made by the Board. The favorable sanitary condition of the people is mainly attributed to the general elevated and dry situation of our soil and climate, the absence of any town, village, or considerable number of congregated dwellings in our territory, and the simple and rural habits of the people.

Notwithstanding the protracted drouths of the past summer, but little difficulty has been experienced with the water supply; our natural streams and springs, and the wells at each farm-house and

dwelling, having generally met all demands; cistern water is used in many places, but never for culinary or drinking purposes.

There have been some cases of malarial fever, probably a slight increase in number since last year, but not attributable, in the opinion of the Board, to any faulty sanitary condition here, as a careful inquiry reveals the fact that most of the cases have been brought to us by persons who have been residing or sojourning in other localities. There is no regular system of drainage or sewerage, and the water-closets and cesspools we believe as a rule are situated so that there is but little danger of contamination to the water supply, being generally located in some private and remote corner of the premises. No doubt, however, some reform and improvement could be suggested in this and all other agricultural communities in regard to the management of the water-closets, kitchen, sinks, cesspools, &c., found in every farm-house and country dwelling, too often showing plainly the want of proper care and cleanliness on the part of the owners.

In regard to the registration of vital statistics, this Board has endeavored to keep a faithful record of all returns for their own guidance, use and comparison since their organization, but have experienced great difficulty in making the record complete, on account of ministers, physicians and undertakers residing in other townships making return to their own local Boards which are due here, causing us much additional labor and inquiry to ascertain if proper return has been made in each case according to the statute; besides impairing the value of our record for want of completeness. We, therefore, respectfully represent that, in our opinion, some rule or enactment to remedy such remissness would tend greatly to the advantage of the whole system.

SHREWSBURY TP., *Report from* RICHARD A. SICKLES, *Red Bank.*

The water has been very low in the wells, and many of them are dry. Malarial fever has made its appearance where it never was known before, and is supposed to be caused by the impure state of the water.

RED BANK, - - *Report from* HENRY J. CHILD, *Red Bank.*

The commissioners have under consideration the question of water supply. Two companies have bid for the privilege of supplying the town, one from a reservoir, the other from a standing pipe. Up to this date the contract has not been awarded to either.

The natural fall of the ground both sides of the town towards the river, forms the best chance for good drainage, with as little expense, as any town in the State.

Last year was the first appearance of malaria in this section of country. It appeared this year to be of a worse type, and many more cases.

We have one covered drain built of brick, about three feet in diameter, for surface drainage, running from the front street to river, about 500 or 600 feet. It is a worse nuisance to the inhabitants than no drain, for when the wind is from the river it draws up it, and the stench is very bad.

The common mode of emptying privy vaults is by means of a steam pump connected by a hose to a barrel, the suction pipe in the vault, and as one barrel is filled another is put in its place. In these barrels it is carted out on the farms, and used as a fertilizer. Refuse slop water has numerous ways for its disposal.

KEYPORT, - - *Report from* S. V. ARROWSMITH, *Keyport.*

A marsh in the central part of the town having been regarded as inducive of malarial disorders, has been drained during the past year at the expense of the town. Malarial affections have been less prevalent and milder than last year. We have asked an ordinance compelling cemented vaults for privies.

MORRIS COUNTY.

CHATHAM, - - *Report from* B. D. GRISWOLD, *Madison.*

During the summer months fever and ague and other diseases of a malarial character were more prevalent than during the previous year, owing in part to the drouth and the poorer quality of water used in consequence thereof, as there is no water supply other than that from wells and cisterns, the majority of which were empty for some weeks.

The report notices that odors from slaughter-houses, ponds and foul water pipes were more noticeable than usual during the dry season.

JEFFERSON TP., - *Report from* AMZI L. WEAVER, *Oak Ridge.*

The most sickness we have had has been at Hurdtown mines near Lake Lopatcong. We think it is caused by the Morris Canal Com-

pany. The upper end near Hurdtown has been flowed over for three miles, and at this time of the year it is drawn down very low. The place has always been noted for fever and ague. The Board has inspected the buildings at Hurdtown, and they have tried to clean up all the rubbish, but it does not appear to do any good. Vaccination is being more fully attended to.

MENDHAM, - - - - *Report from* J. R. PITNEY.

We have no malarial disease this year.

MORRISTOWN, - *Report from* J. C. LINDSLY, M. D., *Morristown.*

The water supply is excellent.

The privy system is miserable. Several small streams running through the town are made public sewers, to the detriment of those living near them.

Intermittent and remittent fevers have prevailed more than for many years past. This is believed to be due to some ponds and streams. Into one of these the sewage of the asylum is discharged without proper filtration.

MT. OLIVE TP., - - *Report from* J. B. KING, *Stanhope.*

The emptying of excreta and slop-water into Budd's lake from any of the hotels is of doubtful propriety. Chills and fever have been somewhat prevalent this year.

ROXBURY TP., *Report from* JOHN T. LAWRENCE, *McCainesville.*

Chills and fever have abounded.

DOVER, - - - - *Report from* WM. H. LAMBERT.

Driven wells have served a good purpose the present year.

OCEAN COUNTY.

BERKELEY, - - - *Report from* H. WILLIAMS, *Bayville.*

JACKSON, - - *Report from* THOMAS P. BISHOP, *Cassville.*

LACY TP., - *Report from* CHAS. H. STULTS, *Forked River.*

Diphtheria made its appearance here about the first of May, and about the time when the burning of charcoal ceased. It seems to be a fact that while the coaling business is in progress there is very little sickness. It is noted that as the burning of charcoal commenced in August, diphtheria ceased; the only sickness now is chills and fever, brought by watermen from the South, who come here to get well. During the summer months there were several cases of a disease resembling hay fever.

STAFFORD TP., *Report from* WM. H. FLUMERFELT, *Manahawken.*

PASSAIC COUNTY.

ACQUACKANOCK TP., - *Report from* N. FREDERICKS, *Passaic.*

There has been a lessening of malarial fever the past year.

MANCHESTER, - *Report from* JOHN VAN HOUTEN, *Paterson.*

Driven wells have not been a success. Cisterns are much used and generally have filters. In the past year there has been some filling up and draining of low spots where water would stand and vegetable matter collect and decay. There is, also, in contemplation, an artificial pond, of which the dam has been torn away, leaving several small pools. Malarial fevers occur, but not so frequently as last year.

PASSAIC CITY, - - - *Report from* F. H. RICO, M. D.

Our wells, owing to the character of the soil, are easily contaminated.

Malarial fevers are not near so prevalent as last year.

There were several cases of smallpox in the spring. Vaccination was generally performed and the cases successfully quarantined.

WAYNE TP., - - *Report from* R. M. TORBET, *Paterson.*

The only natural defect in drainage is caused by the rocky reef in the Passaic river, above Little Falls, which, in times of high water, backs it up in the Singack brook and Pompton river, overflowing a large part of the southern end of the township, and to this some attribute the malarial fevers.

In hilly townships, like ours, where the general health is good, there seems but little for the Board of Health to do. We think the law a good one and its provisions ample, though there may be town-

ships which will not require to have all its provisions go into effect for years to come.

WEST MILFORD, - *Report from* A. TERHUNE, *West Milford.*

We have naturally a healthy township and, if water companies do not dam up our lakes for reservoirs, there is no reason why it should not remain so.

SALEM COUNTY.

LOWER ALLOWAYS, *Report from* EPHRAIM CARLE, *Harmersville.*

Less of malarial fever and general healthfulness.

MANNINGTON TP., - - *Report from* DAVID GRIER, *Salem.*

PILEGROVE, - *Report from* J. M. C. RICHARDSON, *Woodstown.*

SALEM (City), - - *Report from* JOS. M. BACON, *Salem.*

The building of water works is nearly completed. Ditches, carrying water to streams, have been cleansed.

The city has employed a physician to attend to vaccination.

UPPER PITTSGROVE, - - *Report from* HENRY COOMBS, *Elmer.*

Action has been taken to have children vaccinated.

SOMERSET COUNTY.

BEDMINSTER TP., - *Report from* WM. P. SUTPHEN, *Bedminster.*

We are almost free from malarial fevers.

There has been a more general use made of the contents of privy vaults by converting it into night-soil by the application of lime, ashes and earth.

At each meeting of the township committee the health book has been presented, and any matter relating to this Board properly canvassed. Consequently no special expense has been incurred by the Board.

HILLSBOROUGH, - *Report from* C. R. P. FISHER, M. D., *Neshanic.*

At the annual meeting of the Board, March 14th, 1881, the circular of the State Board, as to vaccination, was directed to be sent to

each district clerk. There have been a few isolated cases of diphtheria, and malarial diseases have markedly increased, although we know of no especial cause.

FRANKLIN TP., - *Report from* D. J. VOORHEES, *East Millstone.*

We have been called together twice for special service the last year.

Malarial fevers exist to some extent, but are not on the increase.

Ministers and physicians are not particular enough to make vital returns in the township in which the event recorded occurs.

MONTGOMERY TP., - - *Report from* WM. OPPIE, *Harlingen.*

The assessor has canvassed the township carefully in the interests of health.

There have been a few slight cases of malaria bordering on the Millstone river and the Delaware & Raritan canal.

NORTH PLAINFIELD, - *Report from* ISAAC BROKAW, *Plainfield.*

An outbreak of smallpox was circumscribed by active measures, vaccination, etc., and cost about $245 to the township.

WARREN TP., - - *Report from* JAMES RALPH, *Warrenville.*

Some cases of malarial disease are reported.

SUSSEX COUNTY.

BYRAM TP., - *Report from* C. F. COCHRAN, M. D., *Stanhope.*

Malarial diseases have been on the increase. The law as to unregistered practitioners was inquired into by the Board on account of some irregularities affecting the health of the community.

GREEN TP., - - *Report from* JOB J. DECKER, *Andover.*

MONTAGUE TP., - - *Report from* JOSHUA COLE, *Montague.*

Malarial disease has diminished since last year.

NEWTON TP., - - *Report from* GEORGE HARDIN, *Newton.*

STILLWATER TP., - *Report from* C. V. MOORE, M. D., *Stillwater.*

One-third of the wells have been dry.

There was much sickness of a malarial type at a small village on the borders of the township.

UNION COUNTY.

CLARK TP., - - - *Report from* WM. J. THOMPSON.

Our Board supervises all matters relating to health, and has acted promptly in cases brought to their notice.

CRANFORD TP., - *Report from* GIDEON E. LUDLOW, *Crawford.*

The Board asks for a milk inspector, fully empowered, to be provided by the State.

FANWOOD TP., *Report from* T. H. WESTCOTT, M. D., *Scotch Plains.*

There have been some cases of malignant scarlet fever, and of follicular pharyngitis. The Board has looked after vaccination.

LINDEN TP., - *Report from* JOHN A. ETHERIDGE, *Linden.*

The report shows good attention on the part of the Board. There has been a diminution of malarial diseases.. In one instance an old cesspool in a garden, covered over by planks, was discovered. In cleaning it out the owner of the property contracted typhoid fever and died.

NEW PROVIDENCE, - *Report from* JOHN WOOD, *New Providence.*

Our town is generally healthy. Two stagnant ponds have annoyed us some, but are under control.

PLAINFIELD, - - - *Report from* H. C. LOWRIE, M. D.

Water supply derived entirely from open and driven wells—quality excellent. A great many *open* wells have failed during the past three or four months. No driven wells have given out. No cisterns are used, and no filters. Have had no diseases arising from impure water.

An epidemic seldom invades the city, but at such times the sick are carefully quarantined. We had a few (5) cases of variola and

varioloid last February; they were carefully isolated by the city physician, and not a single case of contagion resulted. The *five cases all were* produced by a traveling person convalescent. The city council then ordered general vaccination.

The gravel pits which were partially filled year before last, have remained in a perfectly healthy condition, and will so continue.

The Randolph mill-pond, bounding the city on the west, has been remedied. The dam was destroyed by freshet in February, 1881, and the owners *were not* allowed to rebuild it. The flats on either side of the channel were leveled, and seeded with oats and grass seed, and in the summer an abundant crop was mown. Now the pond is in a very fair condition for health.

RAHWAY.

The Board is more efficient than formerly.

Malarial fever has occurred much during this year, but mostly of mild type. Smallpox has caused much anxiety. A detailed account, abbreviated from that of the health physician, is appended.

Case I.—Mrs. Desterway, aged twenty-seven years, taken sick on October 23d, died on October 28th of malignant or hemorrhagic smallpox. It was at first said case occurred from clothing sent from Jersey City, but this is false, as the clothes (only clothing she ever received) were sent to her nearly two years ago; had been made up and worn out by the children. She had not been out of city of Rahway for two years. The only clue that I can get at is that about two weeks before she was taken sick a crazy woman, an acquaintance, visited her and spent the day; she came from Newark, and it is said that she was complaining of feeling sick. That evening she left the city and I cannot find out where she went to. Mrs. D. had not been vaccinated since she was a child. This case was treated as typhoid-malaria, and the neighbors all visited her, and, as she was a poor woman, helped nurse her. She had a public funeral, but undertaker Ryno, believing it to be smallpox, had the coffin closed.

Case II.—James Corso, aged twenty-seven years, brother-in-law to first patient; had helped to nurse her, and frequently handled her; was taken sick, and after being treated for about a week for typhoid-malaria, his physician called Dr. James, who, having some doubt as to diagnosis, sent for Dr. Janeway, of New York. On consultation it was pronounced a case of hemorrhagic smallpox. Had been vaccin-

ated once. After about a week's illness he died. The case in its symptoms was evidently obscure.

On November 2d, during the time that Corso was sick, one of Mrs. Desterway's children, Carrie, aged two years, never vaccinated, died of congestion of brain; probably due to undeveloped smallpox; the same day, November 2d, Mrs. Desterway's two other children, aged four and eight, were also seized with the disease; never vaccinated; confluent variety; two last recovered. These children, after the death of their mother, were all taken to Mrs. Marsh's house (sister of Mrs. Desterway's). On November 5th, Mrs. Marsh was taken sick with the disease, of a distinct variety, coming on about nine days after exposure; had been vaccinated once when young; the other inmates of house, five in number, were vaccinated; all took, and have escaped except one child of Mrs. Marsh's, aged two years; had been vaccinated five times; never took until this last time; has distinct smallpox. All these cases were confined to one house and all got well.

Mrs. W., aged about twenty-eight years, vaccinated when a child, sat up with Mrs. Desterway two nights; taken sick November 5th; distinct variety; husband and cousin in house; both re-vaccinated and have escaped disease.

Miss B., aged about twenty-four years, vaccinated when infant, exposed to first case, confluent variety; taken sick, confluent variety, November 4th; brother's baby, in same house, taken sick same day; aged about eighteen months; vaccinated three times and never took; Mrs. B., mother of Miss B., taken sick with varioloid about 28th of November; vaccinated three times; took twice, last about twenty years ago.

Mr. Crowell, aged about thirty-five, occupied part of house with first case (Mrs. Desterway); taken about November 5th; had been vaccinated when young; confluent variety. Mrs. C., his wife, aged about thirty, taken sick about three days after exposed to first case; vaccinated when child; distinct variety.

Mrs. High, aged sixty-three years, vaccinated when young and at breaking out of the disease; vaccination did not take; taken sick November 16th; died November 20th; hemorrhagic smallpox.

A case occurred October 28th, or thereabout, of varioloid, in another part of the city—Mrs. Mary O'Connell, a resident of New York; a friend of hers had died of smallpox at her house in New York; she came here for fear of being sent to hospital; had no new cases from this; returned to New York well.

The above cases were all confined to seven houses. With the exception of the four cases of death, they have all recovered, and if no new cases show themselves within a few days, will be entirely rid of it in that section of the city. Our method of dealing with them has been to place a large card on the houses with "smallpox" on it; do not allow any one to visit the inmates, nor any one from within to go on the street; we have had all unnecessary furniture removed from the sick room; we furnish them with all the disinfectants they can use (we furnish it so that they will use it freely)—lime, carbolic acid, &c.; after the case is reported, have all the rooms, clothing and closets in the house fumigated with sulphur; furniture that has remained in room first scrubbed; walls whitewashed, &c.; have a man stationed in the neighborhood, who does all their errands, so that they have no need to go into the streets; burn the bed and bedding; bury all cloths, &c., used during sickness; allow them to wash sheets, &c., if they soak for twenty-four hours in solution of acid carbolic and zinci sulphate first. The percentage of vaccinations that took, as near as I can find out, has been about seventy per cent. Some of us had as high as ninety per cent. take, some less. Several physicians among them have been surprised at the number of successful secondary vaccinations. The matter used has been bovine, most of it obtained from the health officer, New York city. A new case of a colored child proves to be smallpox. Don't know how she got it, unless from a dress waist bought from a ragman. Three or four other cases are reported, but the epidemic has ceased.

This outline is printed with the report because of the obscurity of the first cases; the occurrence of smallpox in cases that had apparently been vaccinated; the frequency with which revaccination succeeded, and the efficient measures used to check the disease. There are various explanations of some of these facts, and while none show the inefficiency of vaccination, they do show that we need to know what genuine vaccinations are, and to have all the facts in evidence before we arrive at a conclusion.

SPRINGFIELD, - *Report from* W. C. JOBS, M. D., *Springfield.*

During the months of August and September the malarial fevers were not as prevalent as in October. During that latter month the record of cases was larger than in the same month for the previous six years, and more numerous than in any other month of the present

year. The increase of the frequency of the fever, though generally of a mild type, was attributed to the dirty and scanty supply of the water both in the wells and springs.

SUMMIT, - - - *Report from* GEO. W. NICHOLS, *Summit.*

The water from the driven wells is peculiarly obnoxious, owing, probably, to the near presence of imperfect privy vaults. Complaints are frequent, and the owners of the property have promised to comply with the regulations of the Board.

There are several deep ravines in the township, some of which, supplied from springs, are natural water-courses, from which some families draw their water supply. Several privy vaults and cesspools empty their overflow upon the sides of the ravines, creating not only noxious effluvia, but, by entrance into the streams, contaminate the water, and render its use exceedingly dangerous for either culinary or cleansing purposes.

The Board has had several meetings with prominent citizens, and the subjects of drainage, sewerage, etc., and the best means of destroying malarial conditions, have been fully discussed.

It is hoped the mass of the people may be soon aroused to the importance of guarding against the accumulation of septic conditions, and that the people, at our next town meeting, will appropriate an amount of sufficient magnitude to enable the Board to report a greater advance toward the purpose of its creation.

WESTFIELD TP., - *Report from* JOHN M. C. MARSH, *Westfield.*

We have suffered considerably during the past summer for want of water. A large number of the wells giving out entirely, and the two natural water-courses or brooks running through our village drying up, our water supply came chiefly from dug or driven wells. The driven or tube well is found to give perfect satisfaction, both in quantity and quality of the water.

We have no system of drainage in our village. The surface water is drained into the two brooks running through the village. There has been no interference with the natural water-courses. The State law as to drainage has not been applied in any case the past year. The town has no sanitary map.

There are no water-closets in close proximity to the wells in our town. The inside water-closets and kitchen sinks are connected with

cesspools, situate some distance from dwellings, by iron or earthen pipes. The privy vaults and cesspools are emptied during the cold weather by being bailed out into carts, prepared for the purpose by some of our farmers, and the contents are used for fertilizing purposes.

The physicians, ministers and undertakers have been very prompt in making their returns of vital statistics to the assessor.

Our town has no quarantine establishment for patients sick with contagious diseases. We have had but two cases of smallpox, occurring last May, both in the same house. The house was immediately quarantined and looked after by the Board of Health. Neither case resulted fatally, and it did not spread to any other person in our village.

The Board has been to an expense of over $75 the past year for sanitary purposes.

WARREN COUNTY.

ALLAMUCHY, - *Report from* WILLIAM M. SEALS, *Hackettstown.*

The general health very good. No contagious diseases of animals, except five or six cases of hydrophobia.

FRELINGHUYSEN, - *Report from* JOHN H. WARD, *Johnsonsburgh.*

Malarial fever has been steadily abating the last three or four years, and is full seventy-five per cent. less.

HACKETTSTOWN, *Report from* JOHN S. COOK, M. D., *Hackettstown.*

Public health not attended to until organization of Board of Health. Since that date nuisances have been abated, and successful efforts have been made to remove every cause of detriment to the health of the community. There is one source of malaria, and, as the Board believe, a prolific one, which they have not succeeded in removing, viz., a pond or slough, situated on the east side of the town, built for the furnishing of water power to a foundry, erected some forty years since. Upon investigation, it was found that the original pond was almost filled with mud and decaying vegetable matter, so as to render the amount of water contained in it totally inadequate to serve the purpose for which it was originally intended, and that it only required the running of the machinery for a few hours in the morning to ex-

haust the supply, and to leave a large surface exposed to the action of the sun during the remainder of the day. As the stream furnishing the supply is a small one, the filling-up process is a very slow one. And then, in addition to all this, two slaughter-houses were in operation at the head of the pond, with their offal and waste material running into the stream. These were soon removed, and efforts were made to secure the co-operation of the town council to remove the pond and drain the land, in order to save delay and the expense incident to its removal through the provision made by statute. In this the Board have so far failed, and, instead, have been compelled to combat an opposition. We have to wait, that public opinion may be influenced and brought to bear more favorably upon the project of removing so prolific a source of malaria, and which must be a great detriment to the well-being and good name of our town.

The statement thus made should certainly attract the attention of all interested in the town. While owners should not be expected to make too great sacrifices, no town can afford to sustain disease factories.

HARMONY, - - *Report from* JOHN K. VANNATTA, *Harmony.*

In some cases where wells have been driven we have found the water, when very low, to emit a bad smell, but can give no cause for it as it is fed from a spring at a depth of say twenty-five or thirty feet. We have traced no bad effects therefrom as yet.

With regard to the disposal of excreta, it is the same primitive way. A privy is constructed some distance from the dwelling, and we have heard no complaint since we last wrote your honorable Board. There were two or three instances where we had to visit and enforce the regulations, as laid down with regard to its disposal, and it has been modified as far as practicable.

The diseases which have been prevalent may be summarized from the returns which we have sent in, as there is no physician connected with this Board. From July 1st to this date we have to note, very recently, that diphtheria has visited us very severely. There are six or seven families now suffering from it within the radius of a mile. The place is 1,200 feet high from the sea level, and was always considered the most healthy portion of the mountain. The houses are all clean, healthy and well built, and the inhabitants are well-to-do farmers.

A subject worthy of note is that near to some of their houses is bog or marsh land, which in rainy seasons is very wet and not drained, and this season being dry, the exhalations arising therefrom might, no no doubt, contain the germs of disease. In one family, father, mother and five children have been attacked, and one child has died from its effects.

LOPATCONG, - - - *Report from* J. YIESLEY, *Phillipsburg.*

Decrease of malarial fevers.

MANSFIELD, - - *Report from* WM. H. MOWDER, *Anderson.*

OXFORD, - - - - *Report from* HENRY MYERS, *Oxford.*

WASHINGTON, - - *Report from* JOHN SHERRER, *New Hampton.*

These abstracts, necessarily brief, show how much can be done by efficient Boards, and how little can be done by such as are inefficient. There are assessors who have so acquainted themselves with the pressing health needs of their townships, and who have come to be such good advisers as to the avoidance of nuisances, as to be of much service in the suggestions they make and the defects they point out. Law is not simply mandatory, and often does much good because it gives force to advice which might otherwise be overlooked.

The reports show that malarial diseases still prevail too extensively, and that they are associated with the conditions of undrained land and vegetable decay. Smallpox has occurred at many points in the State. The records, as made in Egg Harbor City, New Brunswick, Rahway, Stockton township, Camden county, and other places, deserve attention. We urge upon Local Boards close examination of this condensed summary, and efforts at local health improvements.

ANIMALS AS RELATED TO HUMAN DISEASE, AND TO THE CARE OF PUBLIC HEALTH.

E. M. HUNT, M.D.

It is the glory of sanitary science and art that it attempts to define what are the conditions under which mankind can be best sustained in health. This merely means that it is an attempt to find out what there is abnormal or unnatural in the individual, or what there is abnormal or unnatural in his surroundings, so that the two can be put in the intended relations favorable to health. It assumes that originally the author of both made no mistake in the adaptation of the one to the other. So soon as physics, as a practical study, came to have a fund of knowledge which told what are the requirements of the natural man, and what are the natural relations of air, earth, food and water and all his surroundings to him, so soon it was practicable to study and designate the deviations, with a view to their rectification. It was soon apparent that these deviations are interferences which result in imperfect health, except so far as they are remedied, or as there is compensation therefor or adjustment thereto. Thus the prevention of disease soon certified itself as more fundamental than its cure. As disease so much saps the life of society and disturbs the welfare of the State, and as many of the evils are the direct result of the infringement of one upon another, government came to recognize that it belonged to its concern in all those particulars in which the individual must look for his protection to the effectiveness of sanitary police—to the law which regulates the duties of men to each other as adjoining citizens.

But it was not long before it found itself compelled to go a step further. Man is but one among the many species of animals that inhabit the earth. These are a part of life. Life in its high human form is very dependent upon life in its lower forms. The latter may imperil the former by appropriating too much of the common aliment

of air or food or water, or by the befoulment arising from secretions, and by the transfer of its diseases to mankind; or, since it has food relations, by the character of the food which it furnishes for our consumption.

Therefore, the study of animals, as related to the public health, cannot be left out of the question. "It is," says Dr. Greenfield, "by the study of comparative pathology that we have come to learn how intimately the processes of disease in the lower animals may resemble those in man, and it is by experiments upon the diseases which they have in common with man, that we have come to appreciate those differences in constitution and in reaction to disease, which enable us in a great measure to control the results of experiments.

"Comparative pathology, that is, the study of the diseases of the several classes of animals, and the study of the same disease in its reactions upon different classes of animals, is to a very large extent a growth of late years.

"It is true that a study of diseases of animals has been to some extent conjoined with the study of comparative anatomy and physiology, and that Harvey, Hunter and Jenner were well aware of the valuable information to be derived from a comparison of human with animal pathology. It was well known that some of the lower animals were subject to certain morbid growths and parasites analogous to those which afflict man, such as warts, cancers and hydatids, and that some animal diseases, such as hydrophobia, could be communicated by inoculation to man; and long before Edward Jenner discovered that cowpox could be transferred to man, it was suspected that smallpox was primarily an animal disease.

"But we have only recently come to understand the full bearing of those endemics and pestilences which have in all ages desolated the animal world, and to see that we stand on common ground with the brute creation in being subject to the same or to analogous plagues, and that by the study of these, under their simpler conditions, we may hope to throw light upon the forms affecting man. It is in this branch of comparative pathology—that relating to infectious and contagious diseases—that we see best the value and importance of experimental pathology, in the direct benefits which it confers on the whole brute creation, as well as upon man, and it is in this field that have been gained some of the most remarkable triumphs of modern pathology, which bid fair to revolutionize the science and treatment of infectious diseases."

Even before this point was reached, the welfare of animals had come to be considered, because disease among them so largely affected commercial interests and financial prosperity. Both of these points render the subject worthy of State and national attention. We seek only brief notice of some of these particulars in which the condition of animals affects public health.

I. As animals, like ourselves, consume air, the crowding of them together deteriorates air. For this reason, not only because of the evil effect on the animals, but because of the additional demands made upon the common stock of the atmosphere, and its contamination, we should estimate this closeness and avoid it.

II. The secretions of animals are, many of them, injurious to the public health, and, as such, they largely and rapidly add to the accumulation of offensive organic matter.

For both these reasons the close keeping of animals, and the disposition made of the refuse, must in all cities be closely under the inspection of the sanitary police. Animals are also too often kept so near to isolated country houses as to befoul the atmosphere, to taint the water or to add too largely to heaps of decaying matter.

III. Many diseases of animals are directly communicable to man. Not less than ten diseases are thus recognized.

While the inoculability and fatal communication of hydrophobia and glanders are well known, it is not so generally known that anthrax or malignant pustule, smallpox, Asiatic cholera and diphtheria, are thus communicable.

As a specimen of some of the facts in evidence, we refer to the article on the "Transmissibility of Diphtheria from Animals to Mankind," in the *Veterinary Journal* of September, 1881, by Fleming, of the British army veterinary service. There is much reason to believe that thus domestic animals, such as the cat or dog, not only convey a disease as would a garment, but that they transmit it as does one person to another.

According to Gamgee, "foot and mouth disease is a contagious eruptive fever, affecting all warm-blooded animals, and attacking man under certain circumstances as readily as any of our domestic quadrupeds." Vacher says the strong presumption is that it can be caused by the ingestion of the meat of the affected animals.

There is too much reason to suppose that erysipelas and carbuncles or boils often occur from infected meat or milk. That anthrax, both in

the form of splenic fever and malignant pustule, is communicable from animals to man, does not admit of doubt.

The communication of tuberculosis or consumption, both by the milk and flesh of cattle, is now attracting much attention. In 1865 M. Villemin, and after him Dr. Tappeiner, showed the inoculability of tubercle. So high an authority as Klebs asserts, "that by inoculating calves with human tubercle, he has produced the characteristic pearly eruptions of the bovine disease," thus showing its identity with what is known as the pearl disease of cows. In 1869, Gerlach, of Hanover, had showed how the flesh, as food, would convey this form of it from animal to animal. Chaveau, Klebs and Gerlach are of those who claim the identity of the human and bovine tuberculosis. It is found that about five per cent. of the cattle are affected with tuberculosis, and that a genuine consumption can be produced in sheep, swine, rabbits and dogs by inoculation. Still more directly, Dr. Creighton, of Cambridge, in his book on "Bovine Tuberculosis in Man," and in his paper before the International Medical Congress in London (1881), seems to show that the bovine disease is conveyed to man by the flesh and milk of animals. It is claimed that the high mortality among infants fed on cows' milk is to some degree owing to its specific effect in producing tuberculosis in the lungs, or the same disease, in the form of a marasmus, in the mesenteric glands. Prof. Law, of Cornell University, has given some cases of consumption which seem traceable to tuberculous cows. Tubercle is frequently found in the lungs of cattle, especially those that have been kept in close sheds, and are not allowed sufficient air space.

Even where no disease is induced which is directly transmissible to man, the deterioration in the quality of the flesh cannot but deprive it of its highest value as a food, and thus make its nutrition less.

Still more serious is the result when it is remembered that milk enters so largely into consideration as a food. In experiments made upon milk it is not difficult to discover that there is very much milk of inferior quality, not because of admixture after procurement, but because it is a secretion from animals so unnaturally kept as to cause a sad substitute for that fluid, which, in its best state, furnishes, in right proportion, all the ingredients which are to be found in a perfect aliment.

The paper of Ernest Hart, before the International Medical Congress (1880), says: "The three diseases which have as yet been recognized as capable of being spread by milk, are typhoid fever,

scarlatina and diphtheria. There is nothing in the analogy of epidemics to limit the list permanently to these; and already there are indications of other cognate diseases being spread by the same agency. The number of epidemics of typhoid fever, recorded in the abstract as due to milk, is fifty; of scarlatina, fourteen, and of diphtheria, seven. The total number of cases traced to the drinking of infected milk, occurring during the epidemics, may be reckoned in round numbers as 3,500 of typhoid fever, 800 of scarlatina, and 500 of diphtheria."

Mr. Francis Vacher, medical officer of health, Birkenhead, says: "There is abundant evidence in support of the view that foot and mouth disease might be spread to the human subject by means of milk."

Prof. Fleming also said to us that he was suspicious as to the flesh having caused the disease in some cases. This apthous disorder is among the most serious of cattle pests, and, as it does not dry up the milk, is fraught with great risks to human kind.

Recently some new facts have been stated by Dr. Brush, in respect of the evils resulting from milk of cows freshly calved, when used for infants.

A proper meat and milk supply is so essential to the health of the people that inspection should be considered essential. The milk and meat of swill-fed and stabled cows needs constant watching in order to guard us from imperfect food. No one can see the way in which the milk business is conducted, or examine some of the foul pens of our cities, without realizing that, in the interests of health, all such places should be subject to inspection by the sanitary authorities. One of the advantages of public abattoirs is that a meat inspector can be at hand to reject meats plainly unfit for food. Such tests as are known and available help much in protecting the public from those impositions which are as prejudicial to the health as they are to the pockets of purchasers.

IV. Parasitic diseases are often originated in or conveyed by animals. There are twenty-two parasites common to men and to animals, some of which are known to originate only in animals.

Several of the skin diseases thus have their origin.

What we know of the trichina spiralis is enough to illustrate those parasites which invade tissues or organs beneath the skin. This parasite is harbored in swine and in its "asexual" form encysts itself in the muscles of the pig. When the raw or half-cooked meat is eaten, digestion disposes of the cysts and liberates their contents. Thus

liberated from the cyst, the trichina come to their mature sexual period and are capable of procreation toward the third day. Besides the irritation by liberation from the cyst, and also of its juices, "in less than five days some of the embryos are born." "One trichina may give birth to a couple of thousand of embryos." Over 85,000 have been found in a cubic inch of human muscle. See Glazier's Report.

The dread of the disease and its fatality is such that, although not very many cases can be traced to an American source, it has greatly effected the demand for American pork in British and European markets. There are other injurious parasites, the history and the mode of conveyance of which from animals to men needs to be well understood and guarded against. As in many other instances, prevention is not difficult, but after the invasion has occurred, the swarming progeny cannot be removed. Often lingering sickness follows, until the higher and stronger life, outdone by the millions of the lesser life, succumbs to the force of numbers.

The feeding, too, of uncooked meats to animals is believed to give rise to many parasitic and other diseases. Dr. Baker, of Michigan, in a recent report as to hog cholera, says that "the disease is probably spread very largely by mice, rats and cats which die and lie around unobserved, and to which chickens and hogs have access."

The prevalence of diseases among animals is sure to place on the market much inferior, if not diseased food, and the great losses from destruction and burial increase the price of good meats, and so cause a poorer and dearer supply for the working classes.

Statistics carefully secured show that the United States, in one year, lost from pneumo-enteritis, or hog cholera, $20,000,000. The losses from rinderpest and contagious pleuro-pneumonia in some foreign countries have been far beyond this. Diseases such as these, to which are to be added Texas fever, usually regarded as splenic fever, foot and mouth disease, and sheep rot, and so-called chicken cholera, have made much havoc with our meat supply. The interests of public health require exact attention to these weighty concerns, in order that diseases may not be propagated, and that bad meat may not come into our markets, and that the price of good meat may not, by scarcity, be so increased as to cause a more restricted diet.

VI. A study of the diseases of animals has thrown, and is throwing, much light upon the contagions which are destructive to them. The following language of an editorial, in a recent number of the

Veterinary Journal, London, only says what is fully felt by medical men whose studies have been in this direction:

"The recent advance made in the study of the pathology of certain transmissible and very fatal diseases of animals, opens up a new line of research and experimentation, and revolutionizes to a startling degree our notions as to the nature and etiology of these maladies, but still more so, perhaps, our views with regard to their prevention—at least in their most deadly form. It is true that protective inoculation has been, during many years, more or less successfully practiced for the contagious pleuro-pneumonia of cattle, and under conditions which, while it prevented animals being attacked with the disorder, rendered it comparatively innocuous, so far as injury to health was concerned. The discovery of microscopical organisms in anthrax, and the experiments which clearly demonstrated that they were the active agents in producing the disease, had, however, a wonderful result for pathology and preventive medicine. Pasteur, whose previous researches on the silk worm disease and fermentation had done so much in this direction, has led the van, in conjunction with our professional colleagues, Professors Chauveau and Toussaint, in defining the conditions upon which protective inoculation may be most effectively and safely resorted to, in several of the scourges of animals, and particularly so in the so-called fowl cholera and anthrax. From the results already acquired, there can scarcely remain any doubt that in the laboratory the germs of these diseases can be so cultivated that their virulency is all but destroyed; so that when inoculated in healthy creatures they scarcely produce any perceptible disturbance, though they insure immunity from a future attack of the deadly germs. This artificial cultivation or attenuation of the virus of destructive disorders, so that by inoculation with it these no longer need be feared, is a subject fraught with the deepest importance, not only to animal but to human medicine, and is only second in point of value to the discovery of means by which the germs of disease can be completely and totally annihilated.

"In veterinary science especially must it command earnest attention. Already this kind of inoculation is being largely practiced for mitigating the ravages occasioned by anthrax or splenic fever among the flocks in France, and in Belgium it appears to be successfully employed in contagious pleuro-pneumonia. In our own empire we have terrible diseases which should be easily brought under control in the same manner. In India we have the cattle plague, (indeed, it constantly

prevails throughout Asia,) sheep-pox, Loodianah disease or anthrax, and other similar disorders, and in South Africa we have that most destructive of equine plagues, the horse sickness—inoculable and anthracoid in its nature—which sweeps off all the horses from entire districts in a single season, and contagious pleuro-pneumonia, destroying the cattle without let or hindrance, from the seaboard to Central Africa, while the same malady prevails almost unchecked in Australia. Then there is swine plague, a disease inoculable, and due to a particular germ, which in Europe and America threatens to ultimately exterminate the porcine species. Surely the startling laboratory discoveries of the last few years can be applied on a grand scale, in general practice, in order to bring the long list of animal plagues completely within the power of man, and so get rid of all the anxiety, loss, danger and embarrassment to nations which their presence ever occasions! Not many years ago the microscope in veterinary medicine was sneered at as a silly toy. Without this wonderful instrument pathology, and even surgery, would have made but little progress, while the science of preventive medicine would scarcely have existed; every day it is throwing light on hitherto obscure subjects. We hope and trust that the great expectations raised as to the further application of the germ theory to the transmissible diseases of animals may be fully realized. It is a grand conception, and the result is already a great victory for the scientists, who are sometimes stigmatized by the so-called practical men as 'theorists.'

"Whether by the direct introduction into the blood of very small quantities of virus, as practiced by Chauveau, or by inoculation with cultivated or specially modified virus, as carried out by Pasteur and Toussaint, a brilliant prospect is opened out for our future dealings with veritable scourges, and for this we are indebted to the microscope, no less than to experimental pathology."

To see how rapidly practical results follow, in reference to anthrax or splenic fever, so dreaded here, we have only to refer to some of the words of M. Pasteur, in his recent address in London:

"In France we lose every year by splenic fever animals of the value of 20,000,000f. I was asked to give a public demonstration of the results already mentioned. This experiment I may relate in a few words. Fifty sheep were placed at my disposition, of which twenty-five were vaccinated. A fortnight afterward the fifty sheep were inoculated with the most virulent anthrocoid microbe. The twenty-five vaccinated sheep resisted the infection; the twenty-five unvaccinated sheep died of splenic fever within fifty hours. Since that time my energies have been taxed to meet the demands of farmers for supplies of this vaccine. In the space of fifteen days we have vaccinated in the departments surrounding Paris more than 20,000 sheep, and a large number of cattle and horses. If I were not pressed for time I should bring to your notice two other kinds of virus attenuated by similar means. These experiments will be communicated by-and-by to the public."

Previous to this we had long regarded the facts as to inoculation for pleuro-pneumonia among the most interesting and suggestive in the range of preventive treatment. The fact that, by introducing juice from the diseased lung into the tail of the animal, a local and yet protective disease can be produced, and even limited in more general effects by the removal of the tail after swelling has occurred, indicated a control of disease which will yet have more extended application.

VII. It is easy to see how directly such experiments and such results bear upon the prevention of human diseases.

Dr. Samuel Wilkes, president of the section of pathology at the recent International Medical Congress, said, "a true human pathology should have its basis in comparative pathology." The resemblances in the effects of disease poisons, and in morbid changes, has been abundantly shown in experimentations upon animals, to which we have been indebted for most important knowledge in human treatment.

The eighteen years of study by Jenner of the phenomena of vaccina, or cowpox, and its successful application as a preventive of smallpox, is illustrated in another direction.

The twenty-five years of labor of Pasteur, aided by those of Burdon-Sanderson, Touissaint, Dr. Greenfield, Dr. Buchner, Koch, Chauveau, Grawitz and others, have opened up a field of inquiry as to many specific diseases in human kind, and led to the hope that we shall yet be able so to dilute and modify certain poisons, such as those of diphtheria, scarlet fever, &c., so as to render the system unsusceptible to serious attack. If we could transfer the face and manner of this eloquent and laborious scientist to paper, we could show how much he knew and how much he meant when he said, "the method is one the fruitfulness of which inspires me with boundless anticipations."

It is not the mere fact that preventive inoculation is already established as a means of limiting contagion among animals, or the question whether it shall not yet become applicable in many of the diseases

to which mankind is subject. Experimentation upon animals, and close watchfulness of symptoms and lesions, and of the causes and courses of disease, has already had such results as to justify the hope that we shall yet have more light break forth in the interests of humanity. Advances in comparative anatomy, comparative physiology and comparative pathology are now being followed by an advance in comparative therapeutics and treatment, especially in systems of prevention applicable in a degree to us as well as to other animals. These are but some of the many reasons that commend a study of the diseases of animals, not only to the attention of physicians, but also make attention to them obligatory upon the State, and upon all those who would aid in the limitation and prevention of disease, in the interest of the citizen, and for both the health, protection and pecuniary welfare of the masses.

CIRCULARS AND LAWS SINCE JANUARY 1, 1881.

CIRCULAR AS TO SMALLPOX.

TRENTON, February 21st, 1881.

The State Board of Health has evidence of the existence of smallpox in scattered localities in this State, as well as in the cities of New York and Philadelphia. The epidemic as existing in Camden long since, upon the invitation of the local authorities received our attention, and vigorous measures were instituted by them. But now, from other sources, scattered cases have occurred in other towns and in rural districts, until it may easily become a wide-spread epidemic. Four or five cases occurring in Trenton have already disbanded the Normal School. (1881.)

The right of school trustees to require vaccination in order to attendance at school in times of epidemic, or else to prohibit attendance, is not questioned. By the terms of the Health Laws of March 11th, 1880, all school boards are authorized to vaccinate at public expense, any pupils attending school who are unable to procure vaccination.

All Local Health Boards need to see to it that vaccination is recommended, as well as rapid isolation of cases secured, if any occur. The cost of local epidemics of smallpox is very great, besides the risks to life and public health. The prevention of the disease is within the range and duty of your control. All our Local Health Boards and school boards should co-operate in influence and provision for more general vaccination, and for revaccination of persons who have not been vaccinated since full growth. The heads of large manufacturing establishments need to attend to it, both in the interest of capital and labor. Trenton has set a good example in making the means therefor accessible.

Most of our physicians have full confidence in humanized vaccine virus, which is easily secured. *Vaccine virus directly from the animal*

is preferred by those who have any fear of communication of other diseases through humanized lymph—a fear that is greatly magnified in the popular mind. It is, nevertheless, due that all have their preference, and that where vaccination is insisted upon as a condition of school attendance, bovine virus be used if desired. Many physicians prefer to use this. The New York City Board of Health, 301 Mott street, New York, furnishes it daily by mail. H. A. Martin & Son send it direct from their herd, Roxbury Station, Boston, Mass. Dr. E. L. Griffin, Fond du Lac, Wis., is prompt in remittal from his vaccine farm. Ready supplies can also be had from Philadelphia and other cities. The price per point is about twenty cents, and less in larger quantities. It can often be had from local druggists. There is reason to believe that much is sold for bovine virus which is not such, and that there is a failure in effect because of age and imperfect keeping.

We urge upon all physicians great exactness in selecting virus, and upon the people protection from the disease. Its outbreak every few years is not a proof of epidemic tendency. The periodicity rather occurs because that after an epidemic, as soon as years enough have passed for a younger product of children to be out in public child-life, this susceptible material becomes so abundant as to insure extension if a single case is introduced from another section. Then there is an outbreak of smallpox and of vaccination. Would it not be better if, somehow, the young population could be systematically protected? Let our various communities and the Local Boards now secure this, not only under present threatenings, but also as a wise preventive measure.

Copies of this circular will be sent more fully on application by postal to State Board of Health, Trenton, and any inquiries be promptly answered.

SMALLPOX CIRCULAR, NO. 2.

January, 1882.

The smallpox epidemic existing in the United States has affected about twenty-five localities in this State. Camden and Jersey City have been the points from which it has chiefly been spread. With the present facilities for travel and the thoroughfare character of this State, there is no reasonable expectancy that any person will reach the age of twenty-one without an attack of smallpox, unless the disease is prevented by vaccination. The person who runs the risk, not only endangers his own life and comfort, but imperils others to a degree not justifiable.

I. Let every parent see to it that each child is vaccinated before one year of age, and sooner, if possible.

II. Let no teacher or child be admitted to a public school without vaccination.

III. Let provision be made by school trustees and Boards of Health for free vaccination to such as need this provision. (See *Chapter 153, Section 10, Laws of 1880.*)

IV. Would it not be well, just before each April vacation, to have schools close an hour earlier and thus have a *vaccination day*, on which all scholars were invited to be vaccinated by their physicians, at home or, by some public arrangement, at the school building?

V. Do not concern yourself about the kind of virus used any more than you would about the source of the medicine you take, but hold the physician responsible therefor. Have the sore examined and take a certificate from the vaccinator, that, in his judgment, you are successfully vaccinated.

VI. Have vaccination repeated or retried after the age of sixteen. Most persons, if fully vaccinated the first time, will have but little result from the repetition, but it is advisable to have this additional assurance of safety.

VII. If smallpox or varioloid occurs in your house, do not attempt concealment. At once send for your physician and do as he advises you, or notify the Board of Health. Have every member of the family vaccinated. A notice, "Smallpox," should be put up, unless by some other means the possibility of persons coming in unawares can be prevented.

MODES OF PROTECTION WHEN A CASE OCCURS.

Up to the time when pustules form, smallpox is no more contagious than measles, and needs the usual care of all infective diseases. There should be no unnecessary furniture, curtains, or loose articles in the room. The secretions from the nose, mouth and throat should go upon some ashes, chloride of lime, or into a disinfectant solution. (See in full, Circular as in report of 1879 and 1880.) Good ventilation must be secured. Arrange as to bed and under-clothing with the view of having it burned after the recovery of the patient.

For fear of carrying the disease to others, no person, save the two nurses, who alternate in service, should be admitted to the room, and these should not mingle with others during their attendance. It is generally possible to use an upper room, or to separate, so as not to require removal. But this will depend upon the extent of the epidemic, the locality and so many other points that it must be left to be decided by the physician or Local Board of Health. All discharges should be promptly disinfected and then not thrown into the common sink or water-closet. One-half pound of sulphate of iron (copperas or green vitrol), or one ounce of sulphate of zinc (white vitrol), or one ounce of sulphate of copper (blue vitrol), or one ounce of chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water will answer, if used so as to cover or mingle with the secretions to be disinfected.

Women, in nursing, should have the hair covered by a cap, and men should have the hair cut short and whiskers either trimmed or removed, if, during their attendance, they will have any occasion to mingle with others. If so, there should be an entire change of clothing in an adjacent room and thorough washing. As, if persons meet you and smell any disinfectant, it will be called a smallpox smell, it is best to get an ounce of thymol and dissolve it in four ounces of alcohol, and use a tablespoonful of this in a gill of water as a wash. Or half a drachm of nitrate of lead, dissolved in a pint of boiling water, to which, afterwards, a pailful of water and a tablespoonful of common salt are added, is a good wash, and, also, of value for washing clothing and vessels. Two drachms of chloride of zinc to a half gallon of water, is of similar service. The patient, after recovery, needs all this care, as to washing, to cleansing the hair, ears, mouth, etc. It is generally best to fumigate the rooms after they are vacated. (See Circular already referred to.)

All beds used by the patient had better be destroyed, unless they can be submitted to baking and fumigation under skilled direction. During the sickness, a tub, with a disinfecting solution in it, should be in the room, into which handkerchiefs, changed garments, etc., should be dropped immediately after use, and boiled soon after. Two ounces of chloride of lime, or one ounce of sulphate of zinc, may be added to each gallon of the water into which the garments are boiled.

In case of death, the body should be wrapped in a sheet saturated with a disinfecting fluid. The coffin should remain in the sick room until the time of burial. If only all precautions are used, while

there should be no unnecessary delay of burial, there is no need of hot haste. With what we know of vaccination and of means of caring for smallpox patients, and of modes of disinfection, a smallpox scare is a very indefensible thing.

In many cases a *hospital* is needed. Let this be well prepared, even if hastily, with a rear wing for kitchen, with a separate laundry room and with an extension in one or both sides for water closet. Patients must not be hurried there at risk of life, and when they get there should find the best provision for their recovery. Cases of varioloid must not be too quickly dismissed, as they often convey the disease. When smallpox occurs in your district, do the right thing promptly and do not waste the first week in consultations. Every Local Board should have its executive officer, who should know how to stop the spread of the fire before it has attained headway. We urge upon all Local Boards the prevention of smallpox, scarlet fever, diphtheria and other preventible diseases.

To pursue a disease, in order to stop it, is often a duty; to get ahead of it, both a privilege and a duty, and very often possible. To prevent is to anticipate, to go before; and Health Boards, as well as individuals, may thus be of great service. Afterthought is sometimes good—forethought is better.

CIRCULAR TO LOCAL BOARDS OF HEALTH.

TRENTON, April 1st, 1881.

It is spring time, and all Local Health Boards should make a careful enquiry as to the duties that devolve upon them, and how they may be best performed. These are clearly defined in an act entitled "An act concerning the protection of the public health and the record of vital facts and statistics relating thereto," approved March 11th, 1880. (See *Laws of 1880, and Fourth Annual Report of the State Board of Health*). Another act is just now passed, which is as follows:

AN ACT relating to local Boards of Health.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, that all township or local Boards of Health in this State, organized under the provisions of an act passed March eleventh, one thousand eight hundred and eighty, entitled "An act concerning the protection of the public health, and the record of vital facts and statistics relating thereto," may expend for the purposes for which said Boards are authorized, to the amount of fifty dollars as actual expenditure, not includ-

ing any payment to members for attendance at the meetings of said Boards, and the same shall be payable in the same manner as other bills presented to the collector, treasurer or other disbursing officer of the township, town or precinct; and in case any additional sum is, in the judgment of such Board, needed to be expended in any township, town or precinct, the need thereof shall be presented to the township committee, common council or other governing board, and they shall have authority to appropriate such an amount, or pay such bills, as they may deem necessary for tho purposes indicated in the act aforesaid.

2. *And be it enacted*, That any Boards of Health now organized in any of the cities of this State, under the provisions of their respective charters, as well as those which are only health committees, may, by the order and direction of the mayor and common council of said cities, organize their Boards in accord with the provisions of the act aforesaid, and shall, in common with the Boards of Health of the several townships, towns or boroughs of this State, have power to make and enforce such ordinances as the care of the public health demands.

Approved March 22d, 1881.

Under these two laws, every city and every township of the State must have its Board of Health. Two or three of our largest cities have Boards formed under "the provisions of their respective charters," but, in most of our cities, so-called Health Boards are only Health Committees, or formed by ordinance instead of according to chartered directions. All such should now organize under these two laws, as some have already done under the law of 1880.

The few townships that failed to organize Boards must now do it promptly, as the law is compulsory.

In our recent experience with smallpox, 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.

All township Boards should hold a meeting at the spring meeting of the township committee, so as to consider any nuisances or evils detrimental to the general health.

While the law only allows $50, as payable by the township, it also provides that the township committee or council may authorize further expenditures, and in case of special meetings, or service on the part of the Board, may compensate therefor, if township committees so direct.

Most Boards need to empower an executive officer to act for them in case of any sudden emergency. There must be an accurate report each year to the State Board, as required under the law. Where

there is no medical member of the Board, or no township physician, the Board may invite some physician to meet and advise with it.

Health Boards have an important duty in co-operating with the city clerks or assessors in securing complete returns of marriages, births and deaths.

With these properly returned, we are able to make out from year to year, or through longer periods, the health and growth condition 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 thus 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 studied systematically; thus, we ward off and modify disease and secure increase of growth. 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 that carelessness or postponement as to birth returns annoys town clerks and assessors and delays tabulation.

It is important that records of meeting and a copy of reports be kept in the township health book. It is also advised that the names and dates of each birth and marriage be kept, and of each death, with the name of the disease. This aids in future study. The State index and transcription, which is kept in full, furnishes data for comparison, and will help localities to know their conditions and what evils they need to guard.

The four reports of the 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.*

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 the owners. We are now specially anxious to rid the State of pleuro-pneumonia, which prevailed in some localities last summer.

The titles of several bills just passed, and applicable to special cases,

will be found in the fourth report. The one as to drainage is very important. 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 prudeuce, 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.

E. M. HUNT,
Secretary and Medical Sup't of State Vital Statistics.

CIRCULAR OF SUGGESTIONS TO BOARDS OF HEALTH AND REFERENCES TO SANITARY LAWS.

TRENTON, N. J., May 10th, 1881.

The State Board of Health has been requested to outline the plan of organization of Local Health Boards, to indicate their general method of work, and the most feasible plan of dealing with nuisances prejudicial to the public health. In any advice that can be given, it must be remembered that very much depends upon circumstances of locality, of density of population, and upon special exposures or threatening of disease. Yet some general indications may be noticed.

I. A Board should have accurate organization, so as meet at a stated time, having its chairman and secretary, and keep 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 enforcement of the law, when necessary.

IV. In cities under sanitary police, it is not best to adopt many ordinances, but rather to indicate what should be, and then to deal with any case in which a nuisance is certified. It is not necessary, under the general laws of the State, to prove disobedience of an ordinance, but only that the thing complained of is contrary to the law. Ordinances are valuable only 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. Nor, is it necessary that all reliefs in the interest of health and life should come through the legal action of Local Health Boards.

It is important that their legal powers should be exercised in all that class of cases in which the usual process of courts would be too tardy, and that, by their inquiries and investigations and recommendations, they 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. A suit, when a necessity, like the amputation of a limb, is not the greatest evidence of skill or usefulness. 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.

The president of a Local Board in a village government, recently told us that in his city the tendency to attack and remove nuisances was such that the Board had come to be regarded as a regulator and mediator, rather than a Board of compulsion, and had done great good by information and judicious advice, although not hesitating to act both in preventing and abating nuisances where law was needed.

V. Any Boards wishing to study the scope of local ordinances, may find these in the Sanitary Code of the Board of Health of New York City, or of Hudson county, or of the Jersey City or Newark Health Department. A copy of some one of these will be sent on application to us.

The attention of all Boards of Health is directed to the following laws:

Chapter 155, Laws of 1880. "An Act concerning the protection of the public health, and the record of vital facts and statistics relating thereto."

Chapter 135, Laws of 1881. "An Act relating to Local Boards of Health."

"An Act to prevent the introduction of malignant and other infectious diseases in the State." (*Revised Statutes of 1877, p. 300.*)

Chapter 239, Laws of 1878. "An Act concerning the registry and returns of Marriages, Births and Deaths."

Chapter 81, Laws of 1879. Supplement to the above.

See, also, *Third Annual Report of State Board of Health, for these Acts united.*

Chapter 158, Laws of 1881. "An Act to provide for drainage where the same is necessary to public health."

Chapter 159, Laws of 1881. "An Act to authorize the abatement of nuisances in cities, and to make the cost and expense of such abatement a lien upon lands whereon such nuisances existed."

Chapter 210, Laws of 1881. "An Act for the improvement of the sanitary condition of counties in this State."

Chapter 220, Laws of 1881. "An Act authorizing the construction of sewers and drains, when necessary to preserve the public health."

Chapter 217. "An Act concerning the adulteration of foods and drugs." Approved March 25, 1881.

Chapter 192. "An Act to prevent the manufacture and sale of adulterated lard." Approved March —, 1881.

Chapter 141. "An Act to prevent the adulteration of milk, and to regulate the sale of milk." Approved March 22, 1881.

Chapter 154. "A Supplement to an act entitled 'An Act to establish a State Board of Health.' Approved March 9, 1877." This is an act relating to the contagious diseases of animals, and was approved March 23, 1881.

Vaccination. (See *Laws of 1880, Chapter 155, Section 10.*)

Various other acts of less importance, or local acts for cities, may be found by reference to the Revised Statutes and laws since passed. (See, also, list of *Health Acts, First Report, p. 143;* and *Laws and Circulars in Third and Fourth Reports,* which can be sent on application).

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 are worthy of thought according to the needs of each locality.

What is the area of the city or township?

What the density of population?

What 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 small-pox, typhus fever, etc.

Is there any sanitary inspection of 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 foods, 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 walls as to dryness or 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?

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 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 houses or outdoor water-closets? If so, how are they cared for or emptied?

For other questions and suggestions, see *Fourth Report of the State Board of Health.*

E. M. HUNT, M. D.,
Secretary and Medical Superintendent of Vital Statistics.

CIRCULAR OF THE NEW JERSEY STATE BOARD OF HEALTH AS TO SANITARY, HOUSEHOLD AND ORNAMENTAL ARTICLES AND APPLIANCES.

TRENTON, N. J., July 1st, 1881.

In the practical applications of sanitary science, it has become necessary to use very many appliances, both for convenience and to guard against evils incident to household and city life. These inventions have become far more numerous and useful than

is generally known. To afford the people a better opportunity to become acquainted with their merits, both by personal examination and by the opinion of experts, the State Fair of New Jersey and the State Board of Health, in 1879, united in an exhibition of sanitary appliances. Although it was the first of the kind attempted in this country, it was so highly successful as to lead us to make it a permanent and prominent feature at this great annual gathering of our citizens. This fair is held for a week each year, only a few miles from New York City, near Newark, and on the direct route to Philadelphia and to the South and West. The attendance from this and other States is very large, and it affords the best opportunity for familiarizing the people with valuable improvements. It opens this year September 19th.

A special building, supplied with water, is provided, and the actual working of house-systems, ventilators, and various other appliances can be shown.

It is intended to make this exhibit an attraction at our Annual Fairs, so that all may become acquainted with the best sanitary arrangements, and inventors and dealers have a good opportunity for comparing and testing apparatus. When necessary, the judges will order trial, and postpone award until satisfied.

Specimens, models or drawings may be sent either as competing for premiums or for exhibit. Every article should bear a descriptive label, containing detailed information respecting its construction, use, retail price, and the place at which it can be obtained. There is no charge for space. Facilities will be afforded for those who desire to show any apparatus in actual working. Articles must bear the name of the owner or agency exhibiting. The small cost of conveying goods to and from the fair must be borne by the exhibitors. Letters of inquiry may be addressed to E. A. Osborn, C. E., Middletown, N. J., or to State Board of Health, Trenton, N. J. Articles sent for exhibit in our care should be directed "New Jersey State Fair, Waverly. Care of New Jersey State Board of Health."

MUSEUM.

The State Board of Health has commenced at Trenton, the capital of the State, a museum of sanitary appliances, to which any owner or manufacturer may present the articles exhibited as the property of the State, for permanent examination and exhibit. Or they will, by us, be directed to the persons or agents with whom they are to be left. Specimens of all new sanitary inventions are solicited.

The following is an abbreviated summary of leading articles, but various other articles will properly come in this department, and be subject to award.

DEPARTMENT K.

SANITARY, HOUSEHOLD AND ORNAMENTAL.

CLASS 71.—CONSTRUCTION, MATERIALS, ETC.

	PRIZE.
Samples of Building Stone, Concrete or other Building Material	Diploma.
School-room Furniture and appliances	Diploma.
Pipes, Tile, etc	Medal.
Wall Paper and House Decorative Materials	Diploma.
Sanitary Pottery, etc	Diploma.
Sanitary Models for care of animals	Diploma.

CLASS 72.—HEATING AND VENTILATING APPARATUS.

	PRIZE.
For Warming Houses by Flues, Steam or Hot Water. Best system of each	Silver Medal.
Steam or Gas Cooking Apparatus	Medal.
Stoves for Heating or Cooking so as to avoid gas and dust	Diploma.
Chimney Cowls and Caps	Diploma.
Specimen Ventilators of all kinds	Medal.

CLASS 73.—DRAINAGE AND WATER SUPPLY.

Drainage Plans or Sanitary Maps	Grand Medal.
Specimens of Soil and Organic Matter from "The New Jersey Experimental Station,"	Medal.
Water Supply Apparatus, as Cisterns, Flush Tanks, Filters, Coolers, Sinks, etc., best form of each	Diploma.

CLASS 74.—BATHING APPARATUS AND BATH ROOM FIXTURES.

Bath Tubs and Connections	Diploma.
Best Water Traps and Grease Traps	Each a Medal.
Dry Earth Closets	Medal.
Best Pan, Hopper and Plunger Water Closet	Each a Medal.
General assortment of Plumbers' Work and Material	Medal.
Gas and other Lighting Material and Fixtures	Diploma.
Electric Light Fixtures	Medal.

CLASS 75.

Druggists' Samples, Disinfectants	
Preserved Foods, Health and Condensed Foods, Invalid Preparations.	
Refrigerators, Food Preservers	
Yeast Powders	
For selection of each class	Silver Medal, Medal or Diploma.

CLASS 76.

Excavating and Odorless Apparatus, Outbuilding Models and Miscellaneous Sanitary Goods	Medal or Diploma.
Other Exhibits of Sanitary Appliances may have Medal or Diploma as award.	

CLASS 77.

Life and Labor Saving Apparatus	
Life Boats and Preservers or Life Rescue Apparatus	Medal.
Health Lifts—Gymnasium Apparatus	Diploma.
Sick-Chairs, Beds, and other Sick-room Conveniences	Diploma.
Invention and Appliances for Relieving Constrained Positions or for Diminishing Health-risk in Various Industries	Medal.

CLASS 78.

Food Adulteration and Testing Apparatus	

Exhibitors are entitled to admission tickets.

The general direction of the Department is assigned to E. A. Osborn, C. E., Middletown, N. J., and E. Dunn, 104 Market street, Newark, N. J.

The following persons are in charge of classes and assisted by others in sub-classes:

Class 71. Samuel C. Brown, Trenton, N. J.
Class 72.
Class 73. Prof. George H. Cook, New Brunswick, N. J.
Class 74. Mr. Taylor, Newark, N. J.
Class 75. Charles A. Amende, Hoboken, N. J.
Class 76. William K. Newton, M. D., Paterson, N. J.
Class 77. H. A. Hopper, M. D., Hackensack, N. J.
Class 78. William H. Newell, M. D., Jersey City, N. J.

These gentlemen will be aided by a committee of direction, consisting of Amos Clark, Jr., President, and William M. Force, Recording Secretary of New Jersey Agricultural Society, No. 764 Broad street, Newark, N. J.; Hon. Phineas Jones, Newark, N. J.; A. D. Newell, M. D., New Brunswick, N. J.; R. Wescott, M. D., Elizabeth, N. J.

CIRCULAR TO LOCAL BOARDS OF HEALTH.

TRENTON, October 1, 1881.

All Local Boards of Health need to make their annual return to the State Board of Health during the month of October.

All Boards which were constituted under the law of last year are permanently in existence. The law of itself constitutes the township committee, the assessor and the township physician, if there be such an officer, as the Board of Health for each township; and also provides as to Boards of Health in cities.

In some cases complaint is made that Local Boards do not seem to know their precise duties under the law. The general law is to be found: chapter 155 of the laws of 1880.

On pages 272–282 of the fourth report of the Board (1880) is an explanatory circular as to the law and the duties of Health Boards. That report was sent to each assessor, as a member of the Board of Health, and for its reference and use. If in any instance any Board has failed this year to consider the health matters of its town or township, it should at once be called together. It is satisfactory to know that most of the Boards realize the importance of this oversight of the public health. Some, however, take it for granted that no avoidable causes of disease exist, and by their unintentional negligence add to the sickness and to the deaths of their locality.

We ask each assessor or town clerk to state to us any failure on the part of the Local Boards.

The same blanks are furnished as those of last year.

A list of the Boards which reported last year (187 in all) is to be found on pages 119–179 of the Fourth Report (1880).

Boards which reported last year will not need to report the items in the schedule under A, B, E, F, G, I, L, M, N, O, P, Q this year, unless some special new fact exists.

Under C, we ask full statements as to the sources and conditions of water supply; as to objections made to it; as to any assured or proven sickness or deterioration of the general health resulting therefrom; also, what plans of remedy are used? also, if cisterns or driven wells are used and found satisfactory? also, if filters, and if so, what kind are relied upon? Has the lowness of the streams and wells the last three months seemed to affect the quality of the water supply?

Under D, we inquire as to any natural or artificial defects in drainage, and as to any sickness attributed thereto by physicians. How has the amount of malarial fever, so called, compared with that of last year? Are there any serious interferences with natural water-courses? Has the State law as to drainage, or the special one in addition as to drainage of cities, been applied to any case in your section?

Under D, as to sewerage, specify what town or parts of towns have sewers, with their size, construction, material, etc. Has the town a sanitary map, showing its underground structures, its contour, etc.? To what extent are brooks or streams made to carry sewage matter, and have any evil results been felt?

Under H, report the situation of water-closets in relation to water supply and the modes of disposal of excreta, of refuse and of slop-water. Also, cases in which inside water-closets, or slop, or kitchen sinks are connected with the outside privy vault or with cesspools. Also, as to the common mode of emptying privy vaults and cesspools.

Under J, give particulars as to diseases of animals; especially those regarded as contagious.

Under K, state whether slaughter-houses and abattoirs are situated near to private houses.

Under R, report any sanitary improvements of the past year, and any in contemplation.

Under W, add a general report as to prevalent diseases from July 1, 1880, to July 1, 1881, and make a separate noting as to any especial sickness from July 1, 1881, to this date.

Assessors and town clerks in addition should personally report, as is their duty, any neglect in returns of vital statistics, and by whom; since the records of the last three years already show how important exact knowledge as to the marriages, births, deaths and causes of death in each division of the State. Many other matters of importance will no doubt occur to Local Boards, on which report should be made.

We should be glad to have brought to our notice any alleged defects in existing laws. Except that defects of close study of the laws and of judicious enforcement or administration of law are not to be attributed to the laws themselves.

Indifferent attention to duty, dilatory dealing with undoubted nuisances or promiscuous doubts where legal advice would clearly point out the methods, are not to be taken as defects of law. It is found that the calm judgment of courts and juries is against nuisances prejudicial to the public health; that present laws are applicable to such nuisances, and that where reason and persuasion will not avail, the execution of sanitary law has as good chance of being sustained as has any other form of necessary litigation.

Let town clerks and assessors see to it that all circulars sent them are read before the Board of Health or township committee, and copies fastened in the Health Book.

By order of the Board.

E. M. HUNT, *Sec'y.*

(CIRCULAR D.)

TO FARMERS AND DEALERS IN STOCK.

APRIL 1st, 1881.

The experience of the State Board of Health for the past year has shown how important it is to guard against the contagious diseases of animals. Besides the very large pecuniary loss, their effect upon the quality of meat and milk supply tells upon the public health.

PLEURO-PNEUMONIA.

Our chief attention for the year has been directed to pleuro-pneumonia. It has prevailed in but few neighborhoods, but in these the losses have been such that the people fully realize the necessity of preventive measures.

It was in every instance brought in by purchased stock, or spread by neglect of early separation. It does not spring up from any bad local conditions, although filth and bad care favor its spread. When new stock is purchased, unless its source is fully known, it should be kept for two months from the general herd. Any case of sickness should be promptly removed four or five hundred feet from other cattle, to some shed not to be used for other stock.

So soon as there is reason to suspect pleuro-pneumonia, the fact should be promptly reported to the State Board of Health. Our former circulars (A, B and C) give full particulars as to methods of notice, disinfection, &c. These are to be found in the fourth Report of the Board, in hands of Local Boards of Health, or to be had on application. The disease, while not transmissible at long distances, is distinctly communicable, and its limitation depends on the exact carrying out of plans of separation and disinfection. The person who attends to the sick animals should not go near the other cattle, or not until after careful washing and airing.

In addition to directions in former circulars, the English law directs, first, the removal of all litter and other matter, and thorough cleansing of stalls; second, "the application to the floor, and to all parts above the floor, with which animals or their droppings have come in contact, of a coating of lime, made by mixing good freshly-burnt lime with water, and containing in each gallon of lime wash either one-fifth of a pint of commercial carbolic acid, or one-fifth of a pint

of cresylic acid, or four ounces of fresh dry chloride of lime; such lime wash to be prepared immediately before use."

All localities which had the disease last year should at once use every precaution. The law has been made fully effective by the amendments of the last Legislature. Unless the disease is brought to us from outside the State, it is now within the range of extinction in this State. Negotiations are now being had which it is hoped will modify the restrictions on cattle traffic imposed by the New York authorities in 1879.

PLEURO-ENTERETIS OR SWINE FEVER.

This disease, wrongly termed "cholera," needs the same precautions as to purchase of stock, and the same promptness as to separation of sick animals. So soon as the disease is identified, prompt slaughter, the change of the hogs from their pens, and thorough cleansing, are required. In one section of the State there were large losses last year. It spreads chiefly, if not entirely, by contagion, and can be greatly limited. Separate, slaughter, disinfect.

GLANDERS AND FARCY.

These are different forms of the same disease, transmitted chiefly, if not entirely, by a discharge from the nostrils getting upon a thin membrane or a raw surface. Mules seem even more susceptible than horses. It can be communicated to men, and, when so, is fatal. It is on the increase in this country, and in this State. Because the animal is not always at once laid aside from work, it is the more apt to spread. Several cases have been reported the last year. Owners should have some skilled veterinarian decide as to the disease, and know they are liable to damages if other horses contract the disease. Treatment never succeeds; the animal must be killed. (See *Revised Statutes, p. 24.*)

HYDROPHOBIA.

This disease has been unusually prevalent the past winter. Several letters in respect to it have come to us from different localities in the State. There is reason to fear that many cases may occur during the summer. Where any case has occurred Local Boards of Health should warn owners against having dogs run at large without muzzles, or unless in charge of some one. Local township Boards have now the same powers to pass health ordinances as have city Boards, so far as these are applicable and are justified by the need thereof. It is always a matter of discretion with Boards as to what precautions are necessary for the public safety. Persuasion and prudence are most valuable. But this does not mean hesitancy in action in accord with law where there is such hazard to public health as comes within the range and duty of State or local enactment. (See *Revised Statutes, p. 25.*)

Some of the minor diseases of animals are also communicable, and need to be guarded against. The disease, for instance, often called chicken cholera, which is a specific blood infection, affecting various glands, is chiefly to be limited by separation, although recent discovery claims for it a system of vaccination. It is well for all who deal with animals to know that many of their diseases are now well understood, as well as their treatment, or, if not, the uselessness of treatment, and the need of immediate slaughter. Many diseases are thus limited or prevented, so that the loss is restricted. Promiscuous dosing of animals is too often mistaken kindness and real cruelty. As to all communicable diseases, farmers and dealers should themselves know the risks. By avoiding purchases from infected districts; by quick separation of first cases; by proper disinfection and by skilled advisement, none of these diseases can become extensively epidemic in this State. This Board has occasion to acknowledge the valuable co-operation of the State Board of Agriculture and of farmers in various districts.

All communications should be addressed,

STATE BOARD OF HEALTH,
State House, Trenton.

CONTAGIOUS DISEASES OF ANIMALS.

Acts of 1880 and 1881, combined so as to show the law as it is at present:

BE IT ENACTED, *By the Senate and General Assembly of the State of New Jersey*, That in addition to the powers conferred by the act to which this is a supplement,* said Board shall have full power and authority to examine and determine whether pleuro-pneumonia, rinderpest, or any other contagious or infectious disease exist among any animals in any county in this State; and that the sum of five hundred dollars is hereby appropriated to defray the actual necessary expenses of said Board while making such examinations.

*The powers here referred to are those given in the act constituting a Board of Health, viz.: "to make inquiries and reports in reference to diseases affecting animals, and the methods of prevention." March 9th, 1877.

And be it enacted, That in event of any contagious or infectious disease, as aforesaid, breaking out or being suspected to exist in any locality in this State, it shall be the duty of all persons owning or having any interests in said animals, or any person called as a veterinarian to see such animals, to notify the said Board of Health, or any one of them, of the existence of such a disease, and thereupon it shall be the duty of said Board of Health, or some one designated by them, to investigate the same, and quarantine said animal or animals, and take such precautionary measures as to any animal sick, or as to other animals that have been or are in proximity thereto, as shall be deemed necessary, and to enforce such regulations as may be adopted by such Board of Health; or if said Board, without notification, has any reason to believe that any such infectious or contagious disease exists in or among any animals in this State, it shall have the same power of inquiry and examination, and the same rights of jurisdiction as are herein provided, where there has been notification by the owner or those having possession thereof.

And be it enacted, That any person or persons refusing or neglecting to notify said Board of Health, or any of them, of the existence of pleuro-pneumonia, rinderpest, or any other contagious or infectious disease among cattle, shall be deemed and adjudged guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than two hundred dollars, or by imprisonment not exceeding one year, or both, at the discretion of the court.

And be it enacted, That in all cases where animals affected with, or which shall have been exposed to a contagious or infectious disease, are ordered to be killed, or shall have been killed by order of the Board of Health, or its assistants, it shall be the duty of three members, who are freeholders, of such a Board of Health, of the city, township, or county in which the disease exists, as the State Board of Health may request, to appraise the value of the animal or animals so killed or ordered to be killed, taking into consideration the marketable value just previous to the time of attack of such disease; and the animal or animals so killed shall be buried by the owner thereof in the manner specified in the act to which this is a supplement; *provided*, that in no case shall said valuation exceed the sum of forty dollars for any one animal, or, in the case of registered cattle, shall not exceed one hundred dollars, one-half of said valuation to be paid by the State to the owner or owners, on presentation of such appraisement, signed by the appraisers, as provided for in the act to which this is a supplement

And be it enacted, That when any herd or portion thereof has been or is so exposed to any contagious or infectious disease, and the State Board of Health deems the disease likely to spread to that portion of the herd still unaffected, although isolated or quarantined, said herd may, with the consent of the owner or owners, and with restrictions agreed upon between them and the executive officer of the State Board of Health, cause or allow said herd or herds to be inoculated for the prevention of such diseases as can be thus mitigated; but any loss resulting from such inoculations shall not constitute any claim against the State, or the Board of Health acting as its agent; *provided*, that inoculation for pleuro-pneumonia shall in no case be allowed without the consent and approval of the State Board of Health, and by its direction, under the penalties provided in section eight of the act to which this is a supplement.

And be it enacted, That when any city, township or district shall be threatened with any contagious or infectious disease among animals, to such an extent as to seem to require more general precautions, the State Board of Health shall notify the local Board of Health, and with the advice and consent of the majority of said local Board of Health, may, for a time, prohibit the bringing of any cattle into such township

without inspection or a written permit, or may make distinction between fat and store cattle, or may prohibit the running at large of animals in the township, if not already prohibited by law, for such time as the township Board of Health shall advise.

And be it enacted, That the State Board of Health, in itself, or by its authorized agents, is hereby empowered to inspect any animal or animals in this State suspected of any contagious or infectious disease, whether belonging to citizens of this State or some other State or country, or when passing over ferries, or by other means of conveyance to or from this State, or to detain or send back the same, or to dispose of by slaughter, as provided in the foregoing sections of this act and the act to which this is a supplement; and in case there is evidence of any contagious or infectious disease of animals being conveyed from other States to this State, the State Board of Health may order and direct as to the places, days or time when animals may have egress or ingress from and to this State, and regulate the same, and with only such interference with traffic as the necessities of the case may demand.

And be it enacted, That all bills for money expended under this act shall be audited by the Comptroller of this State, and then submitted to the Governor for his approval, and after being thus audited and approved by the Governor, shall be paid by the State Treasurer, upon warrant of the Comptroller.

And be it enacted, That said Board shall keep a full record of their proceedings, and shall publish the same in the annual report of the State Board of Agriculture, yearly, and every year during the existence of this law.

And be it enacted, That if any person or persons shall, knowingly, either buy or sell, or cause to be bought or sold, any animal or animals affected with the pleuro-pneumonia, rinderpest, or any other contagious or infectious disease, all such person or persons shall be deemed and adjudged guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not exceeding two hundred dollars, or imprisonment not exceeding one year, or both, at the discretion of the court.

And be it enacted, That in case an emergency shall arise, and a larger sum shall be deemed necessary than the amount appropriated by the preceding section of this act, said State Board of Health shall present the facts in evidence to the President of the State Agricultural Society, and the President and Executive Committee of the State Board of Agriculture, who shall authorize such additional expenditure as, in their judgment, they may deem the exigency of the occasion to demand; *provided*, that in no case shall the amount of money thus authorized to be expended, exceed the sum of five thousand dollars in any one year.

(CIRCULAR E.)

TO FARMERS AND DEALERS IN STOCK.

The last census of live stock in this State shows about one million of animals, and thus exhibits how large an interest we have in all that relates to their welfare. This is magnified by the fact that this State contains so much of the very best stock in the United States. The diseases of animals are as definite in their character, as avoidable and

as amenable to treatment as those of human beings. Where they cannot be cured, or where, as in epidemics, they tend to spread, their ravages can be very much diminished by separation, by disinfection, and by other methods well known to skilled veterinarians. Because this State is a highway for the conveyance of cattle to markets, and because much stock from other States is brought into this State, we will suffer much from diseases thus contracted unless proper precautions are used. We can point to large losses which in the last two years have occurred to individual owners from purchased stock.

The diseases which are most likely to occur from contagion or from communication from other animals, are:

AMONG HORSES.

I. Glanders or Farcy.*
II. Strangles or Throat Distemper.

AMONG CATTLE.

I. Contagious Pleuro-Pneumonia.
II. Malignant Anthrax or Splenic Fever. (Common also to other domestic animals.)
III. Texas Fever (perhaps a form of Anthrax).

AMONG SHEEP.

I. Sheep Pox (variola ovina.)
II. Contagious Foot-Rot, Hoof-Rot or Foot-Halt.
III. Scabbies (scab or itch).

AMONG SWINE.

I. Pneumo-Enteritis or Hog Cholera.
II. Measles (from the larval form of Tape-worm).
III. Trichinosis (from the larval form of the worm. Trichinæ Spiralis).

AMONG POULTRY.

Fowl or Chicken Cholera.

As the design of State oversight of the contagious diseases of animals is chiefly to prevent them or to avoid their spread when occurring, those who desire treatment must chiefly look to books and to veterinarians.

The following are some *sanitary precautions* and directions applicable in almost all cases:

I. *To avoid contagion.*—Never introduce a newly-purchased animal of any kind into the general herd for a month or more, unless you know fully its previous keeping or ownership, or have a warranty that it has not been exposed to diseased animals. We could give many instances in this State where whole herds have been infected through a single purchase. Avoid especially city cow-pens, as these are great breeders of disease.

II. Let all animals be kept in a cleanly way and with regard to health. No domestic animal is benefited by filth, and most of their diseases arise therefrom, or are intensified and made to extend thereby. They thus become enzoötic or epizoötic, words which mean the same in relation to animals that endemic and epidemic do as to human beings.

III. If an animal is taken sick in a stall or pen or yard, let it remain vacant until you know what the disease is, and let it be cleansed before any other animal is put therein.

IV. Disinfectants, cleanliness, fresh air and whitewash are always valuable. Circular C, of this Board, names several artificial disinfectants. One of the most available is this: Dissolve sulphate of iron (copperas or green vitriol), two pounds to a gallon or sixty pounds to a barrel of water, stirring it from time to time so that it shall be fully dissolved; a pint of crude carbolic acid added to the solution increases its power. The solution can be freely sprinkled by means of a watering-pot, every two or three days, according to the character of the malady. Other disinfectants are also named in the circular of the Board of Health (third and fourth reports) to householders, city authorities and Boards of Health, and in the circulars which accompany this report.

V. If you have occasion to go into yards where there is some disease, do not touch or handle the cattle, if you have those of your own to attend to, or do not go directly to your own yard or stables. The danger is chiefly in actual contact or in going to other animals without free access to air.

VI. The person attending sick animals should not milk or attend to any other animals on the same farm, to which the disease might be imparted.

VII. Read carefully the laws of this State as to contagious diseases of animals, and the circulars of the Board of Health.

BRIEF NOTICES OF A FEW OF THE MORE COMMON COMMUNICABLE DISEASES.

GLANDERS OR FARCY.

These are essentially identical. The disease occurs not infrequently in this State, and is not only communicable to other animals, but also to man.

Several years since, a law of this State, which has not been repealed by the new act, made it a misdemeanor for any person to have or harbor a horse with this disease, and required the slaughter thereof. It is met with most frequently in its chronic form. The chief symptom is a glutinous and continuous discharge from the nostrils, owing to a deep or superficial ulceration in some portion of the nostrils. After a time, one or both glands beneath the jaw generally swell, and hence the name of glanders.

In an acute form there are similar lesions with severe fever. Mules are even more subject to it than horses. The making out of cases (diagnosis) must be left to veterinarians.

Preventive Measures.—At once separate the animal from others; clean and disinfect the stall; put no other horse in at present, and do not expose any other animals thereto. In most cases, immediate slaughter is the best management. The animal must be buried so that dogs may not get access thereto.

STRANGLES OR HORSE DISTEMPER.

Various forms of throat malady are known by this name. Catarrh of the membrances of the upper air passages and swelling of the glands about the jaw and tendency to pus formation are usual. Different epizoötics of it differ much, or it is sometimes mild and sometimes very malignant.

The infection is not far-reaching as a rule. It is least apt to attack old horses or those once having had it. Crowded and dirty stables make it much worse and more communicable, and then the forage and the building itself seem to convey the disease. It varies so in character that rules as to treatment vary. Disinfectants should be used and the discharges from the throat and nostrils or from pus cavities should, as far as possible, go into vessels containing some disinfectant, as, no doubt, these excretions aid in spreading the contagion. It is well to separate the other horses from the one affected and not to have the same groom attend to all.

CATTLE.

Contagious Pleuro-Pneumonia.—Sufficient directions are already given in circulars (A, B, C, D,) and in the sanitary precautions of this circular.

Anthrax.—Anthrax and anthracoid diseases occur in the horse, in cattle, sheep and swine. The last year there were losses of all of these on one farm in Salem county. A form of the disease is sometimes called splenic fever, because the spleen is so uniformly found congested and enlarged. The Texas cattle fever is claimed to be a variety of this disease. The general symptoms of anthrax in its acute form are so rapid that often an animal is dead before the sickness is perceived. In other cases there is trembling and high fever, hurried breathing and a flow of blood or a very congested condition of the mucous membrances. It is most rapid in animals in good condition.

Sometimes it causes or is associated with local tumors and gets the name of anthracoid, erysipelas or carbuncle. Bodies change very rapidly after death. The post-mortem appearances of the mucous membranes of the mouth and other passages and the condition of the spleen, liver, etc., very much aid in determining the disease. As it is communicable and so fatal, great precaution must be used. Any discharges or any bodily material must not be allowed to come in contact with any other animal. Men may take it by having a scratch, or may absorb it through the skin from the diseased fluids. All the minutest rules of disinfection must be observed. The burial of the carcass should not be less than six feet, and long after an occasional load of lime and dirt should be thrown over the spot, as it is now claimed that long after, the earth-worms may bring up the septic material and convey it to other animals. The preventive use of attenuated virus by inoculation is now common in France. The precautions against Texas fever are the same as those above mentioned.

Strangylus (*Filaria*) *Bronchialis,* or other forms of strangylus, occur occasionally in cattle and produce congestion of the lungs and mechanical stoppage of the air-cells, and seem to extend to the entire herd. A few cases have occurred in this State. See Health Report,

p. 158, and report of Dr. Miller, 1881, in Report of Board of Agriculture.

SANITARY PRECAUTIONS AS TO THE COMMON DISEASES OF SHEEP.

Sheep Pox (*Variola Ovina*).—It is propagated solely by contagion, and probably never arises here spontaneously. Loss of appetite, often trembling, general soreness, high fever, and the eruption of little red nodules, which, in from twelve to twenty-four hours, are conical pustules, generally, easily mark the disease. The duration is about six days. It is very transmissible, as forage, pens and the wool and secretions convey it. Winds may convey it a considerable distance, according to concentration and virulence. Extensive sanitary police measures sometimes need to be instituted. Inoculation has often been resorted to with success. The sick should at once be separated from the rest. A second division of those doubtful is often advisable. All those that have it and recover should be quarantined for a time. The thorough washing of the sheep, after full recovery, is desirable. Butchers should not expose themselves to such flocks, or should use special cleansing afterward, so as not to carry the disease to other folds.

Contagious Foot-Rot, or Hoof-Rot, or Foot-Halt.—It is a disease which, as the name indicates, manifests itself in the foot or hoof. Some regard it as a local inflammation, or it may be caused by some fungus or other germ. The painful step, the red skin between the claws of the hoof, the pimples, pustules or vesicles, and the foul, viscid discharge, reveal the disease. The animal becomes feverish and sick, and its condition varies with the progress or relief of the disease. The appearance of the foot, the fact that only one claw or foot is affected, and the gradual spread of the malady among the flock, distinguish the disease from ordinary foot-soreness.

The preventive and sanitary measures are nearly the same as those already detailed. Separation of the diseased, and careful disinfection of premises must be used. The sheep-pens should be vacated and cleansed after recovery. The well sheep had better be removed for a time from the rest, and made to pass through a trough containing in the proportion of a pound of chloride of lime to a pail, or two and a half gallons, of water. Or the disinfectant solution already named of iron and carbolic acid will answer. The feet of those diseased should be often well cleansed in water, or powdered sulphate of copper (blue vitriol) applied, either in a very fine dust or in a solution of a half ounce to a pint, or mixed with tar, as may be directed.

Scabies or Scabs.—This disease is owing to a parasite insect (*acarus*) and is spread by its propagation and migration. The insect causes great itching, and so the fleece ere long becomes ragged. The shepherd soon perceives an uneasiness dependent upon skin irritation. The remedies are those which will kill the insect and do not hurt the sheep. Their name is legion and much depends on the mode of application. The preparation of Zundel, which consists, by weight, of quicklime, one part; impure carbolic acid, one and a half parts; carbonate of soda, three parts; and soft-soap, three parts, made into a stiff paste, is an example. For after-cleansing and disinfection of animals, buildings, manure, and forage, directions already given suffice.

The forms of scabies or itch caused by an insect and known as *Mange* in horses, cattle, pigs and poultry, is of much the same general character, although not so communicable as that in sheep.

COMMON CONTAGIONS OF SWINE.

Pneumo-Enteritis, or Hog Cholera.—Directions as to this have already been given in former circulars. Entire separation of the sick and well, and generally destruction of the sick ones, is required. Removal of the entire stock to new inclosures often helps very much to limit the diaease. It still prevails in our State and may become a very serious malady.

Pig Measles.—This disease depends on an animal parasite in the form of a bladder-worm, the *cysticercus cellulosus*, belonging to the *Cestoda*, or tape-worm class, the tape-worm being the *Tænia solium*. It is in the pig in the larval form, and when ingested by man becomes developed into the tape-worm—a disease which we have some reason to fear is increasing in this country. Even where the cysts are not in a condition to do harm, the measly pork is a very inferior article of food.

Often, the first indications of the disease are that the animal does not thrive. The tongue, carefully examined on its under part, toward its root, will often show bladders from the size of an oat-seed to a pea, slightly transparent and standing out a little from the membrane. These are cysts, like those elsewhere in the body. A sore snout and a roughened voice, slight cough and languor, often characterize the disease. Other symptoms occur according to the amount of cysts, unless the sausage machine interrupts the progress. It is pleasant to know that the cysts will not hatch three or four days after the death

of the swine, but this does not add to the quality of the pork. The cyst does not hatch in the pig, but only when transferred to another medium, as man. Fleming rapidly sums up the mode of prevention: "As pigs cannot become affected unless they swallow portions of the human tape-worm containing the germs of the parasite, the preventive measures are sufficiently indicated. *At the same time*, the sanitary authorities should take precautions against pigs of a vagabond disposition ingesting dangerous filth, by forbidding the disposition of human ordure in any but proper places, to which pigs cannot have access." This is also a strong reason against city pigs.

Trichinosis.—This is another disease arising from a parasite or worm known as the *Trichinæ spiralis.* As this is not yet authenticated to have ever occurred in New Jersey pork, we merely allude to it here.

Chicken Cholera.—This disease causes great losses in some counties in this State. The following quotation from Pasteur (see Agricultural Report) will guide to symptoms and prevention:

"The bird which is a victim to this disease, observes M. Pasteur, loses its strength, and its wings droop. The feathers on its body rise, and make it look like a ball. An unconquerable sleepiness overwhelms it. If it is compelled to open its eyes, it appears as if awakened from a profound sleep, and soon closes its eyelids again. Frequently it dies in mute agony without having changed its position. If it happens to move its wings for a few seconds, it is with great difficulty. This disease is caused by a microscopic organism, which M. Pasteur has bred in a suitable manner, and with which he has inoculated Guinea pigs and fowls. The inoculation of the pigs did not always produce death, but did produce an abscess, and fowls inoculated with the contents of this abscess soon died. A few drops of a culture of this microbe placed on a piece of bread or meat fed to the fowls is sufficient to cause the infection to enter the intestinal canal, where the little organism multiplies in such great quantities that the excrement of the fowls thus infected kills others which are inoculated with it. These facts, M. Pasteur says, permit us easily to account for the manner in which the disease is propagated in poultry yards.

"Evidently the excrements of the sick birds are the great cause of contagion. Nothing can be more easy to arrest this than by simply isolating the birds for some days, by washing the yard with an abundance of water, and especially with water acidulated with a little sulphuric acid, which easily destroys the microbe, and by removing all the manure before admitting the birds again. All cause of contagion

will have been removed during this period of isolation, because the birds already attacked will have died, so rapid is the disease in its action.

"By a certain change in the culture of this microbe its virulence may be diminished, and while the fowls inoculated with the most virulent virus are all killed, those infected with the diluted virus sicken but do not die. If they are allowed to recover, and are again inoculated with the more infectious virus, the injuries produced are local, and do not cause death. Chicken cholera is, then, of the character of those virulent diseases which do not repeat themselves. Suppose that this microbe of the diluted virus may be fixed in its proper variety, according to M. Pasteur, and that we are not always obliged to have recourse to its original propagation when we wish to use it, it may be made to serve as a veritable vaccine, transmissible from animal to animal as the vaccine of variola is transmissible from man to man."

The five circulars issued by the Board of Health since its superintendence of the law as to the contagious diseases of animals, will be found together in the present Report of the State Board of Agriculture, and are also to be had in leaflet form.

SUGGESTIONS TO HEALTH BOARDS.

In addition to other directions, to be found in this and other yearly Reports of the State Board, it may be added—

I. Let each Township Committee, at its usual meetings, when the assessor is present, sit also as a Health Board and enter the fact in the township health book, together with any item of business.

II. Whenever new officers are elected, there should at the first meeting be an entry in the health book of the names of the Health Board as thus made.

III. Where there is no township physician as a member of the Board, some of the Boards have invited some adjoining physician to act as their adviser, but it is better to elect a medical member.

IV. Carefully examine all laws relating to the construction of Local Boards and their duties. Correctness and promptness of action are most important. The failure of a law is oftener in delay or mistakes in its administration, or in technical errors, than in the defects of the law.

V. The Reports of the State Board of Health, as sent, are not the property of individuals, but of the Board. The keeper of the town health book should keep control over them, and see that when loaned to others they are returned to him, and passed over into the hands of the succeeding officer.

VI. We ask the same promptness in future annual reports as in these, and that the few who have failed to organize, or to make full report, will fully arrange at the first meeting of the Township Committee, and notify us.

VII. As the returns of marriages, births and deaths so much indicate the progress and health of communities, and are essential in the study of local conditions, all Boards should insist upon prompt returns, and report to the Secretary of State any omissions. It is, too, the legal right of every citizen to have such a record. Any neglecting returns are liable to suit at law.

VIII. All communications should be addressed "State Board of Health," or "Bureau of State Vital Statistics," State House, Trenton.

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17. 19th do. do do. 1856–57–58.
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19. 25th do. do. do. 1862–63–64.
20. 28th do. do. do. 1865–66–67.
21. 31st do. do. do. 1868–69–70.
22. 34th do. do. do. 1871–72–73.
23. 37th do. do. do. 1874–75–76.
24. 40th and 41st do. do. do. 1877–78.

(For additional numbers see page 212, number 246.)

25. Report of the Cholera Epidemic in England, 1866.
26. Supplement to 25th Annual Report of Registrar-General, 1851–60.
27. do. 38th do. do. 1861–70.
28. Report of Medical Officer of Privy Council, 1858–62.
29. do. do. 1863–64.
30. do. do. 1865–66.
31. do. do. 1867–70.
32. do. do. 1870–73.
33. Report of Medical Officer of Privy Council and Local Government Board, England, 1873–74.
34. Report of Medical Officer of Privy Council and Local Government Board, England, 1875–76.

No. 35. Supplement, with Report of Medical Officer, 1876.
36. Reports of Local Government Boards, 1878–79. See No. 744.
37. Dictionary of Hygiene. Alex. W. Blyth.
38. Parke's Practical Hygiene. (5th Edition.)
39. Public Health. American Public Health Association. Vol. 1st.
40. Public Health, Amer'n Pub. Health Association. Vol. 2d.
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42. do. do. do. Vol. 4th.
43. do. do. do. Vol. 5th.
44. Hygiene and Public Health. Buck. Vol. 1st.
45. do. do. do. Vol. 2d.
46. Water Supply of Cities and Towns. Humber.
47. Hygiene of U. S. Army, 1875.
48. Traite D' Hygiene Publique et Privie. A. Proust.
49. M. Levy—Traite D' Hygiene. Vol. 1st.
50. do. do. do. Vol. 2d.
51. Sanitary Engineering. Denton.
52. House Drainage and Water Service. Bayles.
53. Air and Rain. Dr. R. A. Smith.
54. Ozone. Dr. C. Fox.
55. Sanitary Subjects. Halton.
56. Emergencies, and How to Treat Them. Howe.
57. Lectures on Medical Jurisprudence. Ogston.
58. Forensic Medicine and Toxicology. Woodman & Tidy.
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61. do. July, 1879– ——, 1880.
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63. The Condition of Nations. Edwin W. Streeter.
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69. Reports and Addresses of State Sanitary Commission, 1866.
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99. Health of Newark for Twenty Years. Holden.
100. Dangers to Health.
101. Diseases of Modern Life. Richardson.
102. Ministry of Health. Richardson.

No. 103. Health and Disease. Dr. E. Smith.
104. The Maintenance of Health. Fothergill.
105. Health and Education. Kingsley.
106. Lectures on Public Health. Dr. Mapother.
107. Health, and How to Promote It. McSherry.
108. Hand Book of Hygiene and Sanitary Science. Wilson.
109. Manual of Public Health. Hart.
110. Filth Diseases, and Their Prevention. Dr. Simon.
111. Hall on Drowning.
112. Manual of Surgical Emergencies. Swain.
113. Mothers' Work.
114. Muscular Power. Flint.
115. Mother's Register.
116. Minor Surgery and Bandaging. Heath.
117. Air, and Its Relations to Life. Hartley.
118. Hand Book of Rural Sanitary Science. Dr. Marsh.
119. Sanitary Work. Slagg.
120. Sanitary Arrangements for Dwellings. W. Eassie.
121. The Sanitary Drainage of Houses and Towns. Waring.
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127. Food, Its Adulterations and the Methods for Their Detection. Hassall.
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147. Diseases Among Swine and Other Domestic Animals, 1879.
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149. Contagious Diseases of Swine and Other Domestic Animals, 1880.

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152. Manual of Cattle Feeding. Armsby.
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208. Purification of Water-Carried Sewage. Robinson and Mellis.
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210. Warming and Ventilating Buildings. Hood.
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212. Healthy Dwellings. Galton.
213. Sanitary Care and Treatment of Children. Johns Hopkins University.
214. Lectures on State Medicine. De Chamont.
215. Brain and Nerve Exhaustion. Dowse.
216. Bacteriæ. Maguire.
217. Hints for Health. Stocker.
218. Fasting and Feeding. Winslow.
219. Pollution of Rivers. Buckland.
220. Model By-Laws for Sanitary Authorities.
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246. 42d and 43d Annual Report, Registrar-General of England, 1879–80.
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300. Annual Report, Board of State Charities of Massachusetts, 1865.
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303. 4th do. do. do. 1868.
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311. 12th do. do. do. 1876.
312. The Public Charities of Massachusetts during Century ending Jan. 1st, 1876.
313. 13th Annual Report, Board State Charities of Massachusetts, 1875–76.
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326. 4th Annual Report, Board Public Charities of New York, 1871.
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339. Pennsylvania Report of the Board of Public Charities, 1874.
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388. Zymotic Diseases. Wolff.
389. The Common Nature of Epidemics. Smith.
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509. How to Feed an Infant. Baker.
510. How We Fed the Baby. Page.
511. Aphorisms on Mental Culture and Training. Chavasse.
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525. Sewer Gas and Its Dangers. Geo. P. Brown.
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532. The House and Its Surroundings.
533. Exercise and Training.
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535. Personal Appearances.
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537. Personal Care of Health. Manuals of Health.
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539. Water, Air, etc. do.

No. 540. Scientific Addresses. Tyndall.
541. Manual of Heating and Ventilation. Schumann.
542. What is Play? Strachan.
543. What Every Mother Ought to Know. Ellis.
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550. Whose Fault is It? Popular Sanitary Tracts
551. The Worth of Fresh Air. do.
552. Washing the Children. do.
553. "The Black Hole" in Our Own Bed-rooms. do.
554. How to Manage a Baby. do.
555. The Health of Mothers. do.
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853. do. do. Georgia.
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855. do. do. Mississippi.
856. do. do. Texas.
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859. do. do. Tennessee.
860. do. do. Kentucky.
861. do. do.
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863. do. do. Illinois.
864. do. do.
865. do. do. Michigan. See 1450.
866. do. do. Wisconsin.
867. do. do. Iowa.
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1481. (English) Army Medical Report for year 1876.
1482. 3d Biennial Report State Board of Health of Maryland, 1880.
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[Pamphlets are marked in numbers, with a period before them.]

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.2 Animal Vaccination.
.3 General do.
.4 Diphtheria.
.5 Disinfection.
.6 Scarlet Fever.
.7 Malaria.
.8 Yellow Fever.
.9 Lessons on the Prevention of the Spread of Fevers. Ashendea.
.10 Anthrax Contagion. Russell.
.11 Facts about Fevers. Page, M. D.
.12 Domestic Sanitary Works. Rawlinson.
.13 Ladies' Sanitary Association.
.14 Sanitary Progress—Circulation or Stagnation. Chadwick.
.15 Fermentation and Disinfection. Dake.
.16 Alms House Regulations, Camden Co., N. J.
.17 Annals of Medical Progress. Toner.
.18 Plan of Sewerage, Baltimore. Latrobe.
.19 Health and Healthy Homes. Loring.
.20 Sewerage and Drainage.
.21 do. Treatment. Coventry.
.22 Drainage, Sewage, Health, &c., New Orleans.
.23 Ladies and Sanitary Science.
.24 Ventilation of Sewers.
.25 New York Sanitary Society.
.26 Durham System of House Drainage.
.27 Domestic Sanitation, &c., New Orleans.
.28 Sewerage of Memphis. Waring.

No. .29 Disposal of Sewage. Rochdale.
.30 Sewerage Works of Croyden.
.31 Sanitary Works Abroad—Paris and Berlin.
.32 New York Sewers. Fowle.
.33 Hints on House Drainage.
.34 New Jersey Drainage Acts.
.35 Underdrainage. Denton.
.36 Geology of Hudson River. Russell.
.37 Soil and Drainage of Hudson County. Ward.
.38 Land Drainage. Reeve.
.39 Main Drainage of London. Bazalgette.
.40 Sanitary Engineering. Cain.
.41 Regulations of House Drainage. Field.
.42 Sewage Disposal—Downward Filtration. Denton.
.43 Sewage Poisoning. Blake.
.44 Coventry Sewage Works.
.45 Health and Sewage of Towns—Society of Arts.
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.50 Reports by Rudolph Herring, Civil and Sanitary Engineer.
.51 Fortnightly Review on Vaccination.
.52 New York State Board Circulars.
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.61 Natural Water Supply, Sewage and Health, London.
.62 Water. Chittenden.
.63 Croton Water.
.64 Plain Words about Water. Church.
.65 Water Pollution. Green.
.66 Soil and Water Pollution. Reynolds.
.67 Proper Water Supply. D. DeHart.
.68 Boston Water Supply. Nichols.
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.75 Domestic Poisons. Carr.
.76 Adulterations of Food.
.77 Adulteration of Drugs.
.78 Laws as to Adulterations of Food and Drugs.
.79 Adulterations of Food—Medical Journal.

No. .80 Color Blindness. Jeffries, M. D.
.81 Light, as related to Disease.
.82 American Public Health Association, 1880–81.
.83 Cleanliness, Health, Wealth. New Orleans.
.84 New Orleans Report and Addresses.
.85 What the State owes the People, and what the People owe the State. Brooks.
.86 State Medicine.
.87 Healthy Homes.
.88 Deeds and Needs of Hygiene. Hunt.
.89 Hygiene of Emigrant Ships. Turner.
.90 Enteric Fever Outbreaks. Russell, Glasgow.
.91 Adulteration of Milk—The People vs. Schrumpf.
.92 Education and Health Circulars.
.93 Medical Society of Penna. on Hygiene.
.94 Food and Clothing.
.95 Food and Feeding. Sir Henry Thompson.
.96 Exercise and Training. Lee.
.97 Muscle Beating. Klemm.
.98 Study of Temperaments. Wilkes.
.99 Dress—Its Sanitary Aspects. Roth.
.100 Moral and Social Aspects of Health. Ackland.
.101 The Religion of Health.
.102 Medical Hints as to the Singing Voice. Browne.
.103 Physical Education and Hygiene. Hitchcock.
.104 School Life, as affecting Sight and Figure. Liebreich.
.105 Sanitary Condition of School Houses. Nichols.
.106 Free Parks and Camps for City Poor. Toner.
.107 Pathogeny of Diphtheria. Curtis and Satterthwaite.
.108 Septicæmia from Human Saliva. Sternberg.
.109 Abnormal Entozoa in Man, and Sequel. Lockwood.
.110 Filaria Sanguinis Hominis in South Formosa.
.111 Coroner Law, Massachusetts.
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.114 Manual of Health Laws, New York State.
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.121 Longevity. Gardener.
.122 Origin of Species. Huxley.
.123 Various Catalogues.
.124 Medical Profession and Public Health. Deshler.
.125 Suggestions on Rural Hygiene.
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.134 Medical and Health Lists of Names.
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.139 Boston Report of Board of Health.
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.141 Thirty Specimens of Local English Health Reports.
.142 Specimens of American City and Township Reports.
.143 International Medical Abstracts.
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REPORT

OF THE

BUREAU OF VITAL STATISTICS.

DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

By EZRA M. HUNT, M. D.,

Medical Superintendent of State Vital Statistics.

YEARLY OUTLINE AND SUMMARY.

The consideration of the value and methods of vital statistics has been prominent the last year, from the fact that the attention of statisticians and others has been so officially called thereto. Gen. F. R. Walker, in his superintendency of the United States Census, early arranged for the securement of a more complete return of mortuary statistics. He, in common with other authorities, recognizes that the perfecting of systems must depend upon the constant gathering made by the States.

The National Board of Health regards the accurate and frequent collection and tabulation of such returns so indispensable as to give to it great prominence in the administration of public health.

The American Association for the Advancement of Science, through a committee, of which the able statistician, Hon. E. B. Elliott, was chairman, recently made special communication to the American Public Health Association as to the practical importance of the subject. This association is now giving full attention thereto, and a preliminary report by Dr. Elisha Harris shows that close attention is being given to the study of methods, and the best systems for such analyses as shall guide us in deductions significant as to the limitation of disease.

Thus far the chief effort of this Bureau has been to secure accuracy, uniformity and universality of returns; to have such indexing and transcription as will render them easily accessible for legal and vital purposes, and to make from them such tabulations as point to the locality and causes of disease. There are respects in which the study of marriage and birth returns are not less important in deciding indications as to economical and vital questions. There are also many deductions as to disease, in its relations to birth, nationality, parentage, for which the material is fast collecting, but as to which conclusions, derived from too few numbers, might be erroneous.

The comparative success which has attended the efforts to secure

these returns, is shown by their steady increase, while the per capita expenditure is not as great as when there was no attempt at classification or study. It is only as to the returns of births that our methods do not seem to be perfected. So far as vital study is concerned, we are able from those obtained, and from the deaths under one year of age, to compute allowances. But it would be better if the returns themselves were more complete. As it is they are several thousand in advance of those under the last system, besides being accompanied with details of value in vital study. Until our governing authorities, and especially those of our cities, come to know that proper sanitary care and police requires that the number of young children be known, in order to limit and protect from disease, they will be insensibly contributing to the general death rate. For, in order to limit disease and to promote health and comfort, especially with the wage population, we must know the kind and amount of material which disease has at hand. For, be it known that the diseases which go about killing little children, depend upon that neglect and ignorance which make it easy for such diseases to destroy. These are enemies to public thrift, and not the peculiar study of promiscuous philanthropists.

We find in the State no tendency to resist a law which has its foundations in a decent care of human life. It is not officious for the State, in the case of a marriage, to claim that it have the recorded evidence thereof, with such appended facts as, in the judgment of those who have made the civic care of population a study, are deemed desirable. The former plan, by which the performer of the ceremony was required to pay a shilling and make the record, and the State besides collected a return at a cost of about twenty-five cents, was much simplified by the present law. Facts as to illegal marriages and as to various divorce laws in other States, show how wisely, both for legal and moral purposes, and for protection from hasty and clandestine marriages, has been a system of registration.

As to births, the trouble arises from negligence and delay rather than from intent. Some at first were disposed to question the right which a State has to enforce a duty without compensation. This duty has been imposed by a law on the statute book for 30 years, and the principle is acknowledged in many cases, where lawyers, who are apt to protect their own legal rights, are required to perform services for which no direct pay is provided. It would be easy to show that incidental benefits accrue to medical men from all laws that

look to this kind of guardianship over such vital conditions of population as they bear relation to.

As to deaths, the common sentiment is that the death and the cause of death of every person should be authenticated. Because of this, many countries and some States allow burial only by licensed undertakers. Our present State method is fraught with as little trouble as accuracy will permit, and is easy to those who on their visit provide for the securement of the necessary certificate.

NOMENCLATURE.

In most of the returns of death there is evident carefulness of diagnosis, or a note showing some doubt or complication which is recognized. We invite the attention of all students of statistics to the data already on hand, as showing how informatory these records are, if for instance any one physician is disposed to abound in "general debility," "cancer of liver," pyæmia or septicæmia (without locality), congestive or gastric liver or other doubtful term, the return itself comes to be eliminated and either is dropped from the vital tabulation or loses its significance in the multitude of numbers. As the prominent principles of study have already been analyzed in the two previous reports, we need not recount them here.

CLIMATOLOGY.

As this is the subject of a separate paper in this report, we need only direct attention thereto. We hope that hereafter the Local Boards of our cities will avail themselves of such weekly and monthly returns as will enable them to know the relation of temperature, humidity, etc., to disease. It is our work to collect these relations over large areas and for longer intervals. It is for others to trace the immediate effects and so learn to anticipate as well as to record. A proper forecast of the health officer in large cities, watches effects and provides for an increased sickness rate in certain parts of a city, under certain approaching weather conditions, as intelligently as does the seaman who reads the weather indications for our northern lakes.

RELATIONS OF LOCAL BOARDS OF HEALTH TO VITAL STATISTICS.

Some of our Local Boards, with commendable care, help to secure the vital returns, and seem to have some conception of such facts as relating to public health. But it is also true, that there is little pro-

vision for such study in many of our cities. Newark, for instance, with its 136,508 inhabitants, has no weekly or monthly or quarterly analysis of its vital statistics. All yearly or half-yearly summaries are furnished us and studies can be made upon them. But such a city should not be content unless it secured the service of some statistician, who, a day in each month, should study the indications and give such warnings or instructions as could not but be precautionary. The same is true of Trenton. Paterson gives the most intelligent study of this kind, but also needs a fuller analysis of the meaning of localized sickness and death rate. No one can review similar short period studies of Glasgow without seeing why it is that the commercial and business interests of the cities require such administration.

CENSUS.

The death rates for last year were calculated on the basis of the census of 1880, and those of 1879 recalculated to conform thereto. As the returns then in hand were not the final ones, it has been necessary to review and recompare. No changes are found that require adjustment, although we have given the revised returns in the present tables.

The greatest difference is that of 108 in Newark, which, with its large population, does not sensibly disturb the percentage. Some changes in areas will be noted in foot-notes in connection with the tables.

REMITTENT FEVER.—INTERMITTENTS.—MALARIA, ETC.

The results of the type of diseases known as malarial, do not generally find full record under this division. In general, it is said that these diseases are not usually fatal, but produce that chronic breaking down or condition of malaria which tells on the future and shortens the period of active life, as often that of actual years. But in reviewing our record we find that the unusual prevalence of malaria for the two years previous to July, 1881, has quite prominently recorded itself in the death rate. All this class of diseases promotes congestion of the internal organs. The spleen often becomes permanently enlarged and the liver embarrassed in its important functions in aid of digestion. Were there no question of comfort or economy involved, we would need to give great prominence to the morbific influence of malarial diseases. There is no disease more

under our control, both as to its prevention and limitation. Drainage for health, and the use of proper precautionary care, and the continued preventive treatment of those once affected, are capable of greatly limiting this malady. The recurrence in special seasons only means that an existing evil is not always equally potent, but awaits the favoring influences of certain conditions of weather. Our power of preventing is in removing that one of the factors over which we have control. To hesitate or doubt because we do not govern both and all, is merely to provide material for the forces of diseases. The number of deaths recorded this year from malarial disorders is 431, being an increase of 138 over 1879–80, and of 163 over 1878–9.

TYPHUS FEVER.

We hope seldom to have occasion to include this filth fever in our list. The special case of the Camden County Alms House, is already noticed; besides this, several single cases are reported from other parts of the State. These had been directly exposed to the contagion in Philadelphia, in Camden county or New York city. The type seems to have been distinctly recognized, and should lead our large cities to great precaution, and to the requiring of an early report of such cases. Two of the reported cases were in Camden, one in Trenton, three in Newark, two in Jersey City, three in Gloucester, Somerset and Union counties, respectively. Some of the cases are so positively stated as almost to preclude an error of diagnosis. It is so natural for many an immigrant to travel on foot from New York to Philadelphia, that we may easily obtain the disease from abroad, as well as manufacture it at home. As it is one of the most dreaded of pests, the warnings of the last year should not pass unheeded.

TYPHOID FEVER.

The 324 cases of 1879, and the 373 cases of 1880, have multiplied to the 574 cases of 1881. Of those for this year, 50 must be deducted for typhus fever, which is always marked in our office schedule. This may not be considered a large rate for a State having so many crowded areas of population. But the fever is so unmistakably a manufactured and preventible disease, and so often removes those in the prime of life, as to need the astute care of Boards of Health. Over 20 cases in New Brunswick seemed to have been directly traced to one locality and to a pump-water supply. The

poison of it is so distinctly specific, that even typho-malarial fever, so-called, has no distinct lesions, and is only thus too often vaguely named because a malarial atmosphere seems to add an additional complication in treatment. To it we perhaps must attribute part of the increase of the last year. But it seems to us wise that practitioners should keep closely in view the distinctiveness of type, and more and more avoid the use of the word typhoid to describe low forms of other disease. All the more, because it is so doubtful whether quinine is of much value in typhoid fevers, and it is so easy to be tempted to its use by an over-recognition of a malarial element. The remissions of pulse and of temperature may require great care to record the distinctiveness, but are certainly not those of malarial periodicity. More than all do we need to recognize the relations of surroundings to the welfare of families, to guard all secretions against any possible infection, and to have a hygienic code in application which shall prevent the spread of the fever.

SMALLPOX.

Last year we had occasion to note a slight epidemic of smallpox in Salem, and a more extended one in Camden. The year before there had not been a death therefrom in the State. This year we have had notice of it at several points, and as even yet prevalent in many places. Camden city and Hudson county, by reason of their railroad connections, have had enough cases to insure a supply for the State. Testimony is coming to us from various places as to what active dealing with first cases, on the part of physicians and Boards of Health, can do to stay the disease, and how a hesitating Board can talk and wait until the fire is under headway. Vaccination has been and is being practiced in the State as never before. Revaccination is also approved, and seems to have had effect in an unusual percentage of cases. Physicians and Local Boards are looking with some care into all the phenomena which experience is recording, but it is as yet premature to reason from isolated cases. There is no weakening of confidence in the protective power of vaccine virus. There is a healthful anxiety to be assured of its purity, and a caution which is misinterpreted when it leads to suspicion on the part of the laity. It is only salutary because it means that medical men intend to be assured as to the purity and value of the material they use. The patient has, at least, as good security as to the virus used, as he has

that the prescription made is the right medicine. How far the law of a periodical visitation of such a disease as this may be said to determine its frequency, is not yet fully apparent. But it is far more probable that the neglect of vaccination about every six or seven years, brings out into public life (which school life is to the child) sufficient swarms of unprotected ones to furnish a tempting supply for every vagrant contagion, and to make epidemics out of sporadic cases. We only sigh for the day when public opinion will not need to wait for such warnings. *Is it not possible to have at each public school building in the State an annual vaccination day, on which, with proper provision made therefor by law, all can be vaccinated, or those revaccinated who may desire it?* The Board issued an early circular of warning and direction, and by correspondence and otherwise has done all in its power to limit the disease. Besides the 144 deaths recorded for Camden county, up to July 1st, there had been 110 deaths in other parts of the State. Of these, Hudson county had 70. Some of these date so far back as January, and show that Hoboken and Jersey City were already in process of epidemic. It has seemed to us that the work of the county Board is not allowed to be as radical as it should be in such cases, probably for want of funds or because permanent hospital accommodations are not at hand. A corporation ought to excuse itself for not putting out a fire, because it is expensive, just as plausibly as it excuses delay for this cause in heading off an epidemic. It may cost active outlay, but all this is economy as compared with the cost of an epidemic. We draw especial attention to the local report of Egg Harbor City and that of Rahway, as illustrating some of the phases of the disease, and methods of dealing with it. One case of death from vaccination is reported. Also one from a pin scratch. The one patient was aged 75 and the other 63. Each of them had erysipelas. All who see fit to argue therefrom that vaccination and pins must be given up may carry on their high debate alone.

SCARLET FEVER.

This disease registered 627 deaths in 1878–79, 573 in 1879–80, and 499 in 1880–81. There is no good reason why a greater decrease should not be secured. It has come to be more generally recognized that the skin secretion and desquamation has much to do with the spread of the disease. A microscope shows that the epidermis and scarf skin is shed or thrown off, and to a degree is charged with the

virus of the disease. For this reason the early use of vaseline or other oil or mucilage is urged. After scarlet fever has occurred in a house there is need of the most thorough airing of all clothing and general house cleaning of all exposed rooms. (See Household Circular, p. 260, of Report of 1880.)

MEASLES.

This disease numbered 87 cases, 77 cases and 70 cases, respectively, in the last three years. While it is not often immediately fatal, experience shows how it may become a serious and fatal malady. In 1862–63, it was very fatal in the army, and we had occasion to see it in a severe form. It often leaves the lung tissue impaired and serves as the start for tubercular deposit. As it is often treated without medical attendance, all should know the subsequent risks to which it gives rise, and how the lungs are left susceptible to the slighest changes. Children need to be guarded from exposure for a time.

Rötheln, or German measles, as it is often called, is reported as a cause of death in a case in Passaic county. It is a sort of rash, so like measles as often to be mistaken for it, and needs reference here only because it may at any time become epidemic, and should be recognized as quite distinct.

WHOOPING COUGH.

This proves seriously fatal in some foreign countries, and with us is greatly influenced by the season of the year or by states of weather. We are satisfied that it is often too lightly viewed in households, and leads to convulsions or other brain or nervous symptoms, which impair vitality long after the cough has ceased. The sputa or spittle should never go into the handkerchief, but into some disinfectant solution, as it conveys the disease. The deaths from it this year were 119, as against 277 of last year, and 137 of the year before.

DIPHTHERIA.

This continues to be, perhaps, the most formidable of children's diseases, and not infrequently claims victims in later life. In the last report it was made the subject of some special description, pages 8–13. The view seems confirmed that it is generally local before constitutional, and is always derived outside of the body. Its particle is

inoculable, and its conveyance by contagion indispensable. As it is not volatile, its transmission is that of near proximity or of exposure to infected garments or objects. It is one of the diseases greatly within the control of active hygienic and preventive measures. We have, the past year, known the elder daughter of a family, who ought to have been restrained by law, if need be, from going home, to convey it to four children, so that all five died. One or two of the children were taken to a physician in a way to expose others. Law must be kind but definite in dealing with such cases. 1,100 died of this disease in 1878–9; 873 in 1879–80, and 1,128 in 1880–81.

DIARRHŒAL DISEASES.

We must urge upon Local, and especially city Boards of Health, a closer study of these diseases. In certain districts of almost every large city they are the signs of how the population is suffering from low-race vitality or from bad air or water or food. The children are the delicate plants that first wither, because placed in an unwholesome medium or starved of the nutriment which their bodies require. The sudden flux is but the rebellion of nature, and too often ends the life before hygienic measures can be secured. Every physician knows that he seeks the cause as earnestly as he seeks to give the remedy. The fact that the treatment is so often in change of air or food is merely a certificate that the sickness is a casualty. If city Boards will accept such evidences it will lead to a closer attention to prevention.

Dysentery, which is specially marked in the office schedule, caused several deaths this year. It has, of late years, seldom prevailed in this State as a complication of remittent fever. When so prevailing it is apt to prove very fatal. This year there were more cases than usual in Mt. Holly and vicinity, and of a more serious type than usual. A few sporadic cases were reported elsewhere. When occurring in small children it is classified with diarrhœal diseases.

CONSUMPTION AND OTHER LUNG DISEASES.

As a special paper directs attention to the causes of this disease, we have here only occasion to refer to it. Statistics, rapidly collecting, will enable us ere long to show what counties and what cities have the largest death rates from this disease, and so assist in determining as

to local or avoidable causes. The lungs, from their intimate relation to the outer air and the whole blood circulation, form the most vital point of attack, as well as of life. Pneumonia is a common disease, while catarrhal, bronchial and asthmatic affections are among the most troublesome as well as frequent. There is great need that our population be directed to the means of personal protection. It is an experience that those who do their breathing most through the nose, instead of through the mouth, are not so likely to be affected by dust, by close atmospheres or by sudden changes. Hence those that have to talk are more exposed than those who may be silent. As the condition of the skin has much to do with the freedom and action of the lungs, it should be kept clean, so as not to be clogged with its secretions, and should be protected from drafts or sudden changes of air. This applies especially to the chest and body. It is because flannel is so good an equalizer of heat and air that it is valuable as a garment. So-called chest protectors are overrated, while too many forget that the lungs are as near to the back as they are to the breast.

BRAIN AND NERVOUS DISEASES OF CHILDREN AND ADULTS.

We have not yet sufficient State data to determine whether this class of diseases is especially prevalent. Statistics elsewhere seem to point out many indications as to too great pushing of children, and too great self-pushing by adults. The educational problem has no more important consideration than that which attempts to estimate what the school should be—what it should do in order to furnish to the State a healthful citizen. The time has passed when either the educator or the statesman can cast aside the hygienic view. We must ask whether brain and nervous diseases are being made by school life, or whether our American reputation for nervousness or early brain lesion is an acquired disability.

The deaths from the brain and nervous diseases of children were last year 1,642, being an increase of four over 1879–80, and a decrease of five from 1878–79.

The deaths of adults from similar causes were 1878–79, 1,314; 1879–80, 1,347; 1880–81, 1,502. A study and comparison of the tables will show details.

In respect to diseases of the heart, circulation and to urinary diseases we do not need to make additional remarks to those of former years. The comparative deaths from these for three years

have been as follows: heart and circulation, 1878–79, 972; 1879–80, 982; 1880–81. The record for urinary diseases is as follows: 1878–79, 558; 1879–80, 516; 1880–81, 608. In the office schedules all those relating to the bladder and genital apparatus are separately designated.

HYDROPHOBIA.

The occurrence of cases of hydrophobia at several localities in the State is worthy of attention. It was alleged, both in the winter of 1879–80 and that of 1880–81, and the summer intermediate, that an unusual number of cases had occurred in this country. It was attributed to various causes, such as the frozen state of the streams in winter, the extreme heat of the summer, etc. At one time Dr. Farr noted in England an increase of the disease not to be accounted for by any increase in the number of dogs. Six deaths from this cause appear in our Report of this year, each in different localities. Evidence has come to us of rabies among animals in other parts of the State, where there were no cases fatal to men. Dr. Rogers, one of our veterinarians, says that the disease was enzoötic in the lower part of Gloucester county, adjoining Delaware river, in the early months of this year, and thirty or more dogs died or were killed. It is so direful a malady as to deserve special study as to its causes, its development, and the circumstances which favor its prevalence in the lower animals. We draw attention to the special law of the State as to Protection against Mad Dogs, page 25 Revised Statutes.

CANCER.

This disease claims so large a number of victims, that its diagnosis needs to be carefully watched, and its symptoms closely defined. A careful review of the cases leads us to believe that such terms as carcinoma of the liver, etc., are used without full evidence. There are enough, however, distinct and from well known practitioners to assure us that the disease seems increasing in frequency. Here and there a place has recorded an unusual number, such as will require local investigation. There is some reason to believe that cancer must take its place as a degeneration of tissue, to which the body may become subject under a given set of circumstances, and that a change from the benign to the malign may take place. It is now claimed that a sudden development into virulency occurs, and that, as in

diphtheria, we are to determine the line between a follicular and diphtheritic sore throat, and the phenomena through which one may pass to the other, so we must study the determining or developing factors in some cases of cancer. Dr. Robert Newman, of New York city, in a recent article (Medical Record, December 24th, 1881, page 709), shows how a sarcoma may take on a cancerous development, and quotes from Rindfleish, Buechler, Billroth, etc. The deaths, as recorded for the last three years, are as follows: 1878–79, 378; 1879–80, 425; 1880–81, 451.

PUERPERAL FEVER.

The diseases of the puerperal state ought to receive close study, since they involve the loss of mothers. It is no longer doubted that many such losses occur through direct infection from nurses or physicians. Not a few practitioners now decline attendance immediately after a case of the disease, or of erysipelas of a marked malignant type. While due precautions may suffice, all need to recognize the peculiar susceptibility even to scarlet fever, which then seems to obtain. No pains should be spared in resorting to the most complete methods of disinfection, where there is the least possibility of conveying the contagion. The report of still births for the year is 1,476.

REMARKS.

We hope this year, by a plan authorized by the State Board, to invite physicians to the study of locality, and to the comparisons of disease, so as to enable them to apply the facts of statistics for purposes of closer inquiry, and, at the same time, furnish the advantage to be derived from fuller comparisons combined with personal observation. Every Local Board should, at least, preserve a record of the deaths and causes of death. This care of population and protection from such avoidable causes of disease as are necessarily prevented or abated by the aid of statutory provision, is so essential to the prosperity of the State, that the only questions which arise have reference to methods. These it is the duties of Boards of Health to consider with the greatest care, and to bring to bear thereupon all those vital facts which show the social conditions, the exposures and the diseases of the people.

While no provision is yet made in this State for that extent of

study, and of clinical tabulation, which is deemed expedient in some of the States, and in most foreign European countries, we are able to use the records with great advantage, and are collecting material which will hereafter admit of much more extended study.

The record for the current year certainly shows the great need we have to be more watchful over the causes of disease and the spread of epidemics.

The total record of deaths for the year 1880–81, is 20,964, being an increase of 1,997 over 1879–80, and of 524 over 1878–79. Because of a change in the law, it is probable that some deaths of 1879-80 did not find record. But there can be no question that the period from July 1st, 1880, to July 1st, 1881, must be registered as an unhealthy year. The extreme heat of two summers and the severities of two winters had their effect on various classes of disease. Malaria prostrated scores, whose deaths from chronic diseases were hastened by the complication. Typhoid fever, smallpox and typhus fever appeared as special, although localized, outbreaks. Besides those zymotic diseases, usually classified as preventible, number a great excess. Neither are the causes generally obscure. No vital statistician or careful physician can review our tables for the last three years without being able to see significant contrasts of degree, having to do with locality, with density of population, with neglects of drainage or sewerage, with non-removal of filth, or other ascertainable causes. It is as certain that you can cultivate disease into virulence by certain accumulations, as it is that you can secure an extra crop by the free use of appropriate fertilizers. So many households, so many villages, so many cities are doing this very thing. The people perish for the want of knowledge, or, still more, from failing to apply what is known. It is not all their own fault. There are duties which the State, the city, the township owe to the citizen that cannot be replaced by his personal efforts. The law and the help of an organized system must intervene. However large may be the supply of population from foreign lands, it is unfortunate for any old settled State when its birth-rate is not well ahead of its death-rate. It is unfortunate when, as is the case here, thousands are sick each year who suffer from avoidable diseases, and five thousand or more perish because they are not protected from evils, the relief from which is understood, but as to which they are powerless to relieve themselves. There has been great progress in sanitary knowledge and its applications, but most of our cities need better sanitary police as much as they need the preservation

of order in other respects. We urge upon every township and city Board of Health a more careful attention to the interests of their respective localities, and a careful study of this Report and the facts it presents, in order to make them earnest and efficient in securing better, stronger, longer life to the citizens of the State.

A STUDY OF CONSUMPTION AS A PREVENTIBLE DISEASE.

In the study of the diseases which deteriorate population, or cause numerous and premature deaths, none is more important than an examination into the causes of the prevalence of this disease. While it does not excite alarm as does the outbreak of some sudden and deadly epidemic, the death tables of almost every nation show that it causes a very large proportion of deaths. The English report of 1865 calls it "the most fatal of all human diseases." This, too, means an amount of prolonged sickness, and an entailment of race degeneration, such as belong to no other disease. From the standpoint of political economy, no less than in the special sphere of public health, it demands most careful attention.

At one time it was looked upon as a constitutional and inevitable disease, which in unchecked ravages would claim its yearly holocaust of victims. The advance of both medical and sanitary science has now shown how much it is the result of causes within our control, and how it behooves us to study its prevention in the interests of the people. It is the more important in a country like ours, to which there is a large emigration, since emigration usually represents a class particularly prone thereto. It is also important that in due time comparisons be instituted, such as will show us the proportions of the disease as represented by native and imported population.

The whole number of deaths from this disease reported in New Jersey for the last three years, is 8,488. This gives an average of over one-seventh out of the whole number of deaths from all causes.

The first cause of consumption which we note is that of inheritance, known as heridity. There can be no doubt, from the ample statistics both of this and other countries, and from the weighty testimony of physicians, that it is often derived from one or both parents, or even from an ancestry further removed.

Yet an analysis of such cases makes it very evident that the influence of this bias can often be checked or overcome. The children of

consumptive parents need in early life special attention, as to invigorating food, exercise, and the guarding against any irritation of the lungs. Cases are frequently within the knowledge of practitioners, where the members of a family which have led an in-door life, fall victims to the disease, while those who have an out-door life of not excessive exposure, overcome the taint, and so far eradicate it as not to entail it to their offspring. We know of a family of ten children, all but one of which died of consumption. The one who survived said that when a boy he perceived how all the older members of the family were affected, and resolved to live out of doors, and even chose sleeping in the open air in preference to a crowded bed-room. Simon says that in proportion as the people of a district are attracted to any collective in-door occupation, in such proportion, other things being equal, the district death-rate by lung diseases will be increased. For the bad ventilation which, as a rule, belongs to places of employment, tends to develop among the work people a large excess of phthisis.

Even those in good homes are not aware how often children are injured by being crowded in the same rooms, or sleeping so as to inhale each other's breath, and so have not the quality of pure air which is needed.

The hereditary tendencies of disease, and especially of this one, need full recognition, and then very much can be accomplished by preventive hygienic methods. It is all the more important, because these are the most hopeless cases, if there is a development of the disease.

SCHOOLS.

There can be no doubt that many of our school methods tend to foster or cause lung diseases. School rooms, even when large, need a constant supply of fresh air. The sitting position, long maintained, makes the lung itself inactive, or so constrained as to fail in a supply of air sufficient for healthy inspiration and expiration. The posture at desks is itself unfavorable to full breathing. Hence, there should be constant attention to the needs of the school room on the part of trustees and teachers. It is a great mistake to offer a free education to our American youth with such concomitants as insure feeble physical powers, and a limitation to healthful existence. The time has come when we know enough of the physical requirements for healthy air and healthy breathing, to warrant special attention thereto in the interests of the State, just because the child is a coming citizen, and

because his sickness or feebleness insure large present and prospective burdens. No child should remain as long as one hour in a sitting posture.

Much attention has recently been given to the effect of improper food in producing tubercular trouble. It is certain that children who are delicate often need more sugar and oil as articles of food than they can command. These, *taken at meal time*, with other food, have much to do with vitalizing the system. A poor quality of food, even when enough in quantity seems to be consumed, starves the system, and often leaves the person susceptible to colds, which, when occurring, are not easily overcome. It is now a serious question if there is not a more direct transfer of tuberculous disease. Facts are now being obtained and sifted which seem to indicate that the meat of tuberculous pigs or cows may communicate the disease. A form of tubercle, known as the pearl disease, is quite common with cattle, especially those that are closely kept in ill-aired stables. The disease is either identical or interchangeable with consumption. Whatever may be the question as to meat, it is highly probable that the milk of tuberculous cows engenders the disease in those freely fed upon it. There is much need of a careful study of milk diseases, since so many infants are dependent upon cows' milk as their food. Not only the marasmus and diarrhœa of children may be thus caused, but many cases of tuberculous disease in the lungs are believed to have this origin.

The relations of a proper dietary to consumption can only here be thus briefly alluded to. It is now well understood that different foods have as definite a relation to vital force, and to the prevention and resistance of disease, as have the fire and water of the steam engine to its propelling power. A study of foods and of food supply is needed in order to improve the health of the people, and to lead them to avail themselves of that which is most substantial and economic, as well as most healthy. (See *Report of Bureau of Statistics, 1880, p. 319.*)

The question of the contagiousness of consumption has been much argued of late years. Enough cases have come to record where a healthy wife has seemed to acquire the disease from a sick husband, or where those sleeping closely in wards with consumptive patients have become affected, to excite inquiry as to its modes of propogation. While it is not infective, in the usual sense of contagion, yet it is very certain that a continued foul and close atmosphere is made worse by

the presence of consumptives in it, and that liability is thus increased. Dr. Farr gives the opinion that "the prevalence of phthisis in the armies of Europe is probably due, in part, to the inhalation of expectorated tubercular matter dried, broken up into dust and floating in the air of close barracks." Similar contamination may take place in many a factory and sleeping room, and must be guarded against.

OPERATIVES' CONSUMPTION.

In the practice of medical men, it has long been recognized that lung diseases were often incited by dust in various forms, and especially that to which workmen are exposed.

In 1862 and 1863, the Local Government Board of Great Britain made an investigation into the subject, and secured a series of accurate facts, which may be relied upon as indicating some of the trades and employments especially hazardous in this regard.

The first statement has respect to potters in the great pottery centres of Stoke-upon-Trent and Wolstanton, of Staffordshire, including the principal earthenware and china manufactories of England. While only 30 per cent. of the men of these districts, over 20 years of age, were employed in the potteries, more than half, or 438 out of 827 deaths over this age in Stoke, and 241 out of 615, or nearly two-fifths of those of Wolstanton, were deaths of potters. This class of operatives, therefore, suffered a much larger mortality from these diseases, in proportion to numbers, than the rest of the population, and may, therefore, be presumed to have been exposed to some causes productive of pulmonary disease, from which the rest of the population were exempt. Dr. Greenhow was able, further, to show what branches of the trade were most deleterious. While chronic bronchitis was the most prevalent impairment, phthisis occurred in a large number of cases.

An examination into metal manufactories showed that pulmonary diseases were developed in proportion to the fineness of the dust and the constrained position and closeness of the work. Fish-hook makers and needle grinders suffered much. The introduction of a fan to blow away the dust had been found of great service. Those who worked at needle pointing were not able so fully to remove the impalpable dust, and so suffered more. While chronic bronchitis prevailed more than consumption, the latter was also produced. Dr. Greenhow, in this, and his second report, the year following, reviewed many of the leading industries of Great Britain, such as silk and lace making,

woolen factories, and workers in straw goods and in flax, button makers, watch makers, and many others, and showed how frequently lung diseases were produced, and consumption especially, as a result of the local bronchial irritation, or of unfavorable conditions as to food, air, etc. He thus states the conditions which have most frequently excited lung diseases:

I. The inhaling an atmosphere impregnated with dust, consisting of fine particles of metal or of sandstone, and of other materials used in various industries.

II. Inhaling an atmosphere containing carbonic acid or other gases unfit for respiration.

III. Working in ill-ventilated or over-heated factory rooms.

IV. Working continuously during many hours daily at a sedentary occupation.

V. Maintaining a stooping or otherwise constraining posture while at work.

In this State, pottery, glass-blowing, and various other industries need just this kind of analysis.

No one can read these valuable reports and other facts elicited since, without some appreciation of the interest which capital as well as labor has in guarding against the unnecessary complications to health, which are fostered by some industries, and most of which can be guarded against by adequate provisions of space, and by resort to simple appliances for protecting from dust.

The air which the artisan breathes should, as far as possible, be freed from all impurities. Clean streets, clean clothing, well ventilated shops, the moistening or blowing away of the dust caused in the work, and the consumption by fire of the gases and the smoke, are to be studied and applied, not only as a part of the rights and comforts of life, but as indispensable to personal vigor and race vitality. It is the right of the artisan summoned to work, as it is of the child summoned to school, that they should not find themselves compelled to breath air or inhale particles so injurious to health, as to be an unnecessary tax on vitality.

The influence of soil moisture and of defective drainage in causing consumption has been the subject of some important investigation. Conditions of climate have long been recognized as influencing pulmonary disease, and hence many changes are made in the apparent interests of invalids. Do we not overlook the fact that climate is in part an expression of soil and moisture conditions which have to do

with the ground about us? It has long been observed that low and damp places incline to this class of diseases—a fact not difficult of explanation when we remember that evaporation, heat and various atmospheric conditions are relative, and often can be modified by a change of soil, or by a removal of stagnant water, so that the air can freely permeate the ground to a sufficient depth.

We speak of the falling dew and a heavy fall of frost, forgetting that dew does not fall, but results from condensation of moisture arising from the relative relations of the heat and moisture of the atmosphere, and of the ground itself. The fact that the grass plot has dew and the gravel walk not, is to be thought of when we speak of different climates, since the thought suggested applies to sandy and gravelly soils, and to a modified degree to all the varieties of geological structure. Besides, the presence of mountains and of forests, and the relations of exposures to sun and light, have their influence.

There has long been some general recognition of the relation of dampness of soil or ground to disease, and especially to pulmonary disease, but the point was not dwelt upon and illustrated until Dr. Bowditch, in this country, and Dr. Buchanan, in England, conducted a series of definite inquiries. The observation of Dr. Bowditch had led him, in 1855 and 1856, to make some suggestions as to the law of soil moisture as related to consumption. The fact that the disease was not equally distributed in localities having the same kind and density of population soon became apparent. Dr. Bowditch made a very critical examination of the reasons of this difference, and examined and collected a large number of statistics bearing upon the subject. The study led him to present two propositions:

I. A residence on or near a damp soil, whether that dampness be inherent in the soil itself, or caused by percolation from adjacent ponds, rivers, meadows and marshes, or springy soils, is one of the primal causes of consumption in Massachusetts, probably in New England, and possibly in other portions of the globe.

II. Consumption may be checked in its career, and possibly—nay, probably—prevented, in some instances, by attention to this law.

Facts in evidence were adduced to show the humidity of soils on or near which stood towns, villages or single houses where consumption had most prevailed, and that moisture of the soil is the only known characteristic uniformly connected with "the consumptive-breeding districts."

Dr. Buchanan, in England, did not start his investigation in reference to phthisis, but in order to find out what had been the effect of structural improvements in twenty-five towns for a series of years. Dr. Simon, in examining the facts elicited, says: "The columns appear to indicate a partial dependence of pulmonary phthisis on some of the unwholesome conditions which have been removed. And when detailed examination is made of the cases which give that indication, and they are compared with the different classes where phthisis has not lessened its amount, *the novel and most important conclusion suggests itself, that the drying of soil, which has in most cases accompanied the laying of main sewers in the improved towns, has led to the diminution, more or less considerable, of phthisis.*" (*Report of 1866, p. 16.*) Dr. Buchanan says "that in some of the twenty-five towns a third or a half of the whole mortality from this cause had been removed, while in other towns it had been stationary or decreased. *The sanitary improvement that coincides with decrease of phthisis is, town after town, with least frequent exception, the drying of the ground on which the town stands.*" The next year (*Report of 1867*), Dr. Buchanan made a most valuable report, and arrived at the full conclusion "*that wetness of soil is a cause of phthisis to the population living upon it.*" We think it may now be claimed as an accepted fact that stagnant water and soil dampness cause lung diseases, and that the fatality of these, and especially of consumption, has a marked relation thereto. Coughs and colds do not all come from the sky. There are afflictions from the ground. This relation emphasizes anew the importance of drainage as promotive of the public health. It is one of those cases in which the interests of agriculture unite with those of health.

The relation of damp houses to all lung diseases, and especially to consumption, can not be too much emphasized. In these days, when the laws of healthy construction are so well understood, the damp basement, with its exclusion of light, and walls unfavorable to air ventilation, and all constructions which do not take dampness into consideration, are to be closely criticised. Now that water is so much introduced into houses, there is additional need of caution lest soil already damp or imperfectly drained have added to it a new source of stagnant water.

The study of the relation of climate to consumption, and to all lung diseases, is another matter worthy of our careful attention. It has long attracted the notice of medical observers, and no disease has so often been benefited by change of climate. It is equally true that

particular climates need to be studied with reference to the character of cases and their stages of progress. Else change means acceleration of the disease. It is evident, too, that families showing pulmonary proclivities to disease can be benefited by change of residence, and thus the act of prevention be applied not only to persons affected, but to the entire lineage. To our citizens and for our civic progress it is all the more important, because of our great variety and adaptability of climate. With perfected geologic, meteorological and vital statistic records, we believe that medical men will, as students and observers, make the subject a specialty, will yet be able within our own State to locate those seeking the best climates for forms of lung disability. The freedom from cold and malaria to be found in our most southern counties, and some advantages that can be claimed for some nooks among our hills, point to New Jersey as a suitable home for many who are not benefited by the climate of the extreme south.

The accompanying tables were not finished until after these pages were written, and so all the more forcibly serve to illustrate what has been said. No one can compare the various counties or the cities with them, or with each other, without perceiving the line of evidence. In cities where there is no drainage or sewerage, the record is sadly suggestive. Such cities have no need to wait for typhoid fever or diphtheria to suggest the existence of sewer gas. Ground dampness and soil saturation tell upon vigor and life, and especially upon the lungs, in many ways. Asthma, pneumonia and chronic bronchitis often need to be added to the list. Although the inhabitants of Cape May are not sufficient in numbers for full conclusion, no one can follow up diseases and ages in that county, as has been our duty, without observing some of its advantages for health—advantages shared by adjacent counties, also, in special localities. The climatology and weather records also confirm the idea of mildness and evenness of temperature and moisture.

We offer the suggestions contained in this paper only as preliminary, and for the purpose of directing attention to the study of consumption as the great waster of human strength, the greatest tax on population, and the most potent consumer of national vitality. To limit its ravages is one of the attainments within the reach of our Boards of Health, of our physicians, and of those who are aided by the State in that division of political economy which is known as public hygiene. To such we commend, as preliminary, a study of these tables.

The death-rate from consumption, for three years, is based on the census of 1880, and so is smaller than the actual fact, to the degree that the number of population for the two former years was less. For all counties or cities representing less than 50,000 people, or an average population for each year of 17,000, the rating is to be taken with some allowance since the numbers are not sufficiently large to eliminate common errors. Even for those larger the series of years is not sufficient for complete conclusion. But the table and the study therewith of localities or townships, and of counties and cities, as compared with each other or among themselves, shows great diversity, such as is dependent on locality, occupation, social condition, climate, drainage and sewerage, and other causes within the sphere of closer analysis as numbers and observations accumulate.

RETURN OF DEATHS FROM CONSUMPTION

In the Counties of New Jersey, for 3 Years, viz., from July 1, 1878, to July 1, 1881.

COUNTIES.	1878–79.	1879–80.	1880–81.	Total.	Population, census of 1880.	Death rate per 1,000 from consumption.
Atlantic	36	48	41	125	18,704	6.68
Bergen	87	94	80	261	36,786	7.09
Burlington	155	150	116	421	55,403	7.59
Camden	187	168	180	535	62,942	8.48
Cape May	12	12	9	33	9,765	3 37
Cumberland	92	108	91	291	37,687	7.72
Essex	554	511	585	1,650	189,929	8.69
Gloucester	67	45	61	173	25,866	6.68
Hudson	414	516	587	1,517	187,944	8 08
Hunterdon	59	67	71	197	38,570	5.10
Mercer	178	174	171	523	58,061	9.00
Middlesex	110	102	125	337	52,286	6.44
Monmouth	132	128	109	369	55,538	6.64
Morris	111	87	107	305	50,861	5.91
Ocean	32	28	34	94	14,455	6.50
Passaic	186	180	235	601	68,860	8.72
Salem	73	49	49	171	24,579	6.95
Somerset	55	41	70	166	27,162	6.11
Sussex	54	38	44	136	23,539	5.77
Union	117	115	151	383	55,571	6.89
Warren	77	50	73	200	36,589	5.46

Total consumption death-rate for the State, 6.85.

RETURN OF DEATHS FROM CONSUMPTION

In all Cities of Over 5,000 Inhabitants in the State of New Jersey, for 3 Years, viz., from July 1, 1878, to July 1, 1881.

CITIES OF OVER 5,000.	1878–79.	1879–80.	1880–81.	Total.	Population, census of 1880.	Death rate per 1,000.
Atlantic county—						
Atlantic City	10	11	13	34	5,477	6.20
Burlington county—						
Bordentown	17	24	13	54	5,334	10.12
Burlington	28	28	25	81	7,237	11.17
Camden county—						
Camden	120	115	125	360	41,659	8.64
Gloucester City	19	17	17	53	5,347	9.91
Cumberland county—						
Bridgeton	21	28	21	70	8,722	8.02
Millville	14	36	23	73	7,660	9.53
Essex county—						
East Orange	13	15	22	50	8,349	5.98
Newark	448	396	453	1,297	136,508	9.50
Orange	33	47	33	113	13,207	8.55
Hudson county—						
Bayonne	13	22	17	52	9,372	5.54
Harrison	12	20	19	51	6,898	7.39
Hoboken	76	76	93	245	30,999	7.90
Jersey City	327	344	390	1,061	120,722	8.78
Town of Union	14	12	21	47	5,849	8.03
West Hoboken	7	7	10	24	5,441	4.41
Mercer county—						
Chambersburg	16	17	17	50	5,437	9.19
Trenton	108	108	101	317	29,910	10.59
Middlesex county—						
New Brunswick	47	36	43	126	17,166	7.34
Morris county—						
Morristown	18	19	16	53	6,837	7.75
Passaic county—						
Passaic City	10	14	21	45	6,532	6.88
Paterson	156	152	197	505	51,031	9.89
Salem county—						
Salem	20	8	14	42	5,056	8.30
Union county—						
Elizabeth	51	49	95	195	28,229	6.90
Plainfield	17	19	24	60	8,125	7.38
Rahway	32	26	11	69	6,455	10.68
Warren county—						
Phillipsburg	13	11	15	39	7,181	5.43

NOTE.—The death-rate of some watering places is raised by the deaths of non-residents.

A REVIEW OF ENGLISH STATISTICAL REPORTS,

AS A GUIDE TO THE STUDY OF VITAL STATISTICS.

In the study of every subject there is need of a close study of models. The advantage of this is, that it acquaints us with the plans of those who have won positions as experts, with improvements made, with criticisms offered, and thus presents an outline of the science and the art which are attempted. While there must not be servile adhesion to authorities, no man is fitted to test his own originality or facility of work until he has acquainted himself with the methods devised and successfully operated by others. As it is one of our objects, also, to help forward those who, in the interests of population, desire to study vital facts, it is well, in a succinct and orderly way, to present outlines. We apply this idea by a brief review of the forty Annual Reports of the Registrar-General of England, with all the more zeal because the entire reports are rarely accessible in this country, and because they are of authority as models beyond any others. These forty reports relate to a period which has been largely formative, and yet which has aided much to give statistical methods a definiteness and a certainty such as obtains in a true science and in a distinct, although incomplete art. They show the gradual but certain advance which has been made. They reach over a period which has given opportunity to verify or dispute principles enunciated. They have so been conducted by Registrar-General George Graham, and by the medical superintendent and statistician, Dr. Wm. Farr, as to present their bearing on political economy and State health care. The length of service of both of these gentlemen has given unity and thoroughness to the system adopted. They have kept well apace with the advances made.

The first Annual Report of the Registrar-General of England was made to Lord John Russell, Secretary of State for the Home Department, in 1839, by the then Registrar-General, T. H. Lister, and

related to the year extending from July 1st, 1837, to June 30th, 1838. Before this there had been parish and other extended registrations, which had proved of much value. A commission had been appointed, in 1836, for the purpose of inquiry into the state, custody and authenticity of registers or records of vital returns in England and Wales. A copy of this report is in the library of the State Board of Health. The result of the report, and of other movements in the interests of population, was to secure a recognition of the whole care of registry, and the study of vital returns, as a distinct department of service.

The earliest and most special attention, so far as health studies were concerned, was given to the record of causes of death. Says the first report: "Tables exhibiting the proportions of deaths at every successive year of age, are among the most important materials, from which are deduced the true principles of life annuities and of life insurance, and the rules of friendly societies established for the use of the poorer classes." The commission's report recommended "an accurate and extensive collection of facts whereby may be facilitated the solution of all questions depending upon the duration of human life." In order to make these results "the source of important benefits, especially to the poorer classes, the registrar-general sought to secure facts as to the relative conditions, in town and county, and among different classes of people and of labor." One of the first comparisons, that of the mining parts of Staffordshire, Shropshire, Leeds and its suburbs, Cambridgeshire, Huntingdonshire, and the lowland parts of Lincolnshire, with several of the northern counties of England, showed a contrast of death-rate of infants under one year of 270 out of 1,000 deaths at all ages, and in the latter 180 out of the same number.

The first report as to marriages and births, gave merely a summary of the number of marriages, and the number of males and females not of full age, with the totals of births and the number of each sex. The death tables gave the area in acres of various divisions, the population by the census of 1831, the number of families, and the number respectively employed in agriculture, in trades, and manufactures and handicraft, and other families. It gave the number of males and females dying below the yearly ages, up to thirty-six or thirty-seven years of age, and tables showing the proportion of 1,000 registered deaths, which had occurred at various ages, up to ninety and upwards, in the whole of England and Wales, and in each of twenty-five divisions, which were made for comparisons. In some cases cities, and in some cases counties or districts, are in the comparison. The divisions

were under one year, and from one to three, from three to five, and after that by fives up to ninety.

The work was greatly aided by the sanction given to it by the Royal College of Physicians, the Royal College of Surgeons, and the Masters of the Society of Apothecaries, as represented respectively by their chief officers, Henry Halford, Sir Astley Cooper and J. Hingeston. J. Finlaison, the Actuary of the National Debt Office, aided in the work of what he called "political arithmetic," since he saw the important service of such statistics, and pointed out how, even with the imperfections of return which would occur, yet under a continuous system, the calculators would be able to make it "infallibly known how many deaths and births escaped registration, no less than the material fact of how many persons of each age and sex do now co-exist."

In this report, under date of May 6th, 1839, appears the first letter of Mr. Farr, as the Medical Superintendent of these statistics. Although so brief, it shows that he had comprehension of that work, from which he has just now retired, and which has made him one of the most distinguished contributors to statistical, medical and political science, all of which are economies applicable to the arts of home and civic and national life. He recounts the value of such returns in various aspects, but insists that the most important is in showing "the influence of civilization, occupation, locality, seasons, and other physical agencies, either in generating diseases and inducing death, or in improving the public health." He points out the value of a knowledge of the "epidemic constitutions" of years and places, as well as of the names of disease; of the precision and numerical analysis it would give to the principles of physic, by substituting measure for guess, and claimed that it would add to industry and wealth, because preservation of life would mean increase of vigor, and because "diseases, which are the iron index of misery, would recede before strength, health and happiness, as the mortality declined."

Comparisons instituted between city and county brought out already in bold relief the intensity of the extremes. While the average of England and Wales, as to population, was 265 to the square mile, the heart of English cities showed 263,000 inhabitants to the square mile. In the latter, the ratio of deaths to the population, were "from fifty to sixty per cent. more numerous than the deaths in the countries." It thus soon becomes evident that locality

and density of population have much to do with disease and death. It is easy to see that it is a vital necessity for a nation to know the causes of such wholesale deterioration. How it is brought about is thus graphically written: "Place 200,000 individuals upon a square mile; intersect the space in every direction by 10,000 high walls, which overhang the narrow streets, shut out the sunlight and intercept the movements of the atmosphere; let the rejected vegetables, the offal of slaughtered animals, the filth produced in every way, decay in the houses and courts or stagnate in the wet streets; bury the dead in the midst of the living; and the atmosphere will be an active poison, which will destroy, as it did in London formerly, and as it does in Constantinople now, 5.7 per cent. of the inhabitants annually, and generate, when the temperature is high, recurring plagues, in which a fourth part of the population will perish."

The second report extended the details as to marriages and births, so as to give the number occurring in each quarter of the year, and made comparisons of the births and deaths for districts.

A comparative statement was also made of the ages of persons in the several counties, showing what would be the number of persons of the several specified ages in the several counties, both of males and females—the whole number of each being assumed to be 10,000. Thus the percentage of the various groups of ages could be shown. The contrasts between county and city death-rates were still more fully verified and magnified; yet not in a spirit of abandonment. It was noted that even in the metropolis the "mean duration of life was from twenty-five to thirty years in the east districts, and from forty to fifty years in the north and west districts." It was shown that health and life are preservable, provided the density is not carried beyond certain limits, and if cities avail themselves of advantages within their reach. It was proposed, in the densest neighborhoods, to open some wide streets, through which the collateral streets would be ventilated by fresh atmospheric currents. An epidemic of smallpox, in which over 11,000 died, led to a discussion of the causes which give the maximum activity to such diseases as are always present in a metropolis.

The excess must be accounted for by assuming that the disease had its origin in some spreading physical cause; that the contagious principle grew more virulent, and was conducted with greater facility by the atmosphere; that the susceptibility of the population increased, or, finally, that the tendency of the organization to fall into this peculiar pathological state augmented spontaneously."

In the third report the forms of tables and comparisons remain undisturbed. The letter of Mr. Farr discusses, especially, suicide, and the principles which are the basis of the law of investigation in coroners' inquests—a subject still needing our careful inquiry.

The classes of disease were given in twelve divisions, as follows:

1. Epidemic, Endemic and Contagious, including Smallpox and Typhus.
2. Diseases of the Nervous System.
3. Diseases of the Respiratory Organs, including Phthisis.
4. Organs of Circulation.
5. Digestive Organs.
6. Urinary Organs.
7. Organs of Generation.
8. Organs of Locomotion.
9. Organs of the Integumentary System.
10. Of Uncertain Seat.
11. Old Age.
12. Deaths by Violence.

A separate table of the London hospitals was made for comparison.

The fourth report, that of 1842, was by the hands of George Graham, who from that time continued to be Registrar-General until 1880. The kingdom was now divided into 619 districts and 2,184 sub-districts to secure accuracy of return, and the tables were extended so as "to apply to the tables of the population, the marriages, births, deaths and ages at death." The comparisons of marriages and births were made with the females living, and it was claimed that the number of these was the best basis for nearly all of the comparisons, since more of the male population is floating or absent at the time of any enumeration by census. The fact was noted, that in the area of city and country some cities include more of a half-rural district than others, and that therefore the ratio of dense and scattered population must be known. In his letter accompanying his report, Mr. Farr, on the basis of the statistics, discusses the laws by which the increase of the population is regulated. In the study of marriages he takes only first marriages, because "the first marriages represent the number of persons who marry annually," if those of both sex are enumerated. From various facts he is able to adduce, he shows that the fears of Dr. Price, in respect to depopulation, and those of Mr. Malthus, as to increase beyond the means of subsistence, are alike

groundless. *Families, and not individuals, are the basis of State power and thrift.*

In order that death returns might be more informatory, Mr. Farr revised the statistical nosology, and gave to it the outline which it has since, for the most part, maintained. It is of interest, however, to recognize some of the changes which more accurate knowledge has rendered necessary.

We are told that pestis, or plague, which in the London bill of mortality, A. D. 1665, numbered 68,956, had 2 cases only reported in 1679, and that it then merged in "spotted fever" or "ague and fever," and has now disappeared. There are remarks as to scrofula, phthisis, pneumonia, etc., well worthy of passing note.

Prout is quoted as saying that rheumatic fever is apparently caused by a miasma, and that malaria excites it. The term "zymotic" is introduced as a substitute for "epidemic, endemic and contagious diseases."

Quotations from Sydenham quite accord with more recent views of evolution, while putrefaction and specific genera of infusoria and minute vegetables of the lowest class had before been commented on as the cause of epidemics. (*Vol. 1, p. 95.*)

The fifth report contains notices of life tables of much importance in their bearings on life assurance and annuities. It is noted that, notwithstanding the risks of maternity, the chances of life from twenty-five to forty-five are greater among women than men, on account of the greater risks of the latter to accidents of various kinds.

Too much importance has been attached to obtaining the mean age at death, i. e., "to the summing up of the ages at which people die, and dividing the number of years by the number of deaths." Because, for instance, "professions fluctuate more than the general population," certain professions, stations and ranks are only attained by persons advanced in years, and some occupations are only followed in youth. So the mean age at death, or the age at which the quoted number of deaths occur, cannot be depended upon as showing fully the influence of occupation or longevity. In order to show the contrast between city and country, we have, by a diagram, a graphic delineation of the difference in the lives of 100,000 living in Surrey, Liverpool and London. Of the 100,000 born in Surrey, more than half are alive at the age of fifty, while out of the same number born, 41,000 live to the age of fifty in London, and 26,000 in Liverpool. Among the facts seemingly elicited in this report was the inefficiency of the

lancet in arresting pneumonia, the magnified danger of what is called the "turn of life," and the necessity of distinguishing between rheumatic fever, or acute rheumatism, and those chronic aches called by this name. Important facts were also elicited as to the large losses of women in childbed, and the contagious fever which sometimes occurred as an epidemic. The causes of high mortality in fever districts were considered, and the chief excess attributed to the excessive presence of decaying organic matter in the atmosphere. The bearing of health, on the value of wages, and the comfort of the working classes is clearly shown. The sixth report gives some attention to the births of illegitimate children, as showing the condition of the population, and their especial limitations of life.

The number and causes of death, and of males and females, are, as before, separately considered.

A study is made of the number of violent deaths in various occupations, and a general comparison given of all the vital statistics of various nationalities outside of the kingdom.

Dr. Farr objects to too much reliance on the "mean age" at death, which was the first basis of "Tables of Mortality" or "Life Tables," and to the second, but better method, in which *the mean population is divided by the annual deaths, or the proportion dying in a year, to 100 living, of all ages is found;* and the relative *mortality of two districts or counties is thus compared.* But, on account of errors which occur from emigration or immigration, he gives preference to the method of Dr. Price in the Swedish table, and Mr. Milne in the Carlisle table. He expresses it thus: "By taking the population living in the middle of a year (1841 for instance) at each age, 1–0, 2–1, 3–2, 4–3, 5–4, 10–5, etc., and the deaths in the same year at the same ages, we find how many die in each year of age, out of a given number living, and can calculate, therefore, how many will arrive at the age of 1, 2, 3, 4, 5, 20, 30, etc., years, or determine the true mean duration of life." The bearing of this knowledge on national progress, and on the life insurance industry, is easily perceived.

The seventh report claims that the age of the mother at marriage, and at the birth of her children, must always be given. The value of the registration of vital statistics is shown as "*deterring from crime, fostering a reverence for human life, and discovering the causes of premature death in the various circumstances of the population.*"

In the eighth report the Registrar-General notes how "the fluctuation in the marriages of a county expresses the views which the

great body of the people take of their prospects in the world," and illustrates it by a series of historical and numerical facts. Dr. Farr shows how the registration act throws light on the causes that affect the health of the people, and how, incidentally, it is of great value to the interests of life insurance. In this and the ninth report, meteorology takes its place for more distinct notice. The effect of various agencies on health is discussed, and while a cyclical law is admitted, the terror of epidemics is shown to arise from local conditions.

"Internal sanitary arrangements, and not quarantine or sanitary lines, are the safeguard of nations," is the language of the tenth report. Yet the fact is noted that cholera is epidemic first in India, and influenza in Russia, and that the points of origin must be attended to. The latter was a very fatal disease in England the previous year.

The meterology of England, which had first been separately commented upon by James Glaisher, Esq., F. R. S., of the Royal Observatory, Greenwich, in the report of 1846, from this time onward to the present has received his careful comparison.

The eleventh annual report, containing abstracts for 1848, notices the decline of typhus fever in London, which the year before had marked a mortality of 3,184. The examination of sewerage in London showed 191 streets or ways wholly without proper sewerage, and a great portion of the remainder defective or incomplete.

The twelfth report contains a new English life table, calculated by Mr. Farr, as well as some valuable comments on the whole system of insurance. The study of life, of disease, of death, has very important relations to insurance, and proper systems of insurance, founded on vital studies, have very important relations to a provident care of that large portion of population that can expect no other way of meeting some of the contingencies of human life.

The bearings of the system as a matter of political economy and state thrift, need to be carefully studied. It takes the place of friendly societies, upon which English artisans have so much depended, and is capable of results as progressive as if it were a trade or an art. The comments upon the revelations which epidemics make of polluted rivers, crowded workhouses, stagnant sewers and cesspools, undrained and uncleansed cities, and of their propagation and extension from such lurking-places, are still applicable. Statistics are carefully compared as showing the "insalubrity of undrained land." Thus, the mortality of Ely, North Witchford, Whittlesey and Wisbeach, in Cambridgeshire, at the mouth of the Xene, was 2.45 per cent., while that of the high parts of Surrey, Sussex, North Devon and Northumberland was from 1.80 to 1.40 per cent.

The frequent change of camp was shown to be a necessity in war, because of the befoulment of land by human effluvia. "But an undrained town, insufficiently supplied with water, drains and sewers, has the inconvenience of a perpetual camp," with its fevers and fluxes, besides a surety of being exposed to fatal epidemics.

In the appendix of the report of 1849, commences a new series of quarterly returns, giving not only deaths, but the marriages and births in all the over 2,000 sub-districts. More attention is also given to facts in climatology. It marked a change or extension of method which aggregated facts, so as to show them in closer relations and with more specific areas. These statistics, says the report, express the results of the circumstances and infinite variety of conditions in which the seventeen millions of inhabitants of England are placed.

As they are facts, and are expressed numerically, they admit of no exaggeration; while they correct the fallacy of judging of the state of a great and various kingdom; either from the field of one man's experience—from his own parish or county—or from vague, accidental, prejudicial representations.

The letter of Dr. Farr to the Registrar-General, is with reference to life tables as deducible from bills of mortality. It is a most valuable presentation of the bases of calculations as to life insurance as well as to provisions for sickness or for remuneration in case thereof. He claims that "the rate of mortality in decennial periods after the age of fifteen, furnishes the most satisfactory basis for determining the series of fractions to express the probabilities of life."

In the thirteenth report, in comments as to smallpox and the neglect of vaccination, reference is made to the recent investigations of Mr. Cerly, of Aylesbury, who "introduced the matter of smallpox, taken from man, into the cow and produced pustules, which supplied lymph and raised pustules in children, possessing the properties of cowpox, and which have served since for all the purposes of vaccination, thus proving that cowpox is a modified smallpox," a point now often disputed. The report, in reference to the contrast afforded as to the aggregate mortality in the open country as compared with cities and towns, says: "The juxtaposition of the figures in the table suggest the melancholy reflection that more than seven millions of people inhabiting the metropolis and all the cities and great centers of indus-

try are still exposed to a mortality which is not inherent in their nature, but is due to the artificial circumstances in which they are placed. The waters, the sewers, the soils, the church-yards, emit poisons. To every 10 natural deaths, 4 *violent* deaths, *i. e.*, deaths from these poisonous exhalations, are superadded. The quarterly summaries are accompanied with quarterly meteorological statements by James Glaisher, F. R. S.

The tables of summary as to the seventeen groups of causes of death, are made more informatory by Table I.—Giving the causes of death registered in England for four successive years; Table II.—The *causes of death* to one million persons living in 1850, the deaths from each class of causes, and from each cause; and Table III.—*Causes of death* to one million deaths from all specified causes, in the year 1850, the *proportional numbers* for each class of causes, and from each cause.

In the fourteenth report, the Registrar-General again notices that the *mean* age at death is not to be relied on to show the healthiness or insalubrity of certain occupations, "which depends on many circumstances besides health, and among others upon the ages of the living, which varies accordingly or not, as the business is one entered into early or continued into late in life." The tables as to the influence of occupations, contained in this report, are valuable. The best average is represented by farmers, and the heaviest rates of mortality by miners, laborers, butchers and inn and beer-shop keepers. Tables II. and III. of the previous report are consolidated into one. The fifteenth report, for 1852, notices consumption as "the greatest, the most constant and the most dreadful of the diseases that afflict mankind." It causes nearly half the deaths between 15 and 35, and during one year was fatal in 50,594 cases. Of the constitutional diseases after consumption, dropsy is the most fatal. It caused, for the same period, 9,788 deaths, and stands, for diseases of the heart and kidneys, most frequently. Rheumatic fevers are placed in the zymotic class. Violent deaths, or deaths by external causes, were 3.6 to every 100 deaths, or 14,475.

The sixteenth report (1853) refers to the deductions made in the thirteenth report by comparing the number of people living in 1841 and in 1851, with the number of births and deaths in each of the ten years. The deaths to 1,000 vary to some extent, as the population is composed more or less of children or adults, but the birth-rate and the death-rates at certain specified ages, help to eliminate any error from this cause. The series of results are deduced by dividing the

deaths in the ten years, 1841–50, by ten times the authenticated mean of the population enumerated within the 628 districts in 1841–1851. It is shown that the general results thus obtained are reliable. In Rothbury and Glendal, in Northumberland, and Eastbourne, in Sussex, the annual death-rate was only 15 deaths in 1,000 living. In a summary of all the districts, the Registrar concludes that the mortality from natural causes, through the kingdom, does not exceed 17 per 1,000, and that all deaths above that number are to be referred to artificial causes. An analysis shows that the excess results from unhealthy occupations, the want of natural care, resulting from the necessary toil of mothers, marshy lands, and the "condensation of people in towns, without the requisite mechanical and chemical arrangements for removing concentrated impurities, for supplying pure water, and for introducing through large streets free currents of pure air."

The good results of vaccination and the evils of neglect are illustrated. The prevalence of carbuncles and boils, as an epidemic, in two districts, is noted. Prof. Laycock (nineteenth report) claims carbuncles as sometimes contagious. The evils of water contaminated by sewage had been fully illustrated in severe sickness at Newcastle-upon-Tyne, at Hull and at Exeter, and the labors of Dr. Snow had served to awaken attention to its effect on cholera and other epidemics. The report of Mr. Farr on Nomenclature and Statistical Classification of Diseases, for statistical returns, as initiated by the first Statistical Congress, at Brussels, is one of great value, and has aided much in that grouping of diseases and causes of death which is indispensable to the deductions of great principles as to the laws of preservation of human life. The report of the second Statistical Congress, held at Paris (1855), the first having been held at Brussels in 1853, shows the importance attached to statistical nosology, statistics of insanity, of epidemics, of accidents, and of the whole area of vital statistics.

The seventeenth report notices the fact that the health of operatives is so much affected by dust as that it has been proposed to distinguish a class of pulmonary diseases as "sand and dust" consumption.

With all the talk about the risks of maternity, it is claimed that in a good state of society the child-bearing women of a population are "select lives" in the insurance sense. The circumstances under which a common disease, as diarrhœa, takes on an epidemic form as cholera, are worthy of much study.

Local and meteorological circumstances had much to do with the

virulence of the disease at Newcastle-upon-Tyne, in 1853–4. "Zymotic matter is evidently distributed at different degrees of strength, and there is a point of strength at which it strikes down all resistance and overwhelms a population with destruction. *The causes of this destructive form of the disease* fluctuate much more than the causes of the diarrhœa.

The mortality of cholera was highest on the land, at the low mouths of rivers, and generally on the low ground of towns. "Cholerine or any other organic matters, mechanically suspended, either in the air or in the waters, necessarily accumulate in the lower strata."

The language of the eighteenth report has not ceased to be applicable in this State.

"The great work of the day is to improve the health of the people; and the first steps toward its accomplishment are the throwing open building grounds on favorable sites, facilitating the distribution of the population over town and country by railways, supplying the towns with pure water, draining and opening streets, and removing constantly for immediate deposit in the soil, the town guano, which would, no doubt, prove an excellent substitute for that imported."

In the nineteenth annual report (that for 1856), the value of a coroner system is shown to be not only in detecting criminality but also in protecting from carelessness, nuisances, etc. The utility of inquest is not to be shown by the number of crimes found to be committed but by the number which the system prevents.

The record of death certificates is a mild form of inquest, and much helps to prevent crime.

The report of the Third Statistical Congress, held this year at Vienna, adds valuable information.

"Without the possibility of comparing observations, progress in the sciences, based on observation, is impossible." (Quintelet.) This is why statistics as to life and death are so important. The review of marriages in the twentieth report again notices that these vary with the prosperity of a country.

"The marriages of the middle-higher classes are apparently most numerous when the price of wheat is highest, while the reverse happens with respect to the marriages of artisans and laborers. These marry in the greatest number when the price of wheat is near the general average. All violent fluctuations in prices are injurious, and the medium price, whatever it may be, is most favorable to the happiness of the great bulk of the people."

It is shown that in certain marshy districts the mortality is raised

from 17 to 24 for 1,000, chiefly in consequence of the noxious emanations from a rich, ill-drained soil. Fever and ague are the most ready indices. The comparison between several healthy and unhealthy districts still more proclaims how many deaths are artificial and avoidable. Since ours is so much a city State, the comparisons between town and county are most important. The report for this year (20th) notices an unusually stagnant condition of the air in August and the high temperature, as causing great increase of diarrhœa and of diphtheritic disease. In comments upon the puerperal diseases, Dr. Farr notes that a society had recently been formed "for the cultivation of the important act" of care for the conditions of maternity.

"The excretions of the skin, frequently absorbed, give rise to some forms of zymotic disease." Ablution is the preventive. It is conceived that epidemics in clouds of invisible mist exist at times in the atmosphere, and their settling and their violence may depend on climatology and telluric and personal conditions.

A remark in the twenty-first report, on education, suggests to us the care of public health is all the more important, because of the interferences which sickness causes to education. The securement of education and of health are the most important interests to a republic.

The report of 1858 has the first extended notice of diphtheria. "Public men will yet find," says the report, "that some glory may be gained by saving life by great sanitary works. It was in 1858 that the Legislature gave the inhabitants of every district of England and Wales the power to raise the money and to execute the great works which the country requires." These were known as the public health and local government acts.

It marks the era with which commenced "The Report of the Medical Officer (John Simon) of the Privy Council," a series of reports which have done more for public health and State life-care than all others. The report narrates additional facts as to malaria. Bedlington is quoted as showing with what precision the death-rate can be advanced, it being 23 in 1,000, in 1856; 27 in 1857, and 35 in 1858. The description of its evils ends by saying, "Bedlington neglects sanitary measures and sits tranquilly over its cesspools, which send up disease among the inhabitants."

In the twenty-second report (1859) the valuable results to health which had been shown in the districts of the Nene, are referred to. It is insisted that great manufactories should consume their smoke, instead of leaving it to be consumed by the people.

It is said: "The improvement of the health of London has proceeded step by step with the amendment of the dietary, the drainage of the soil on which the houses stand, the purification of the water which the people drink; with the sweetening of the air and with the progress of medical science, which is the source of sanitary doctrines. The causes of disease are numerous, but every one that has hitherto been discovered can be to a certain extent controlled. In its zymotic diseases the solidarity of the human race is unquestionable."

In the report of 1860, among the incidental advantages noticed of birth registry, is the fact that not so many children are left to die without medical attendance. Rheumatism as well as ague is largely attributed to the undrained land. In order to compare results of registry for ten years, there was made an extended supplement to this report, in which special tables of comparison were published. Tables were also given more fully of the effect of occupations, although, owing to the uncertainty in the naming of the trades, the influence of trade and profession upon mortality and duration of life must not be too hastily calculated.

The report of 1861 gives some valuable comments on the misfortune of cesspools, and the diseases resulting therefrom.

The twenty-fifth report draws attention to the fact that the high death-rate of Liverpool, Manchester, etc., are the fruit of causes long in operation and made worse by increasing density of population, since this is the "worst-drained part of England." Typhoid fever is so much a pythogenic or putridity fever that Dr. Murchison gave it this name, and believes that it is "often generated spontaneously by fecal fermentation." For the first time, ovariotomy is alluded to, with the fact that Mr. Spencer Wells had operated on one hundred cases and sixty-six had recovered.

In the twenty-sixth report, attention is drawn to the fact that scarlet fever, which had been very prevalent and fatal in parts of the kingdom, admits of preventive measures. It seems to have reached us from Arabia, and demands the most careful study as to its laws of propagation, and the means of its dilution and limitation.

It occasioned 30,475 deaths that year, and diphtheria, which first figured in the returns of 1859, caused 6,507 deaths.

In the twenty-seventh report it is noted that the registration of deaths had often served to bring crime to light, as in the case of Palmer, Pritchard and others.

The twenty-eight report (1865) gave a careful notice of vaccination,

which had first become a subject of legislative act in 1802. The country was, in 1865, threatened not only with cholera, but yellow fever. The Hecla, from Cuba, laden with copper ore, entered Swansea harbor, and landed James Saunders, who died that day. Twenty-nine persons, who had been in or near the Hecla, were attacked, and fifteen in all died of it. "The disease did not spread by contagion, but was apparently induced by the diffusion of the fever miasm among the people." The last death occurred October 8th.

The report of Mr. Leigh, of Manchester, notes the fact that although cholera "probably originated in the filth and dirty habits of the devotees who throng the banks of the Jumna and the Ganges, assisted by the miasm and putrescence of those polluted rivers," yet this is made more deadly by lighting in foul places, "where the tone and strength of the population" has been so affected by their circumstances and surroundings as to "vitiate the blood and exalt their susceptibility to deleterious influences," and cause "a chronic disorganization, always attracting the marauding bands of the enemy."

The value of the "English life table," both for vital statistics and life insurance, is shown. The statement that to 41 persons living there is one birth, one death, annually; the rate of mortality is one in 41, and 41 is the mean duration of life, is nearly the fact as to the registry of England.

Under remarks on constitutional diseases, Mr. Farr refers to the fact that human tubercle, when introduced by inoculation, causes tubercular deposit in animals, and thinks that the prevalence of phthisis in the armies of Europe is probably due in part to the inhalation of expectorated tubercular matter, dried, broken up into dust and floating in the air of close barracks. The first appearance and diffusion of rinderpest in England occurred this year.

The next report (1866) considers the evils of the smoke nuisance, and the causes of the vitiation of the atmosphere of the larger towns, and concludes that the action of organic poisons is nearer to fermentation and putrefaction than to any chemical process. In this year cholera was epidemic.

A letter to coroners contains valuable hints as to the different forms of inquest. Even where no one is killed, ought not causes of accident to be investigated?

This report has a separate supplement on the cholera epidemic in England. It had thus far visited England four times—first in October, 1831–32. Many thousands were attacked and perished,

but no registration of causes of death was then kept. All sorts of theories as to "the new disease" prevailed, but "the dreadful suspicion of occult poisoning, which excited the populace to madness and murder, not only in Hungary but in Paris," did not occur in England. The great discovery as to it then was, that cholera, in its worst forms, is preceded by diarrhœa, and that to arrest this is often to arrest the disease. The practical importance of this discovery was well established in the epidemic of 1849 and that of 1854, and led to house-to-house inspection, and to a restraint which, in numberless instances, checked the disease. In the epidemic of 1848–49, the Board of Health, consisting of Lord Ashley, Mr. Chadwick and Dr. Southwood Smith, insisted upon the full applications of this method. The epidemic passed some places, as if for cause. Dr. Snow showed that the "cholera stuff was distributed in all its activity through water." "The terrible outbreak in St. James district inculpated the Broad street pump." Jameson says that the natives of Bengal claim boiled water to be a preventive.

In the third outbreak, that of 1854, Sir Benjamin Hall was President of the Board of Health, and asked of Lord Palmerston a medical board, which was granted, and led to fuller and more permanent inquiries into the public health. Thus, by the year 1866, from the observations of the three great plagues, we had learned enough of the causation of cholera "to justify confidence in its limitation and control, by preventing the distribution of cholera stuff through water, by the early treatment of the premonitory diarrhœa, and by destruction by disinfectants of the cholera flux." Was not that sanitary progress? Dr. Snow held that cholera was disseminated only by contact with the evacuations, or through water containing them. Pettenkofer showed that in Germany the localities "which had the water line nearest the surface had suffered most from cholera. The excretions of cholera patients give the germ." It is easy for living molecules to multiply by millions. The comfort is, that the lower vegetable and animal life is short-lived, and so self-limiting to a certain degree. "The air or the water which one day is poisonous, may, a few days after, be harmless." "The spores of some fungi are ærial, and repel water, but vibrions are true aquatic productions." (*Hassall.*) The effect of elevation, distance, sewerage, wealth and poverty, occupation, sex and age, etc., are discussed. The zymotic theory is fully discussed, as also the practical means to be used to prevent the spread of the disease. Quarantine, after the methods of former days, is strongly condemned.

In March, 1866, an International Cholera Conference, with representatives from seventeen countries, sat at Constantinople. It discussed the origin, development and mode of propagation of cholera, and the measures of preservation, hygiene and restriction.

When we read of the conditions in India, it is not surprising that cholera originated there. Dr. Barnes gives, as the sole cause, "the exhalations arising from the decomposition of animal and vegetable matter, and the use of water in which this process was continually going on." The whole treatise is a most valuable contribution, not only to the history of cholera, but as a guide to our dealing with other epidemics.

The thirtieth report has comments as to the need of studying weather beyond the scope of mean temperatures, humidity, etc. The need of elementary education as to health matters is enforced, while a summary of improvements made, as showing improvement in health conditions, is given. It is well said that "in estimating the fruits of sanitary labors in the older neighborhoods, *it should not be forgotten that the conditions of populations, increasing rapidly within fixed boundaries, has a constant tendency to deterioration, so that to prevent an increase of average mortality is itself a decisive gain.* New testimony is given to the fact that on the undrained lands of the lower valley of the Thames, and of other English rivers, where their waters are stagnant or sluggish, and thrown out of their channels by mill-dams, thousands of the population suffer from ague, rheumatism and neuralgia, while many die of these and other diseases." Dr. Farr ably discusses the causes of zymotic diseases.

The report for 1868 says "that the great lesson to be derived from vital statistics is to discover the relations which certain results bear to causes under control. The returns of recent years afford proof that some diseases have been brought under control, and it is encouraging to reflect that any sanitary measures adopted to check the ravages of any one epidemic, are operating at the same time more or less *towards the reduction of the virulence of others.*" In 1868 the great sewer system of London, as planned by Bazalgette, was nearly completed.

The appendix contains an account of the Statistical Congress held at the Hague, in 1869. In order to emphasize the number of preventible deaths, it is said that statistics shows that from 1851 to 1861, 30 large towns of England, having a mean aggregate population of

two and a half millions, lost *every year* 32,735 more than would have died had this been subject only to the rate of mortality prevailing in the healthy districts of England.

Drainage is said to have favorably influenced the rate of mortality more than any other one measure. It is only by it and by vegetation and cultivation that malaria can be subdued.

Parasites derived from unhealthy meat, or impure water supply, cause many deaths. The contrast between 352 deaths of men from gout, and but 96 women, is worthy of study.

The report for 1870 notices how scarlet fever seems to recur more frequently, and in its virulence to be an index of insanitary conditions.

A supplement for 1860–70 presents a similar series of tables to that of 1850–60.

The letter of Dr. Farr recounts the changes as to life and health-care which have occurred. In 1771–80, smallpox, in London, was the cause of one hundred in every one thousand deaths; in 1831–5, of twenty-seven, and in 1861–70, of eleven. It is believed that in large ratio we are able to diminish other diseases also. He fully discusses the errors of Malthus, and says: "If Malthus had had before him the returns of produce, as well as of population, in America, he could scarcely have fallen into the error of laying it down that while population increases in a geometrical, subsistence increases in an arithmetical progression."

The progress of mankind in health, the mortality of males and females at the several periods of life, the effect of density of population on health, the march of an English generation through life, the law of mortality and of attacks of disease, the health of men engaged in various occupations, and other matters of great sanitary importance, are discussed.

While mortality increases with density, it is not directly, but as the "sixth root of the density." Examples are given to show how certainly density increases disease, unless sanitary art lends its aid.

"The mean lifetime is found from a life table, which shows how many of a given number born, live through each year of age, and what is the sum of the number of years they live; the sum of these years, divided by the lives, is their mean lifetime. Thus, by the English life table, 1,000 persons live in the aggregate 40,858 years, and their mean lifetime is 40.858, or nearly 41 years. Of their number 303 live to the age of 45; and after that age they live 11.771

years, so their mean after-lifetime at 45, is 23.4 years. This is often called the expectation of life. The given age *plus* the mean after-lifetime, is the mean age at which they die." The pecuniary value of life is alluded to.

The facts as to the effects of occupations are derived from the series of reports for twenty years, in the same classes, at ten different ages. The various statistics show the value of out-door life; the effect of filth trades, of dust, and especially of metallic dust; of confined work like that of tailors and shoemakers, and various other facts of interest and of practical worth.

It has been found by experience that in England, for one annual death, *two* are on an average constantly suffering from sickness of some severity. There are two years of severe sickness, on an average, to one death.

The thirty-fourth report for 1871 says of the vital returns that "No part of the county need remain in ignorance of the sanitary condition as shown by the proportion of deaths to its population, the number of deaths referred to the principal zymotic diseases, and its infant mortality, measured by the proportion of deaths under one year to births registered."

Smallpox this year ravaged the kingdom as not before since 1838, and caused 16,268 deaths. The letter of Dr. Farr gives many valuable facts as to it and vaccination. A report on "Infant Mortality," by the Obstetrical Society of London, forms a part of the appendix.

The thirty-fifth report discusses the density of great cities, and how the population is to be maintained in health, and shows that registration is a cheap form of inquest. While it is admitted that we have not all the facts in evidence, yet "if the attainable, though imperfect, knowledge of disease suffices for the purposes of medical practice, it cannot be worthless for medical statistics."

Comment is made upon the evils of unskilled attendance upon mothers. A mother's life often hangs on some simple act easily performed by one having knowledge of the mechanism of delivery, but, in the absence of the skillful hand to perform that act, she dies, and carries out of life with her the unborn child.

The report of 1873 shows how the ratio of deaths at all ages may be taken as a fair indication of the sanitary condition of the population, and add the usual extended tables.

The thirty-seventh report cites Wisbech, Orsett and Salisbury, and

other examples of sanitary supervision which have been exercised for long years with excellent perceivable results.

Diphtheria was fatal to 3,560 persons. After the age of forty-five it is more fatal than scarlet fever, and country districts show an undue proportion. Glanders occurred to four men, and hydrophobia to sixty-one. It had shown increase before, and is twice as fatal as twenty years ago. Cancer is noted as worthy of very close study, and especially in view of the fact that 7,541 females and 3,470 males, mostly over the age of forty-five, perished therefrom.

The effects of water and the diarrhœal death-rate of children is studied in the report of 1875. The mean future lifetime of men and women, married and unmarried, is compared. The expectation of life among married men is greater than it is among unmarried men, but the difference between married and single women is not so great.

The thirty-eighth report traces the classification of diseases made first by Mr. Farr, in 1837, and as changed somewhat not long after. In 1847 the causes of death by age and sex were abstracted. Some changes have arisen from new diseases or from a closer knowledge of the old. The tables of 1875 are in accord with the present method.

The thirty-ninth annual report (1876) notes that the increase of dogs or neglect of police regulations does not account for the increase of hydrophobia. The distinction is to be borne in mind between zymotics such as reproduce themselves in successive generations, with various degrees of energy in an infected population, and poisons which, even if of animal origin, comport themselves more like chemical bodies. The poison of hydrophobia represents the one, and that of the cobra capella the other. While the first reproduces itself, the venom of the latter is not reproduced in the animal bitten.

The food value of alcohol is discussed: its possible importance as such noted. The causes of death to mothers are stated, and the need of training for those who attempt skilled oversight.

The fortieth report, containing the abstract for 1877, was made in 1879. The report first traces the marriages for ten years as an index of depression and prosperity, while 1870–73 showed a high marriage rate.

The years of prosperity were followed by four of stagnation. The marriage rate (or persons married, to 1,000 living,) was 15.9 in 1869, 16.1 in 1870, 16.7 in 1871, 17.5 in 1872, and 17.6 in 1873. It fell to 17.1 in 1874, 16.8 in 1875, 16.7 in 1876, and 15.8 in 1877. It is thus seen how quickly commercial or trade conditions affect the social

status of population. Similar facts prevail as to births. To ascertain the number of births to a marriage, the annual births are divided by the annual marriages of a previous year. The uniformity with which there is an excess of males over females, also points to a law of provision for various casualties and exposures. The rate of illegitimacy in different countries and through a series of years, is shown to depend much upon the proportional number of unmarried females living during the child-bearing age.

The reduction in death-rates for twenty-three and a half years was found to be equal to 12.2 per cent. in the urban and 8.5 per cent. in the rural districts.

In the Meteorological Report of James Glaisher, F. R. S., the subject is considered in the following order: Atmospheric pressure, temperature, rainfall, wind, thunder storms, lightning, solar halos, lunar halos, aurora borealis, snow, hail and fog.

Dr. Farr discusses the density and proximity of population, its advantages and disadvantages, and the present provision of parks in the great towns.

Even so brief a summary indicates the indispensable importance of the work which has been thus done under the direction of the English government, as a guide to all those attempting similar statistics for our States.

CLIMATOLOGY

AS RELATED TO HEALTH AND CHOICE OF LOCALITY, WITH ACCOMPANYING TABLES.

The object of the study of the conditions of weather, in connection with a report on vital statistics, is to determine the relations which these conditions bear to the causation or progress of disease.

"Meteorology is the science which treats of the atmosphere and its phenomena. Climatology is the science which treats of the causes which affect the *climate of a particular place.* By the climate of a place we understand its peculiar condition with respect to temperature, moisture and other atmospheric phenomena. By weather we understand the condition of the atmosphere *at a particular time,* with respect to temperature, moisture, winds, cloudiness, etc."

We become acquainted with these by two kinds of observation. First there is that made in the use of instruments of precision, by which we are able to express by figures, or in description, the temperature, the moisture, and other particulars bearing upon the weather. These not only suppose correct instruments located in proper positions, but also the care of accurate and skilled observers. Hence the observations, to be reliable, must be made by those of certified and approved skill, who are themselves instruments of precision, and promptly record the results indicated.

The comparisons of these results in different localities, and in the same locality for different years, aid much to define the variations of climate and the weather conditions of each place.

Sources of error are eradicated by records over long periods. The laws of mutation are found to be as uniform in respect to series of years as they are as to seasons. A corresponding closeness in observation of epidemics, and of more general diseases, shows that climate has power to produce or to modify disease. It is only by the com-

parison of the statistics of the weather, and the statistics of disease, side by side, over shorter and longer periods, that we are in the line of discovering the relations of the two. For purposes of large and extended comparison it is important that the State have such records quite fully. This does not supersede the importance of a close record in districts, and especially in those large cities in which the weekly relations of weather to disease need to be noticed, in order to ward off the known effects which certain changes produce upon the population of particular parts or wards.

But this is not the only kind of observation. Prof. C. F. Brackett, in his able article on meteorology as an aid to the physician, (*Third Report, pp. 93–100,*) insists "that the habits of local showers and the domestic fog bank must be studied by the prophet of every neighborhood which presents any peculiarity of feature or position, as must also the higher clouds and prevailing winds, and indeed everything that can contribute to the end in view." A comparison of the two is needed. Especially medical men in their study of disease must also be observers of the effect of weather changes, in that accurate way which ere long gives assistance, both in prevention and treatment. Dr. Farr also remarks "that climate should always be considered in reference to the indigenous inhabitants, and to strangers, and to the natives either of a similar or different climate." (*Registrar's Report, Vol. II, p. 88.*)

There are many factors that enter into the constitution of the weather of any particular region or locality. Those that have to do with longitude and latitude and altitude are generally recognized. But there are other modifications arising from the earth. The relations of land and water, the interspersions of islands and lakes, the shapes and exposure of mountains and valleys, the presence and frontage of woods and great forests have much to do with moisture, evaporation and the effect of sunshine. The geological formation and the soil, the drainage, the powers of the surface as to the retention or radiation of heat and the degree of cultivation and the kind of growth upon the surface, all exert their influence upon the climate; an influence in some regards definite and appreciable, and as much subject to variation by the art and device of man as any other of the laws affecting life. As we have far more to do with the earth than with the sky, it is most important that we study all these influences, and how far and in what way they are under our control, so that we may induce such modifications as are favorable to health and life.

As to those influences which are more purely atmospheric, we need to know these with accuracy, in order that we may know what may be anticipated in each district, and thus suit the choice of homesteads to prevailing conditions, or in case of certain proclivities to disease, adapt our choice of residence to the demands of our own constitutions.

At the commencement of the present system of vital statistics, the Board issued the following form of record, in order to secure such data as are needed in the study of climatology:

METEOROLOGICAL REGISTER FOR THE STATE BOARD OF HEALTH OF NEW JERSEY.

For the Month of ..... *188* ..... *, at* ..... *by* .....

Days of month. Name of 1st day.	Thermometer In Open Air. 7 A. M.	2 P. M.	9 P. M.	Daily mean.	Dry and Wet Bulb Ther. 7 A. M. Dry bulb.	Wet bulb.	2 P. M. Dry bulb.	Wet bulb.	9 P. M. Dry bulb.	Wet bulb.	Humidity, Sat. being 100. 7 A. M.	2 P. M.	9 P. M.	Registering Thermometer. Maximum.	Minimum.	Mean.	Range.	Barometer. 7 A. M. Barometer.	Thermometer.	Thermometer attached.	2 P. M. Barometer.	Thermometer.	Thermometer attached.	9 P. M. Barometer.	Thermometer attached.	Barometer reduced to 32°. Mean.	State of Sky. 7 A. M. Per ct. of cloud.	2 P. M. Per ct. of cloud.	9 P. M. Per ct. of cloud.	Winds. 7 A. M. Direction.	2 P. M. Direction.	9 P. M. Direction.	Rain and Snow. Depth of snow.	Melting rain or snow.	Ending rain or snow.	Entire rain and melted snow.	Summary for the Month.	Remarks as to Thunder and Lightning, Hail Storms, Aurora Borealis, Solar and Lunar Halos, Mists, Haziness, Frosts, Fogs, Prevalent Disease of Men and Animals, Plant Life, Destructive Insects, etc.
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Summary for the Month.

THERMOMETER (Dry). Degrees
Mean.....
Maximum.....
Minimum.....
Range.....

THERMOMETER (Wet). Degrees.
Mean.....
Maximum.....
Minimum.....
Range.....

HUMIDITY (Sat. being 100).
Mean.....
Maximum.....
Minimum.....
Range.....

BAROMETER. Inches.
Mean.....
Maximum.....
Minimum.....
Range.....

RAIN. Inches.
Total am't of Water.....
Duration.....Hours.....Minutes.
Snow.....

Total amount.....Inches
Ground covered with Snow, how many Days.
Date of First Frost.
Date of Last Frost.
Days Frost in each Month.....
Days of Thunder Storms.....

Directions.—Mark for No Clouds, 0; Entire Cloudiness, 10; In part, expressed by tens; kind of clouds: Cu.—Cumulus; Cir.—Cirrus; Nim.—Nimbus; St.—Stratus; Record Winds in the direction from which they blow by the usual 8 points, as N., N. E., E., etc.; Force along side will denote as follows: Breeze (2); Strong Wind (4); Gale (6); Violent Gale (8); Tornado (10). When rain is accompanied with thunder and lightning, mark on the rain column Th. The readings of the Barometer represent Atmospheric Pressure, and the record of Rain and Snow the Atmospheric Precipitation.

In cities it might be well to record the daily mean humidity, and to *add range* in the column of "Registering Thermometer," as here.

As the time required for our Report is December, and the record of vital statistics cannot be completed for any one statistical year, up to the date of report, we make the statistics of the weather to conform as to time to the statistics of vital record, and so tabulate from July 1st to July 1st of the ensuing year. As other comparisons need to be made, either quarterly or half-yearly, or from January to January of each succeeding year, the tables will be so arranged as will enable students of these subjects to make the needed comparisons. In these tables will be given all the data that are needed for comparisons of weather and disease, although not such fullness of detail as is generally found in meteorological reports.

The slight changes from the printed form heretofore furnished observers will not prevent its use. The only column change suggested is under the head of registering thermometer, to substitute *range* for mean, since the daily mean of "thermometer in open air" serves to express this. The "daily range" is valuable in calculation, if the thermometer is in the same place, although some prefer both. We have also added in the summary for the month: Date of frost; date of last frost; number of days of frost in each month; days on which thunder storms occurred. Some also note dews. These are not all important in the usual records. But in this State great diversity is shown, and in the study of health resorts, such data are important. It is quite remarkable, for instance, how Cape May is exempt from frost, when places in lower latitudes are not, and what varieties of climate adapted to particular temperaments and ailments can be found in this State. Accurate records kept by local authorities, through a series of years, would lead to the establishment of climatic rules, reliable and valuable as indices of where to locate. The form of summary which seems most desirable for our purpose is similar to that given by Prof. Rockwood, on page 205 of our fourth Annual Report, of which a specimen is here subjoined.

METEOROLOGICAL SUMMARY FOR 18—.

Station, Bayard Avenue, Princeton, N. J. Latitude 40° 21′ N.; Longitude 2° 20′ E. Height of Barometer Cistern above Sea Level, 225 Feet.

OBSERVER, ——— ———.

	BAROMETER. (Reduced to 32 degrees.)			THERMOMETER.								
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when precipitation equalled 0.01.	Cloudy days.
188–.												
July												
August												
September												
October												
November												
December												
188–.												
January												
February												
March												
April												
May												
June												
For the Year												

* Including melted snow.

The days when precipitation equalled 0.01, helps in studying the influence which "the exchanges of moisture that are always in progress between any object and its surroundings may have on life and health." While absolute uniformity of tables is not required, we ask our observers to conform thereto as far as consistent with their own methods. We leave a space at the end of every three and six months in order that separate averages may be made for the quarter or half year. Then the summary of remarks for the year may be added briefly, including other particulars alluded to in our form for "Monthly Summary" and "Remarks." As a specimen, we subjoin

the form of remarks and specifications with which James Glaisher, Esq., F. R. S., of the Royal Observatory at Greenwich, has usually accompanied the vital records of the Registrar General, of England.

[Specimen Report.]

REMARKS ON THE METEOROLOGY OF THE YEAR ——.

BY JAMES GLAISHER, ESQ., F. R. S., &C.

The year —— was remarkable for its low temperature, particularly in January, November and December, when the weather was inclement; the spring and summer were cold and wet. There was an unusual amount of cloud during the year, and consequently very little sunshine. Until the end of September the readings of the barometer were generally below the average, and rain was in excess during these months, excepting March, which was dry. Snow fell very frequently, and fog was unusually prevalent. The temperature of the whole year was the lowest in this century, excepting only that of 1814, and it was a bad one for agricultural work.

Atmospheric Pressure.—Till September 24th the reading of the barometer was generally below its average, the exceptions being the 17 days ending February 1st; the 14 days ending March 14th; the 28 days ending May 25th; the eight days ending July 30th, and the five days ending September 4th; the average daily excess of these 72 days was 0 17 inch, and the mean daily defect below the average of the remaining 195 days was 0.23 inch. From September 25th to the end of the year, with the exception of a few days, the reading was high, and the average excess of daily pressure for these 98 days was 0 28 inch. Thus the readings of the barometer were low for the first three quarters of the year, and high during the last quarter. The lowest reading in the year at Blackheath was 28.63 inches, on February 10th, and the highest was 30.62 inches, on December 22d, so that the range of reading in the year was 1.99 inch. The day of lowest mean reading was February 10th, when it was 1 05 inch below the average, and the day of highest reading was December 23d, when it was 0.66 inch above its average.

Temperature.—With the exception of the 11 days ending February 16th, and the 17 days ending March 20th, there were not 7 consecutive days during the year on which the temperature reached its average. From the beginning of April to the end of July the average daily deficiency of temperature was 3° nearly, and from November 20th to December 27th it was as large as 9½° daily. The temperature of every month was below its average of 60 years, and there is no other instance back to 1771 of such being the case.

The highest temperature in the year was 81°.5 at Cambridge, 80°.8 at Carlisle, 80°.4 at Blackheath, 80°.3 at Cockermouth and Royston, 80°.2 in London, and 80°.0 at Barnstaple, Streatley and Somerleyton; the lowest reading was 1° both at Cambridge and Stockton, near Rugby, 1°.5 at Silloth, 2°.0 at Cardington, and 3°.0 at Leicester.

Rain.—There was an excess of rain in every month excepting March, and the last three months of the year; this excess being particularly great in the months, May to August. The greatest total fall in the year was 56.77 inches at Sharples, near Bolton, the next in order being 47.71 inches, at Helston, 42.4 inches at Stonyhurst, and the least was 26.19 inches at Carlisle; the next in order being 27.10 inches at North Shields, 27.41 inches at Lowestoft. The greatest number of days on which rain fell was 240 at Bradford, 225 at Bywell, 223 at Stonyhurst, and 215 at Truro.

Thunder Storms occurred on 64 days in the year; they were as follows:—One at Helston, on January 14th; 2 in February, at Guernsey and Plymouth, on the 6th and 20th; 1 in March, on the 30th, in Yorkshire; 5 in April, evenly spread over the country; 7 in May; none in the South; 13 in June, chiefly in the Midland and Northern counties; 10 in July, chiefly in the North; 15 in August, general everywhere; 6 in September, chiefly in the North; 1 in October and 3 in December, at the Southern stations.

Thunder was heard but lightning was not seen on 75 days, viz.: 5 in March, 10 in April, 10 in May, 15 in June, 14 in July, 14 in August, 5 in September, 1 in October and 1 in December.

Lightning was seen but thunder was not heard on 42 days, viz: 5 in February, 3 in March, 3 in April, 1 in May, 9 in June, 6 in July, 12 in August, 1 in September and 2 in November.

Solar halos were seen on 68 days in the year, the greatest number in one month was 12, in June.

Lunar halos were seen on 39 nights; none were seen in the months May, June and July.

Snow fell on 26 days in January, but on only one day, the 10th, in Guernsey, Cornwall and Devonshire; it fell on 23 days in February, on 16 in March, on 14 in April, and on 8 in May; in April and May no snow fell at Guernsey or in Cornwall, but it was pretty general elsewhere; it fell in July at Bolton, on the 4th and 8th, and at Cockermouth on the 9th; it fell on two days in

the middle of October (the 14th and 15th), in the north of England, on 16 days in November, and on 11 in December. Up to May 31st snow fell on 87 days, and altogether on 119 days in the year. It fell at many places on January 1st, and at a few places on December 30th.

Hail fell on 126 days in the year, on 76 days up to June 30th, and on 50 days in the second half of the year.

Fog was very prevalent throughout the year; it occurred at one or other stations on 18 days in January (mostly north of London), on 20 days in February (chiefly in the Midland counties), on 14 days in March, on 14 days in April, on 21 days in May (but many stations, particularly in the middle of the country, were free from fog), on 10 days in June, on 18 days in July (chiefly at Torquay and Allenheads, at other stations on one or two days only), on 18 days in August (but 11 of these days were noted at Torquay—at most stations where fog is returned it was on one or two days only, and at many no fog was observed), on 18 in September (chiefly between the latitude of 52° and 54°), on 21 days in October (but scarcely any at stations south of latitude 51½°), on 18 in November (only at stations north of 51½°), and on 26 days in December (on 3 or 4 of these days in the south, on 10 or 12 at several places in the Midland counties, and on 1 day only at Carlisle, and at some stations in the north there was scarcely any fog).

While our observers will need to make the same records as heretofore, we shall ask for publication in the report only the above table, with the remarks of the observer appended. Any facts as to the diseases of each period, or as to the effect of sudden changes as noticed, may be referred to.

While occasionally furnishing tables of other localities, we choose such points for continuous yearly observations as represent different geological structures and sectional geographical positions. Thus the station which, through the liberality of A. L. Dennis, Esq., of Newark, has been established at

(1) *Newton*, will represent the most northern section of the State, as well as the sandstone, slate and adjacent rock.

(2) *Paterson* well represents another northern section located on trap rock.

(3) *Newark*, with quite diverse geographical surroundings, stands for the east red sandstone section.

(4) *Princeton*, *New Brunswick* or *Trenton* may stand for the whole shale region between, and the tables of either would answer.

(5) *Freehold*, amid the sand and clay marls of the western part of Monmouth county, represent another section.

(6) *Vineland*, on the sandy clay of the south, central and interior portion of the State, will represent the large adjacent region.

(7) *Cape May*, on the similar sandy formation, but as representing the extreme point on the Atlantic coast, is also desirable.

(8) *Middletown* represents our northern coast.

To these the student of climatology as related to disease, may easily add the observations of Barnegat and Sandy Hook, as furnished by the Signal Service, and as standing for a higher latitude of sea coast exposure.

In addition, the observations had at New York city, Philadelphia

and Easton, as made in those cities, will well represent adjacent portions of this State, which perhaps may hereafter need special study in the interests of Jersey City, Camden and Phillipsburg, and for climatic comparisons.

The materials for comparison of vital statistics, date from the third report, since its tables were the first ordered and completed under the present law. Its records reach from July 1st, 1878, to July 1st, 1879. The climatology for that year, as there given, is only that of Newark, Princeton and Vineland, pp. 143–150.

That from July 1st, 1879, to July 1st, 1880, pp. 195–207, fourth report, gives returns from Newton, Paterson, Newark, Princeton, Freehold and Vineland, with an additional table for Barnegat and Middletown. The former represents our middle coast, while for our purposes Middletown is fully equal to Sandy Hook as a place of record. If the record of Cape May and other Signal Service coast stations are not always given by us, they will be available and used when semi-decennial or decennial comparisons are made.

This year the seven places already designated will be secured, or points representative of them. By another year we shall hope to have tables for comparison which will represent all these districts from July 1st, 1878, the date at which the new forms of vital statistics commence, and in better shape for comparison.

Brief remarks should accompany the condensed summary for the year.

We shall now soon have opportunities for comparison of vital and weather returns and of the contrasts of localities for five years, and shall hope, with other observers, to be able to arrive at some conclusions therefrom. At present we confine the notes to weather conditions, mostly to the last statistical year and to the six months from July 1st to January 1st, 1882.

For the year, from July 1st, 1880, to July 1st, 1881, the following are the most noticeable facts: The preceding winter, that of 1879–80, was unusually mild. This was true in the middle and the northern part of the State, and at Vineland the year was 8 per cent. above the average temperature, and 13 per cent. above the cold year of 1880–81. The rainfall was only three-fourths our usual winter average. The early months of 1880 were mild, while the spring months of March and April were backward, with a diminished rainfall in April. The dryness of the winter had caused lowness of the springs and wells, which was not compensated for by any rains of the spring months. The early spring and summer months were characterized by absence of rain and

high temperature. The report at New Brunswick, for instance, says of the month of May: "It was unusually warm, and the maximum temperature of the year was reached on the 26th of that month, above that of any preceding May ever observed here. The mean temperature also exceeding the mean for years (from November 1st to November 1st) by 8 degrees. From the 20th to the 28th the daily maximum ranged from 85 to 98 degrees—a hot period quite as long and as intense as those of our hottest summers. June, also, was marked by its high temperature and long-continued heat periods. The rainfall of the three months, April, May and June, was very deficient, amounting to 2.68 inches, whereas the mean for these months is 12.05 inches. It was a most serious drought, as there was no rain between April 29th and May 30th. While we saw some of the effects of this on the last quarter of the death-rate, from July 1st, 1879, to July 1st, 1880, it is still more apparent in the largely increased death-rate of the year from July 1st, 1880, to July 1st, 1881. Our last report shows a similar record for Newark, Paterson and Vineland. J. S. Hilton, C. E., of Paterson, says the drought in duration may be stated as one lasting eight months, and a drought of that extent may be safely recorded as having never been equalled, at least within the memory of the oldest inhabitant. Thus the first half of the present statistical year, viz., from July 1st, 1880, to January 1st, 1881, had all the burden of this drought, accompanied with high temperature.

The first quarter of 1881 was marked by a severe degree of cold. The mean monthly temperature was in January about 4 degrees below the average for the last five years; in February, over 3 degrees below, and in March over 2. The ground in all the counties above Trenton was covered with snow throughout January and February. Although this and the rains raised the springs, yet the severe drought of the former year was not fully compensated. The cold of March extended late into April, so that the first month of the second quarter had a temperature about 4 degrees below the last semi decennial average. May and June were also the same number of degrees below the average. The rainfall of April at New Brunswick was only .43, as against the average of 3.68 inches for the last 27 years. The severe drought of the summer did not commence until about the 1st of July. The warm summer of 1880 and the cold winter of 1880–81 were the chief factors in the increase of intestinal and pulmonary diseases. The records show the effect of these changes, and should be the subject of future study as to seasonal influences.

METEOROLOGICAL SUMMARIES FOR CHOSEN STATIONS IN ORDER FOR COMPARISONS WITH DISEASE AND WITH VITAL STATISTICS.

NOTE.—Those of Newton come nearest our desire as to forms, in order to admit of ready comparisons. It is well to leave a space at each quarter year (not carried out), in order that cities where death-rates need oftener to be compared, may insert a quarterly summary. The Board would express its great obligations to all our observers for aid in adapting methods for special climate study in reference to health and disease.

(*a*) Summaries for the period from July 1st, 1880, to July 1st, 1881.

(*b*) Summaries from July 1st, 1879, to July 1st, 1880, years in form for vital statistic comparison.

(*c*) Summary from July 1st, 1878, to July 1st, 1879, in form for vital statistic comparison.

(*d*) Summary for part of year since July 1st, 1881, for Newton, and for the whole of year 1881 for Vineland and New Brunswick.

METEOROLOGICAL SUMMARY FOR THE PERIOD FROM JULY 1ST, 1880, TO JULY 1ST, 1881.

Station—Dennis Library, 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 degrees.)			THERMOMETER.			Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation Equalled 0.01.	Cloudy Days.	Rainfall on Days.	Thunder and Lightning on Days.	Snowfall on Days.	Fog.	Hail.	Frost.	Lunar Halos.
	Max.	Min.	Mean.	Max.	Min.	Mean.													
1880.																			
July	†	†	†	90 0	62.0	74.73	†	N. W.	†	.....	9	10	13	2	.....	2	.....	.....	.....
August	†	†	†	88 0	51.0	72.63	†	S. W.	†	.....	6	8	8	1	.....	.....	.....	1	.....
September	†	†	†	88 0	48 0	66.53	†	S. W.	†	.....	6	11	7	.....	.....	.....	.....	2	.....
October	29.681	28.750	28.965	77.1	29.8	50.99	70.3	S. W. and N. W.	1.70	.....	9	12	11	.....	.....	2	.....	7	.....
November	29.914	28.851	29.459	67 3	10.5	36.67	67.1	S. W.	1.68	3.0	10	15	12	.....	6	2	1	3	.....
December	29.684	28.910	29.249	45.0	-7.9	25.62	74.6	N. W. and S. W.	2.73	15.7	12	21	5	.....	13	.....	1	1	.....
1881.																			
January	29.862	28.620	29.341	43.3	-5.0	21.83	74 97	N. E. and N. W.	4.06	20.25	9	18	5	.....	12	.....	1	.....	.....
February	29.997	28.639	29.068	56.0	-6 0	28.82	68 25	N. W. and N. E.	0.60	6.5	5	11	3	.....	3	2	.....	.....	2
March	29 580	28.332	28.993	58.0	17.0	35.80	68.0	N. E. and N. W.	†	5.0	7	16	5	.....	5	.....	2	.....	.....
April	29.569	28 579	29.118	83.0	17.0	47 22	53.18	N. W.	†	Trace.	2	7	2	.....	1	.....	.....	.....	.....
May	29.735	28.874	29.294	95.0	30 5	61.30	70.0	S. W. and N. E.	†	.....	8	9	9	3	.....	.....	.....	.....	.....
June	29.421	28.910	29 017	88.7	40.3	65.17	70.38	N. W. and N. E.	5.12	.....	16	13	17	5	.....	1	.....	2	1
For the year	29.719	28 385	29.167	81.2	23.9	48.94	68 53	.....	15.89	50.45	99	151	97	11	40	9	5	16	3

*Including melted snow. †No observations taken.

METEOROLOGICAL SUMMARY FOR 1880 AND 1881.

City Surveyor's Office, Paterson, New Jersey. Latitude, 40° 55′ N. Longitude, 74° 11′ W.

BY JOHN T. HILTON, C. E.

MONTH.	BAROMETER. (Reduced to 32 degrees.)			THERMOMETER.			Mean Humidity.	Prevailing Winds.	Rain (inches).*	Snow (inches).	Days when Precipitation Equalled 0.01.	Cloudy Days.	REMARKS.
	Max.	Min.	Mean.	Max.	Min.	Mean.							
1880.													
July	.....	.....	.....	92.0°	61.0°	79.0°	.....	S. W.	12.06	.....	12	.....	Remarkably heavy rainfall. No record as heavy for the month.
August	.....	.....	.....	93.0	52.0	74.0	.....	S. W.	6.92	.....	10	.....	
September	.....	.....	.....	93.0	48.0	68.0	.....	S. and N.	3 36	.....	6	.....	
October	.....	.....	.....	69.0	33.0	53.0	.....	W. and S. W.	5.57	.....	9	.....	
November	.....	.....	.....	67.0	9.0	41.0	.....	W.	5.60	3.50	10	.....	First snow on 25th.
December	.....	.....	.....	47.0	6.0	28.0	.....	N. W.	2.41	14.00	9	.....	
1881.													
January	.....	.....	.....	44.0	-3.0	25.0	.....	W. and N. W.	7.33	18.25	8	.....	
February	.....	.....	.....	57.0	-5.0	26.0	.....	N. and N. W.	6.95	10.25	11	.....	During the month, 3.21 in. fell in 7 hours.
March	.....	.....	.....	54.0	24.0	36.0	.....	W. and N. W.	16.11	1.50	10	.....	Remarkably heavy rain, 12.45 in. above the mean.
April	.....	.....	.....	82.0	24.0	46.0	.....	W. and N.	1.74	.....	4	.....	
May	.....	.....	.....	87.0	35.0	63.0	.....	S. W.	3.69	.....	11	.....	
June	.....	.....	.....	86.0	49.0	66.0	.....	S. E. and S.	11.74	.....	14	.....	Very heavy rainfall, 7.41 above the mean.
For the year	.....	.....	.....	72.7°	27.8°	50.4°	.....	.....	83.48	47.50	114	.....	A remarkable rainfall for the year. In Dropus table of rainfalls for the vicinity of New York, the heaviest annual amount is in 1868, amounting to 64 13 in.

*Including snow.

TEMPERATURES, RAINFALL, &c., AT FREEHOLD, N. J.,

From July 1st, 1880, to June 30th, 1881, from the records of CHAS. F. RICHARDSON; Vol. Observer for Signal Service.

MONTHS.	MINIMUM TEMP'TURE. Date.	MINIMUM TEMP'TURE. Degrees.	MAXIMUM TEMP'TURE. Date.	MAXIMUM TEMP'TURE. Degrees.	Monthly Mean Temperature.	Rain or Snowfall on Days.	Total Rainfall or Melted Snow (inches).	Mean Relative Humidity (per cent.)	Prevailing Winds.	Thunder and Lightning on Days.	Depth of Snowfall (inches).
1880.											
July	30	54.	9	90.	73.91	15	8.57	78.7	N. W.	13	....
August	16	50.	25	89.	74.34	9	4.17	81.0	S.	9	....
September	23	46.	5	88.	65.21	6	2.87	79.6	W.	3	....
October	25 & 26	31.	16	79.	51.14	11	2.61	77.0	N. W.	....	....
November	24	9.	5	65.	36.98	10	3.44	72.6	W.	1	4.3
December	30	-11.	5	49.	25 52	12	6.58	73.2	N. W.	....	51.2
1881.											
January	1	-7.	13	41.	22.50	12	7.85	75 3	W.	....	9.8
February	2	-6.	28	53.	27.25	12	6.33	80 1	N. W.	1	11.4
March	2	20 5	16	59.	36.26	11	7.14	75.6	N. W.	1	3.
April	5 & 7	21.	24	76.	44.94	5	1.07	70.6	N. W.	1	....
May	4	35.	12	91.	60.95	13	2.78	80.7	S. E.	7	....
June	7	47.	29	90.	64.45	16	7.78	81.3	N. W.	9	....
Totals	....	287.5	....	870.	583.45	132	61.19	925.7	....	45	79.7
Means	....	23 9	....	72.5	48.62	11	5.09	77.1	N. W.	3.7	....

The records retained here begin with April, 1875, though the work began in March, 1873.

From the summary on file here, the following is taken: Highest temperature, 102°, September 7th, 1881; highest previous, 98°, July, 1876; lowest temperature, as above, in December, 1880; lowest previous, –3°, January, 1879. Greatest rainfall in any one month, 10.67 inches, August, 1875; least rainfall in any one month, 0.55 inch, August, 1876. The records of humidity began November 1st, 1875. Highest monthly relative humidity, 92.7 per cent., in October, 1877; lowest monthly relative humidity, 57.5 per cent., April, 1876. The thermometers used are Green's signal service pattern. The rain-gauge is from the headquarters of the service at Washington. The thermometers are in the model shelter that was on the Government Building at the Centennial, and correctly located.

METEOROLOGY OF VINELAND, N. J.—For Vital Statistic Comparison, from July 1, 1880, to July 1, 1881. Elevation above Sea Level, 105 feet. Latitude 39° 38′.

	BAROMETER. Maximum.	BAROMETER. Minimum.	BAROMETER. Mean.	BAROMETER. Range.	TEMPERATURE, CLOUDS, ETC. Maximum.	Minimum.	Mean.	Range.	Dew Pt.	Humidity.	Degree of Cloudiness.	Clear Days.	Clear Observations.	Rain.	Rainy Days.
1880.															
July	30.024	29.560	29.838	.464	98°	56°	76.45°	42°	67.60	68	6.07	0	27	8.64	8
August	30.230	29.592	29.909	.638	90	50	73.03	40	65.77	62	7.66	0	13	6.64	8
September	30.160	29.590	29.899	.570	92	44	66.83	48	57.56	63	6.16	1	27	2.94	5
Mean	30.138	29.581	29.882	.557	93	50	72.10	43 1-3	60.31	64	6.60	⅓	22⅓	6 07	7
October	30.269	29.420	29.965	.849	80	30	54.11	50	44.14	71	4.59	11	45	2.75	9
November	30.594	29.500	30.076	1.094	67	9	38.22	58	25.07	63	6.42	4	29	4.44	9
December	30.320	29.534	29.910	.786	50	-10	26.23	60	16.16	56	6.31	4	29	7 53	10
Mean	30.394	29.485	29.984	.909	66	10	39.52	56	28.46	63	5.77	6⅓	34	4.91	9⅔
1881.															
January	30.489	29.158	29.998	1.331	46	-10 1-2	25.31	56 1-2	14.74	61	7 01	1	23	2.82	12
February	30.601	29.310	29.927	1.291	58	-6	29.96	64	20.41	61	5.17	5	37	2.26	7
March	30.072	28.880	29.549	1.192	62	22	28.86	40	30.45	76	7.07	2	22	6.35	13
Mean	30.254	29.116	29.825	1.271	55	1 5-6	28.04	53 1-2	21.86	66	6.42	2⅔	27	3.81	10⅔
April	30.070	29.307	29.754	.763	55⅓	1 5-6	47.36	53 1-2	38.78	69	6.09	2	26	2.61	10
May	30.248	29.492	29.879	.746	88	26	64.24	62	55.86	72	6.02	5	31	2.00	5
June	29.978	29.518	29.737	.460	94	54	69.74	40	61.78	80	7.35	1	18	3.05	5
Mean	30.099	29.439	29.790	.656	79	31	60.44	51 5-6	52.14	73	6.49	2⅔	25	2.55	6⅔
Mean of Year	30.299	29.405	29 870	.848	73	33	50.02	51.16	40.69	66	6.32	3	27	4.35	4⅓
Sums	....	....	....	....	....	....	....	....	....	...	....	36	324	52.20	102
Extremes for Year	30.601	28.880	30.076	1.721	98	-10 1-2	76.45	108 1-2	....	...	....	....	....	....	....

	WIND. North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Total.
1880.									
July	9	6	0	12	3	37	1	25	93
August	4	20	1	12	5	41	1	9	93
September	4	11	2	12	5	29	8	19	90
Mean	5 2-3	12 1-3	1	12	4⅛	35 2-3	3 1-3	17⅔	...
October	9	16	4	5	10	24	7	18	93
November	6	10	0	13	4	22	16	19	90
December	6	10	1	3	3	18	13	37	93
Mean	7	12	1 2-3	7	5⅔	21 1-3	12	24⅔	...
1881.									
January	3	20	1	4	2	12	10	41	93
February	9	13	1	13	4	8	10	26	84
March	2	10	5	6	3	15	16	35	93
Mean	4 2-3	14 1-3	2 1-3	7⅔	3	11 2-3	12	34	...
April	1	8	5	9	4	19	20	24	90
May	2	20	5	21	6	31	2	6	93
June	10	17	1	9	3	25	9	16	90
Mean	4 1-3	15	3 2-3	13	4⅛	25	10 1-3	15⅓	...
Mean of Year	5 5-12	13 5-12	2 1-6	10	4⅓	23 5-12	9 5-12	23	...
Sums	65	161	26	120	52	281	113	276	...
Extremes for Year	....	....	....	....	....	....	....	....	...

	Temperature.	Dew Pt.	Hygrom.	Degree of Cloudiness.	Cloudy Days.	Clear Observations.	Rain.	Rainy days in month.	WIND. N.	N. E.	E.	S. E.	S.	S. W	W.	N.W.
Means, 1878-79	52.88°	48.38	81.5	5.95	3.58	28.91	4.02	8 33	66	112	24	121	56	341	80	295
Means, 1879-80	57.07	61.00	76.0	6.04	2.58	29.08	3.82	7.83	78	101	23	93	80	369	75	276
Means, 1880-81	50.02	40.69	66.0	6.32	3 00	27.00	4.35	4.50	65	161	26	120	52	281	113	276
Mean of all Means	53 32	50.24	74.5	6.10	3.05	28.33	4.06	6.89	70	125	24	111	63	330	89	282

METEOROLOGICAL SUMMARY FOR 1881.*

From Observations at Newark, N. J., by Hon. W. A. WHITEHEAD, Newark, N. J.

	BAROMETER.			THERMOMETER.								
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Prevailing winds between.	Inches rain and melted snow.	Inches of snow.	Fair days.	Rain on days.	Snow on days.
January	30.660	29.400	30.173	49.25	0.12	24.45	W. N.W. and N. N.W.	5.050	14.50	19	5	8
February	30.850	29.450	30.240	51.25	-3.00	27.93	N E. and S E.	4.645	10.50	19	7	
March	30.380	29.170	29.830	57.00	21 75	37.27	N.W. and S.W.	6.835	1.50	14	11	
April	30.314	29.502	29.913	80.75	22.00	48.53	N.W. and S W.	1.715	.....	21	6	
May	30.460	29.512	30.086	92.50	38.00	64.12	N E and S E.	2.917	.....	19	12	
June	30.200	29.652	29.920	90.00	49.50	66.75	N.E. and S.E.	5.040	.....	13	13	
July	30.250	29.650	29.933	95.00	59.25	75.07	N W. and S.W.	1.340	.....	12	7	
August	30.520	29.650	30.027	93.60	56.50	75.65	{ Equally between E & W. horizons. }	0.280	.....	22	5	
September	30.350	29 900	30.129	100.50	50.75	73.72	N E. and S E.	0.870	.....	17	7	
October	30.580	29.624	30.191	83.00	33.75	57.94	N.W. and S W.	2.730	.....	19	10	
November	30.650	29.630	30.197	68.75	22.25	44.11	N W. and S W.	3.075	11.25	17	12	
December	30.623	29.400	30 19<	66.50	19.50	39.00	N.W. and S.W.	4.535	2 25	16	14	
For the year	30.850	29.170	30.073	100 50	-3.00	52.88	.....	39.032	31.00	208	109	28

* Rate given with these for the V. S. year for comparison.

TABLE OF TEMPERATURE FOR THE YEAR FROM JULY 1st, 1879, TO JULY 1st, 1880.

Station—Newton, N. J. Latitude, 41° 2′ 45″ N. Longitude, 2° 19′ 48″ E. Altitude, 660 feet.

COMPILED BY Miss E. FOSTER.

	THERMOMETER.			Prevailing Wind.	Rainfall on Days.	Days when Precipitation Equalled 0 01.	Cloudy Days.	Thunder and Lightning on Days.	Snowfall on Days.	Fog.	Hail.	Frost.	Depth of Snow (inches).	REMARKS.
	Max.	Min.	Mean.											
1879.														
July	96.0	60.0	60.29	S. W.	9	6	3	.....	.....	.....	.....	.....	.....	Dry and windy.
August	92.0	56.0	72.18	S. W.	10	5	7	1	.....	2	.....	.....	.....	Rains, from northeast.
September	86.0	40.0	63.62	S. W.	6	5	7	1	.....	4	.....	2	.....	Moderately warm and dry.
October	81.0	30.0	61.58	S.	5	3	7	.....	1	2	.....	.....	.....	First half, cool and dry; latter, cool and windy.
November	76.0	16.0	44.26	N. W.	7	8	7	.....	6	1	1	.....	.....	Dry and windy.
December	62.0	10.0	35.29	N. E.	7	10	14	.....	4	3	2	.....	.....	Hazy; frequent mists.
1880.														
January	60.0	10.0	39.79	S. W.	12	10	13	.....	2	9	.....	.....	4	A very humid month.
February	66.0	5.0	37.78	S. W.	4	5	11	.....	5	2	.....	.....	6	First part, clear and cold; rest, hazy and warm.
March	72.0	18.0	38.68	N. W.	7	10	15	.....	6	.....	2	.....	13	Very humid.
April	78.0	34.0	51.72	N. W.	11	7	12	2	2	.....	.....	.....	.....	Dry and windy.
May	92.0	40.0	69.40	S. W.	6	5	10	.....	1	1	.....	3	.....	Warm and dry.
June	91.0	50.0	72.90	S. W.	10	6	5	1	.....	.....	.....	.....	.....	Hot and dry.
For the year	79.6	30.7	53.79	.....	94	80	111	5	27	24	5	5	23	

METEOROLOGIAL SUMMARY FOR 1879 AND 1880.

City Surveyor's Office, Paterson, New Jersey. Latitude, 40° 55′ N. Longitude, 74° 11′ W.

	BAROMETER. (Reduced to 32 degrees.)			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Humidity.	Prevailing Winds.	Rain (inches).*	Snow (inches).	Days when Precipitation Equalled 0.01.	Cloudy Days.	REMARKS.
1879.													
July	.....	.....	.....	98.00°	61.0°	76.0°	.....	.....	5.18	.....	11	.....	Rainfall 1.18 above mean. During the month 1.50 in. fell in forty-five minutes.
August	.....	.....	.....	92.00	58.0	71.0	.....	.....	7.89	.....	9	.....	Rainfall 3.16 above mean. Remarkably heavy rain storms—0.88 in fifteen minutes.
September	.....	.....	.....	80.00	42.0	63.0	.....	.....	3.38	.....	8	.....	Rainfall 0.30 below mean. Heavy showers, ½ in. falling in five minutes.
October	.....	.....	.....	80.00	28.0	60.0	.....	.....	0.32	.....	5	.....	Rainfall 3.50 below mean. The lowest record of rain in half a century.
November	.....	.....	.....	70.00	17.0	40.0	.....	.....	1.15	3.50	7	.....	Rainfall 2.76 below mean. The lowest record of rain in half a century.
December	.....	.....	.....	60.00	11.0	34.0	.....	.....	5.55	7.25	11	.....	Rainfall 1.64 above mean.
1880.													
January	.....	.....	.....	62.00	11.0	36.0	.....	.....	2.90	3.00	9	.....	Rainfall 0.40 below mean.
February	.....	.....	.....	63.00	5.0	35.0	.....	.....	4.16	10.25	12	.....	Rainfall 0.75 above mean.
March	.....	.....	.....	62.00	19.0	37.0	.....	.....	6.73	14.00	14	.....	Rainfall 3.00 above mean.
April	.....	.....	.....	80.00	30.0	52.0	.....	.....	4.31	.....	13	.....	Rainfall 0.50 above mean.
May	.....	.....	.....	95.00	30.0	72.0	.....	S. W. and W.	0.85	.....	3	.....	Rainfall 3.66 below mean. The lightest record of rain since 1836.
June	.....	.....	.....	97.00	59.0	76.0	.....	S. W.	2.90	.....	8	.....	Rainfall 1.10 below mean.
For the year	.....	.....	.....	78.25°	30.9°	54.3°	.....	.....	45.32	38.00	110	.....	

*Including snow.

METEOROLOGY FOR VINELAND,

For Vital Statistic Comparison, from July 1st, 1879, to July 1st, 1880.

	BAROMETER.				TEMPERATURE, CLOUDS, &C.										WIND.								
	Maximum.	Minimum.	Mean.	Range.	Maximum.	Minimum.	Mean.	Range.	Dew Pt.	Humidity.	Degree of Cloudiness.	Clear Days.	Clear Observations.	Rain.	Rainy Days.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Total.
1879.																								
July	30.104	29.403	29.824	.701	97	46	75.27	51	65.33	73	5 74	2	30	3.04	7	4	9	3	6	12	47	1	11	93
August	30.052	29.530	29.788	.522	94	49	72.21	45	65 12	77	5 60	4	34	10 63	10	9	17	0	4	4	47	6	6	93
September	30.240	29.618	29.963	.622	91	38	65.53	53	62.55	75	5.44	2	36	3.35	7	11	8	0	13	8	20	4	26	90
Mean	30.132	29.517	29.858	.837	94	44.3	71.00	59	64.33	75	5.59	2.67	33.3	5.67	8	8	11⅓	1	7⅔	8	38	3⅔	14⅓	.....
October	30.589	29.384	29.996	1.205	92	28	63 84	64	54 82	74	5.14	6	39	1.14	7	4	13	2	5	11	27	9	22	93
November	30.409	29.378	29.976	1.031	80	18	48.08	62	36.78	68	5.71	3	30	2.75	7	1	1	3	10	13	17	11	34	90
December	30.450	29.536	30.012	.914	70	12	41.68	58	32.49	72	7.66	0	16	6.28	12	11	18	5	6	2	23	9	19	93
Mean	30.483	29.433	29.995	1.050	80⅔	19⅓	51.20	80	41.36	71⅓	6.17	3	28.33	3.39	8.66	5⅓	10⅔	3⅓	7	8⅔	22⅓	9⅔	25	.....
1880.																								
January	30.450	29.525	30.041	.925	61	10	41.28	51	21.29	68	7.04	1	21	3.75	6	5	9	1	1	2	33	14	28	93
February	30.392	29 014	29.923	1.378	69	12	39.05	57	21.26	71	6.35	4	24	2.38	6	5	8	1	7	4	17	8	34	84
March	30.306	29.144	29.864	1.162	74	20	40.91	54	34.43	82	6.25	2	30	3.36	10	8	4	1	8	8	29	4	31	93
Mean	30.383	29.228	29.943	1.436	68	14	40.42	64	25.66	74	6.55	2⅓	25	3.16	7.33	6	7	1	5⅓	4⅔	26⅓	8⅔	31	.....
April	30.164	29.414	29.808	.750	82	22	53.06	60	42.55	80	6.35	3	27	3.47	9	9	4	3	8	8	18	7	33	90
May	30 088	29.608	29.871	.480	91	34	69.20	62	55.31	74	5.68	2	29	.77	4	6	8	4	15	5	39	0	16	93
June	30.112	29.527	29.842	.585	97	52	74.77	45	62.82	78	5.51	2	33	4.90	9	5	2	0	10	3	52	2	16	90
Mean	30.279	29.423	29.840	.850	90	36	65.68	75	53.56	77	5.85	2⅓	29⅔	3.05	7.33	6⅔	4⅔	2⅓	11	5⅓	36⅓	3	21⅔	.....
Extremes for year	30.589	29 014	29.916	1.575	97	10	.....	87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45 82	94	78	101	23	93	80	369	75	276	1,095
Mean for year	30.319	29.400	29.906	1.045	83.16	28.41	57.07	69.5	61.64	76	6.04	2.58	29.08	3.82	7.83	.....	.....	.....	.....	.....	.....	.....	.....	.....

METEOROLOGY OF VINELAND, N. J.

For the Vital Statistic Comparison, from July 1st, 1878, to July 1st, 1879. Elevation above Sea Level, 105 feet. Latitude, 39° 38'.

	BAROMETER.				TEMPERATURE, CLOUDS, &c.								WIND.								
	Max.	Min.	Mean.	Range.	Max.	Min.	Mean.	Range.	Dew Pt.	Humidity.	Degree of Cloudiness.	Clear Days.	Clear Obs.	Rain.	Rainy Days.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Total.
1878.																								
July	29 980	29 488	29 786	.501	96°	66°	77.99°	30°	70.58	80	5 94	3	31	6 42	9	6	13	3	18	7	33	0	13	93
August	30 020	29.501	29 740	.519	92	57	73 16	35	67 83	82	7.31	1	19	8.46	10	2	23	2	19	6	27	2	12	93
September	30.294	29 520	29.985	.774	86	42	67.98	44	60.71	80	5.10	7	35	.69	5	10	21	2	11	6	27	0	13	90
Mean	30.101	29.503	29 870	.598	91½	55	73 03	36	66 87	80 67	6.12	3.67	28.33	5.19	8	6	19	2⅓	16	6⅔	29	⅔	12 2-3	.....
October	30 125	29 016	29 887	1 109	78	32	56.24	46	48 32	76	5 24	5	34	2.18	7	6	6	1	9	5	28	11	27	93
November	30.317	28 820	29.813	1 497	61	23	42.96	38	36 65	79	5 46	4	34	2.25	7	4	12	4	8	1	23	9	29	90
December	30 313	28.656	29 884	1.657	60	9	31.76	51	22.18	67	5.67	4	30	5.69	9	0	2	2	7	1	30	5	46	93
Mean	30.252	28.831	29 843	1.421	66⅔	21⅓	43 65	45	35.72	74	5.42	4.33	32.66	3.37	7 67	3⅓	6⅔	2⅓	8	2⅓	27	8⅓	34	.....
1879.																								
January	30.363	29.275	29 903	1.088	63	-4	28 92	67	27.95	86	5 70	7	34	5.01	13	5	9	1	1	2	33	14	28	93
February	30 600	29 305	29.891	1.295	58	7	29 55	51	32.29	85	6 80	5	26	1 73	6	5	8	1	7	4	17	8	34	84
March	30 514	29 294	29.964	1 220	68	18	41 01	50	42.15	87	5.30	4	35	3.89	9	8	4	1	8	8	29	4	31	93
Mean	30 492	29.288	29 916	1.201	63	7	33.16	56	34 13	86	5.93	5.33	31 66	3.54	9 33	6	7	1	5 1-3	4⅓	26 1-3	8⅓	31	.....
April	30 238	29 758	29 755	.480	83	30	48 33	53	51.28	87	6.70	1	20	2.96	9	9	4	3	8	8	18	7	33	.90
May	30 288	29 666	29 908	.622	92	46	63.39	46	57.21	84	6.12	2	29	4.15	8	6	8	4	15	5	39	0	16	93
June	30.091	29 358	29.881	.733	94	44	73.29	50	63 33	85	6.22	0	20	5.36	8	5	2	0	10	3	52	2	16	90
Mean	30.206	29 594	29 881	.612	89⅔	40	61.67	58	57.29	85.33	6.35	1	23	3 96	8.33	6⅔	4⅔	2⅓	11	5⅓	36 1-3	3	21 2-3	.....
Mean for year	30.291	29.304	29.860	.958	77.5	31	52.88	47.5	48.98	81.5	5.95	3.58	28.91	4.02	8.83	5½	9⅓	2	10 1-12	4⅔	28 5-6	6⅔	24 7-12	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44	347	48.24	100	66	112	24	121	54	341	80	295	1,095
Y'rly extremes.	30.600	28.656	29.985	1.944	96	-4	77.99	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE OF DR. INGRAM, OF VINELAND, ON THE SUMMARIES FOR THE THREE STATISTICAL YEARS ENDING JULY 1ST, 1881.

The summaries of these three years are rather expressive in the way of *contrast*. The year 1878–9 is near the average in temperature, pressure, &c., while 1879–80 is above the average temperature by 8 per cent., and over 13 per cent. above 1880–81.

These fluctuations in temperature bring with them conditions that seriously affect the public health, especially in the aged, as well as among the youths where there is much exposure, and to all classes not enjoying proper food and clothing.

The winter of 1880–81 will long be remembered as one of extraordinary severity. To give a clear idea of its exceptional severity, it may be stated that the average number of days in which *any* frost is found here is about 93 during a year, and of these 26 days are continuous frosty days, but during 1880–81 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 10½°. No previous year in the past sixteen has given such results.

P. S.—Vineland is a center of most equable temperature, and hence the exceptional variations which have occurred here, point to still more marked contrasts elsewhere. It and the winter of 1880–81 help to explain the increased mortality of the year ending July 1st, 1881.

METEOROLOGICAL SUMMARY FROM JULY 1ST, 1881, TO JANUARY 1ST, 1882.

Station—Dennis Library, 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.

MONTH.	BAROMETER. (Reduced to 32 degrees.)			THERMOMETER.			Mean Humidity.	Prevailing Wind.	Rain (inches.)*	Days when Precipitation Equalled 0.01.	Cloudy Days.	Rain fell on Days.	Thunder and Lightning on Days.	Snow fell on Days.	Fog.	Hail.	Frost.	Lunar Halos.
	Max.	Min.	Mean.	Max.	Min.	Mean.												
1881.																		
July	29.544°	28.870°	29.208°	95.2°	57.8°	74.66°	67.88°	N. W. and S. W.	2.005	10	9	17	6	.....	4	1	.....	.....
August	29.541	28.904	29.281	97.0	52.4	73.94	73.26	N. W. and S. W.	1.48	4	8	8	3	.....	1	.....	.....	.....
September	29.608	29.139	29.350	99.0	50.4	72.47	81.94	S. S. W.	2.20	11	11	11	7	.....	7	.....	.....	.....
October	29.810	28.735	29.378	84.9	31.2	55.94	84.30	S. W.	4.70	9	15	11	.....	.....	1	.....	4	1
November	29.863	28.797	29.380	68.2	19.6	42 72	79.63	S. W.	3.23	12	12	12	.....	5	4	.....	2	3
December	29.805	28.552	29.352	63.0	17.0	39.09	76.80	S. W. and N. E.	4.76	14	17	14	1	4	6	2	9	6
For the half year	29.863°	28.552°	29.325°	99.0°	17.0°	59.80°	77.15	.....	18.375	60	72	73	17	9	23	3	15	10

*Including melted snow.

REMARKS.—August, hazy; latter part of month, heavy dews. September, characterized by murky atmosphere, dense fogs; heavy dews, 16th and 23d, being like a Scotch mist, dripped from trees and was perceptible on dust of the road; rain on 1st was of reddish-brown color, with sooty taint; sunrise on 6th was accompanied by a yellowish-green fog covering everything and producing weird effects, three and a half hours. October, heavy dews and mists. November, fogs and mists. December, fogs, frosts, mists, lunar halos, drizzling rains, snow flurries (angle-worms and blue birds).

SUMMARY OF WEATHER

For 12 Months ending December 31st, 1881, Vineland, N. J.

	BAROMETER.					TEMPERATURE.				RAIN.			FROST.			WIND.										
	Maximum.	Minimum.	Range.	Mean.	Degree of Cloudiness.	Maximum.	Minimum.	Range.	Mean.	Hygrometer.	Rainy Days.	Rain.	Any Frost.	All Frost.	Thunder.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Total.	Clear Days.	Clear Observations.
January	30.489	29.158	1.331	29.998	70.1	46°	-10½°	56½°	25.31°	61	10	6.81	30	17	.....	3	20	1	4	2	12	10	41	93	1	23
February	30.601	29.310	1 291	29.927	52.3	58	-6	64	29.96	61	9	5.61	23	9	.....	9	13	1	13	4	8	10	26	84	5	37
March	30 072	28.880	1.192	29.549	70.7	62	22	40	28.86	76	8	5.28	15	2	1	3	10	5	6	3	15	16	35	93	2	21
April	30.070	29.307	.763	29.754	60.9	88	26	62	47.36	69	5	1.30	6	.....	1	1	8	5	9	4	19	20	24	90	2	27
May	30.248	29.492	.756	29.879	60.2	94	44	50	64.24	72	10	3.50	.....	.....	5	2	20	5	21	6	31	2	6	93	4	32
June	29.978	29.518	.460	29.737	73.5	94	54	40	69.74	80	11	4.57	.....	.....	4	10	17	1	9	3	25	9	16	90	1	18
July	30.044	29.518	.526	29.779	65.3	97	60	37	77.89	68	6	2.96	.....	.....	6	5	15	2	9	4	30	9	19	93	0	23
August	30.168	29.540	.628	29 898	52.8	100	58	42	76.44	62	4	.65	.....	.....	2	15	12	0	11	4	32	8	11	93	2	34
September	30.164	29.708	.456	29.944	52.8	104	58	46	76.76	63	4	2.35	.....	.....	4	2	14	6	15	6	30	1	16	90	5	33
October	30.376	29.468	.908	30.028	59.0	92	30	62	61.72	61	8	3.13	1	.....	1	10	10	1	7	4	38	7	16	93	5	33
November	30.541	29.594	.947	30.066	61.9	78	24	54	48.56	68	9	3.05	6	7	.....	6	12	0	8	9	19	4	32	90	4	27
December	30.460	29.364	1.096	30.054	68.6	68	18	50	41.98	62	10	3 24	16	1	.....	7	9	0	6	11	25	13	22	93	3	22
Mean	30.267	29.404	.863	29.884	62 3	81.75°	32.83°	48.92°	54.06°	67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94	42.45	97	36	24	73	160	27	118	60	284	109	264	1,095	34	330

NOTES ON THE WEATHER BY MONTHS, IN 1881, AT VINELAND, N. J.

January.—Snow covered ground entire month; good sleighing; frost penetrated ground in exposed places 17½ inches—under the snow it thawed out; blackberry canes killed down to general surface of snow, 8 to 10 inches above ground; some pneumonia and bronchitis, yet not very fatal; barometer 30.041, and this .004 below average.

February.—Snow banks continued through the month; sleighing good to 9th; then considerable rain and changeable weather to 17th; then cold, and so continued to end of month, with some slight variations; total amount of rain and melted snow 5.61, and of this 12 inches of snow, or 1.2 inches of water are included; range of temperature 58—6=64°, and mean 29.96°; only five days thawing weather in month; barometer, maximum 30.601; minimum 29.310; range 1.291; mean 29.927, which is .035 below average; pneumonia and measles common, yet not fatal, the former quite depressing in the aged, and much care needed to bring them through; quinine very valuable, and in some cases stimulants needed.

March.—Month quite rough and stormy throughout; much rain, and this, with the snow of January and February, completely saturated the ground, flooding many cellars; roads very muddy; barometer quite low and variable, ranging from 30.072 to 29 880=1.192; mean 29.549, or a depression .367 below the average; some croup and bad colds.

April.—Quite variable and some rain, up to 18th; after this date vegetation bounded right along; it is quite clear that the blackberry canes were killed to 8 or 10 inches of ground, as the January observations seemed to indicate; raspberries safe, so far; some evergreens look as if scorched on north and northeast sides; latter part (from 19th) of month dry, and flooded cellars dried out; colds, croup, &c., among children; barometer 30.070—29.307=.763 range, and mean 29.754, showing a depression of .118 below the average; temperature ranged from 88° to 26°=62°, and mean 47.36°; last frost on 6th.

May.—Peaches a *failure*, many of the peach trees killed in many places, presumably by frost; apples, pears, wheat, rye, &c., look splendid; an excellent growing month; measles *very* common, and yet generally mild; barometer 30.248—29.492=.756 range; mean, 29 879, or .037 below the average.

June.—Numerous rainy days; very genial weather; healthy; barometer 29.978—29.518=460 range; mean, 29.737, low.

July.—Up to *last day* of month the rainfall was *very* light, and temperature high, consequently vegetation suffered from drought; grass, corn, potatoes, &c., suffered much; raspberries and blackberries *excellent*, and brought fair prices; apples plenty, but no peaches.

Generally healthy; barometer, 30.044—29.518=.526 range; mean, 29.779; temperature, 96°—60°=36° range.

August.—Scorching dry and hot; only .65 inches rain or 4.55 below the average of August in 16 years; a little rain on 4 days; thunder on 2 days; ground dry as powder; temperature, 100°—58°=42° range; 76.44° mean; vegetation drying up; barometer, 30 168—29.540=.628 range; mean, 29.898.

September.—Good rain on 10th; very little either way before or since; crops look bad, very; high temperature and dry, thunder on 4 days; temperature, 104° maximum—58° minimum=46° range; 76.76° mean; barometer, 30.104 maximum—29.708 minimum=.456 range; 29.944 mean.

	Average of Rain, in Inches, for 16 Years.	Rainy days.	For 1881.	Rainy days.
July	4.49	9	2.96	6
August	5.20	9	.65	4
September	4.40	7	2.35	4
Total	14.09	25	5.96	14

These figures for 1881 show powers that can scorch and blight.

October.—Evenly divided rains in month, but not enough to help vegetation to any great extent; *first* frost in season on 6th, and last on April 6th; intervening period, 183 days; round potatoes, nearly a failure; sweet potatoes, better in quantity and quality than anticipated; apple crop, splendid; some dysentery and bilious fever.

November.—Month moderate; no severe weather; wells low; water bad; temperature of wells, 54°; barometer, 30 541 maximum—29.592 minimum=.999 range; 30 066 mean; temperature, 75° maximum—24° minimum=54° range; 48.56° mean; diphtheria (sporadic cases), bilious fever.

December.—Month mild; towards end of month wells began to rise a little; temperature of water, 50°; robins disappeared about 20th; buds of maples and lilacs considerably swollen.

I can only express my regrets that I have been unable to give more details. I think another year may give more valuable materials, out of which to help form a basis of value to the sanitarian, meteorologist and others.

OBSERVATIONS TAKEN BY FRANK OSBORN, MIDDLETOWN, N. J.

From July 1st, 1880, to June 30th, 1881, inclusive. Maximum and Minimum Temperature.

1880. DAY OF MONTH.	JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	86°	64°	90°	60°	69°	59°	68°	41°	58°	34°	45°	24°
2	90	65	89	65	85	60	71	41	58	34	42	31
3	78	63	90	65	87	62	72	50	68	38	42	30
4	84	59	77	65	85	65	75	53	62	39	45	25
5	87	65	78	61	97	62	80	53	59	49	51	26
6	85	66	77	62	98	71	60	51	65	52	51	40
7	84	68	75	60	95	68	77	43	68	41	46	22
8	88	69	89	58	70	60	69	45	59	32	30	12
9	90	67	90	63	64	57	65	48	61	30	30	10
10	91	72	86	65	60	54	69	49	69	42	29	9
11	91	70	91	66	77	51	79	51	63	43	20	5
12	90	69	80	63	83	54	81	52	45	45	30	5
13	85	68	76	62	82	57	79	44	35	35	50	25
14	92	68	90	63	77	55	66	41	46	31	43	28
15	91	68	81	61	73	49	70	44	47	31	44	30
16	79	69	82	52	67	51	76	49	48	27	48	29
17	89	67	78	54	78	52	80	57	52	29	42	20
18	87	64	82	56	83	59	76	36	55	33	35	20
19	87	64	80	57	89	63	58	30	49	19	39	15
20	83	70	81	63	78	64	56	30	42	18	*	*
21	76	64	84	68	85	64	63	36	42	22	*	*
22	75	65	90	69	80	54	65	45	31	10	*	*
23	75	60	84	67	77	48	58	50	34	10	42	12
24	74	61	89	70	75	49	58	37	34	9	48	14
25	82	67	89	72	75	54	56	32	34	10	32	24
26	90	66	93	62	75	55	57	32	34	14	32	29
27	89	66	69	57	81	64	66	33	30	15	27	32
28	89	60	74	60	82	65	68	35	49	19	15	35
29	81	56	82	63	74	50	45	35	36	30	17	7
30	80	56	92	65	74	48	55	45	39	24	14	-11
31	85	60	66	58	.....	.....	62	54	.....	.....	6	-10

1881. DAY OF MONTH.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1	16°	-3°	30°	10°	58°	30°	42°	30°	71°	38°	86°	64°
2	30	7	13	-6	32	18	41	29	59	44	78	59
3	35	10	17	-4	36	19	48	23	68	43	68	53
4	*	*	29	0	36	35	45	24	61	39	56	41
5	*	*	35	5	40	24	44	17	62	39	70	48
6	32	30	40	9	45	23	34	21	62	45	75	55
7	39	24	45	14	52	28	36	19	56	45	70	48
8	44	15	50	14	59	28	57	27	70	43	64	52
9	30	15	45	25	62	32	60	35	77	47	78	58
10	41	20	50	30	41	34	63	35	83	50	63	59
11	44	22	51	31	47	28	65	37	88	61	56	49
12	30	12	54	34	43	23	68	35	91	66	67	50
13	34	11	54	22	41	25	45	34	96	54	76	52
14	46	20	35	17	40	33	39	34	80	51	64	51
15	40	3	35	15	45	28	47	36	73	55	72	59
16	28	3	47	15	50	30	62	34	83	55	79	54
17	36	19	41	20	61	31	69	38	59	48	73	55
18	49	15	41	20	37	33	65	44	52	45	65	55
19	40	15	45	25	44	30	55	32	55	45	88	61
20	46	19	48	23	43	36	67	38	61	49	85	64
21	50	19	36	22	*	*	53	32	61	49	82	64
22	35	25	45	25	48	32	75	38	70	52	78	50
23	39	25	47	25	49	30	64	39	73	52	74	50
24	34	15	45	5	47	26	72	41	71	54	74	51
25	38	7	28	5	49	26	79	55	71	52	76	55
26	*	*	42	12	49	29	79	45	76	50	74	58
27	*	*	36	14	41	24	71	46	73	48	*	*
28	20	6	52	30	47	30	65	46	87	58	73	61
29	23	10	.....	.....	52	30	83	48	74	54	85	68
30	32	13	.....	.....	43	35	72	40	87	60	88	65
31	27	20	.....	.....	36	30	.....	.....	89	65	.....	.....

*No observations taken.

AGRICULTURAL FARM, NEW BRUNSWICK, N. J.

Latitude, 40° 29′. Longitude, 74° 26′. Height, 90 feet.

THEO. WEST, OBSERVER. [Copy from records of Prof. J. C. SMOCK, for 1881.]

	THERMOMETER.			Prevailing Winds.	Rain and Melted Snow (inches).
	Max.	Min.	Mean.		
January	45°	-7°	22.66°	N. N. W.	7.35
February	52	-1	26.69	W.	4.37
March	58	22	34.45	W. S. W.	4.51
April	75	21	43.36	W.	0.43
May	90	42	62.69	S. W.	2.53
June	88	50	64.68	N. N. E.	5.94
July	90	60	71.73	S. W.	0.00
August	99	60	72.12	W. S. W.	1.58
September	103	59	72.44	W. S. W.	0.50
October	89	35	58.55	W. S. W.	0.86
November	69	20	44.14	W.	2.05
December	61	19	39.83	W. S. W.	3.21
For the year	103	-7	51.11	.....	33.33
Range	110	.....	.....	.....	.....

NOTE.—Barometer and Relative Humidity not measured.

NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY TOWNSHIPS.

Atlantic County.

	M.	B.	D.
Absecon	5	17	15
Atlantic City	31	120	134
Buena Vista	4	22	12
Egg Harbor City	15	31	37
Egg Harbor Township	27	84	57
Galloway		35	23
Hamilton	10	41	18
Hammonton	20	36	34
Mullica	5	8	10
Weymouth	2	17	5
	119	414	345

Bergen County.

	M.	B.	D.
Englewood	20	63	44
Franklin	16	24	21
Harrington	10	31	27
Hohokus	30	47	41
Lodi	8	89	81
Midland	2	21	36
New Barbadoes	45	111	68
Palisade	13	26	20
Ridgefield	8	62	49
Ridgewood	11	31	27
Saddle River	4	30	19
Union	8	89	72
Washington	12	49	53
	187	673	558

Burlington County.

	M.	B.	D.
Bass River	.....	24	17
Beverly	8	25	31
Bordentown	39	126	87
Burlington	47	142	132
Chester	34	64	36
Chesterfield	14	17	24
Cinnaminson	11	41	37
Delran	20	14	30
Evesham	7	27	20
Eastampton	.....	12	14
Florence	6	41	19
Little Egg Harbor	21	51	15
Lumberton	4	35	32
Mansfield	15	33	21
Medford	9	25	26
Mt. Laurel	2	37	22
New Hanover	17	44	27
Northampton	48	91	83
Pemberton	18	56	62
Randolph	1	8	9
Shamong	4	17	14
Southampton	16	51	26
Springfield	3	39	26
Washington	1	17	5
Westampton	1	9	19
Willingboro	2	20	4
Woodland	.....	6	4
	348	1,072	842

Camden County.

	M.	B.	D.
Camden City	399	639	954
Centre	4	36	18
Delaware	1	17	24
Gloucester	21	66	106
Gloucester City	32	129	108
Haddon	26	68	54
Stockton	25	61	92
Waterford	8	33	25
Winslow	5	43	35
	521	1,092	1,416

Cape May County.

	M.	B.	D.
Cape May City	21	42	21
Dennis	19	31	19
Lower	7	33	38
Middle	8	50	30
Upper	10	27	24
	65	183	132

Cumberland County.

	M.	B.	D.
Bridgeton	96	207	172
Commercial	7	14	20
Deerfield	2	26	17
Downe	17	26	13
Fairfield	30	78	60
Greenwich	6	21	21
Hopewell	4	27	27
Landis	58	124	92
Maurice River	6	33	33
Millville	82	262	174
Stoe Creek	10	21	13
	318	839	612

Essex County.

	M.	B.	D.
Belleville	10	61	61
Bloomfield	30	143	70
Caldwell	19	60	36
Clinton	16	51	35
East Orange	26	203	101
Franklin	8	21	20
Livingston	6	11	13
Millburn	13	31	24
Montclair	35	130	61
Newark	1,236	3,737	2,884
Orange	92	403	238
South Orange	10	98	53
West Orange	10	79	47
	1,511	5,028	3,643

Gloucester County.

	M.	B.	D.
Clayton	19	62	24
Deptford	7	34	18
East Greenwich	5	10	11
Franklin	8	66	44
Glassboro	26	61	29
Greenwich	16	46	52
Harrison	22	63	27
Logan	4	37	19
Mantua	11	41	31
Monroe	9	45	34
Washington	6	35	16
West Deptford	2	39	17
Woodbury	40	63	45
Woolwich	15	47	28
	190	649	393

Hudson County.

	M.	B.	D.
Bayonne	47	185	154
Guttenberg	6	27	23
Harrison	9	120	138
Hoboken	214	733	785
Jersey City	765	1,437	2,851
Kearney	1	30	25
North Bergen	6	47	229
Town of Union	47	148	110
Union	.....	27	33
Weehawken	2	17	33
West Hoboken	24	119	105
	1,121	2,890	4,483

Hunterdon County.

	M.	B.	D.
Alexandria	4	21	13
Bethlehem	12	41	46
Clinton	7	45	9
Delaware	19	56	27
East Amwell	12	31	30
Franklin	17	21	9
Frenchtown	10	14	21
High Bridge	19	54	22
Holland	12	43	29
Kingwood	5	35	21
Lambertville	36	98	75
Lebanon	19	54	35
Raritan	18	68	52
Readington	25	73	47
Tewksbury	16	60	33
Town of Clinton	7	3	23
Union	7	14	24
West Amwell	3	24	13
	248	755	529

Mercer County.

	M.	B.	D.
Chambersburg	38	141	97
East Windsor	20	43	38
Ewing	3	16	44
Hamilton	21	62	51
Hopewell	27	57	44
Lawrence	9	59	55
Princeton	30	93	66
Trenton	323	586	565
Washington	1	10	22
West Windsor	15	25	17
	487	1,097	999

Middlesex County.

	M.	B.	D.
Cranbury	14	19	25
East Brunswick	16	75	50
Madison	4	21	28
Monroe	19	40	45
New Brunswick	142	430	323
North Brunswick	9	26	19
Perth Amboy	22	145	79
Piscataway	22	60	42
Raritan	21	60	51
Sayreville	5	16	21
South Amboy	19	87	69
South Brunswick	12	51	41
Woodbridge	8	63	59
	313	1,093	850

Monmouth County.

	M.	B.	D.
Atlantic	10	21	27
Eatontown	16	47	40
Freehold	47	68	72
Holmdel	9	22	17
Howell	25	90	49
Manalapan	9	31	23
Marlboro	6	26	37
Matawan	17	46	60
Middletown	34	67	76
Millstone	23	32	28
Neptune	45	100	91
Ocean	61	140	115
Raritan	37	105	62
Shrewsbury	52	179	88
Upper Freehold	28	70	47
Wall	34	124	53
	453	1,168	885

Morris County.

	M.	B.	D.
Boonton	36	49	50
Chatham	17	52	66
Chester	18	60	40
Hanover	15	46	80
Jefferson	5	37	27
Mendham	11	25	16
Montville	11	23	27
Morristown	37	115	109
Mount Olive	15	45	38
Pasaaic	8	10	33
Pequannock	10	52	39
Randolph	72	191	125
Rockaway	31	174	121
Roxbury	11	63	49
Washington	11	37	24
	308	979	844

Ocean County.

	M.	B.	D.
Berkeley	1	19	12
Brick	22	49	32
Dover	21	64	30
Eagleswood	4	8	10
Jackson	6	33	29
Lacey	13	16	6
Manchester	9	24	18
Ocean	1	14	4
Plumsted	6	48	26
Stafford	8	17	11
Union	3	31	20
	94	323	198

Passaic County.

	M.	B.	D.
Acquackanonk	.....	36	22
Little Falls	17	26	29
Manchester	1	22	22
Passaic	66	208	129
Paterson	522	1,469	1,161
Pompton	34	31	27
Wayne	5	14	24
West Milford	24	55	36
	669	1,861	1,450

Salem County.

	M.	B.	D.
Elsinboro	.....	5	2
Lower Alloways Creek	10	16	14
Lower Penn's Neck	8	20	14
Mannington	2	39	52
Oldmans	1	16	1
Pilesgrove	22	70	52
Pittsgrove	14	77	23
Quinton	4	41	13
Salem	38	97	74
Upper Alloways Creek	12	22	34
Upper Penn's Neck	28	51	46
Upper Pittsgrove	8	32	28
	147	486	353

Somerset County.

	M.	B.	D.
Bedminster	12	44	30
Bernards	23	52	36
Branchburg	10	22	16
Bridgewater	76	185	146
Franklin	17	51	55
Hillsborough	16	57	42
Montgomery	12	37	25
North Plainfield	5	56	39
Warren	10	9	16
	181	513	405

Sussex County.

	M.	B.	D.
Andover	14	21	17
Byram	12	29	23
Frankford	9	29	31
Greene	1	9	6
Hardyston	13	20	22
Hampton	3	4	7
Lafayette	9	5	14
Montague	3	8	10
Newton	21	25	30
Sandyston	10	21	19
Sparta	20	29	38
Stillwater	19	21	30
Vernon	7	28	24
Walpack	.....	8	4
Wantage	14	38	45
	155	295	320

Union County.

	M.	B.	D.
Clark	2	7	8
Cranford	3	16	23
Elizabeth	223	707	564
Fanwood	4	18	14
Linden	8	35	29
New Providence	1	15	14
Plainfield	49	161	130
Rahway	48	114	104
Springfield	7	14	18
Summit	8	43	19
Union	9	39	26
Westfield	7	40	47
	369	1,209	994

Warren County.

	M.	B.	D.
Allamuchy	2	3	9
Belvidere	19	32	24
Blairstown	12	27	22
Franklin	26	21	21
Frelinghuysen	6	21	15
Greenwich	10	74	45
Hackettstown	33	48	34
Hardwick	.....	11	2
Harmony	13	35	16
Hope	9	33	25
Independence	12	19	15
Knowlton	9	24	15
Lapatcong	5	51	22
Mansfield	18	22	30
Oxford	20	122	62
Pahaquarry	.....	7	4
Phillipsburg	73	249	114
Town of Washington	36	19	36
Washington	2	47	20
	305	865	531

Totals of Marriages, Births and Deaths for all the Counties.

	M.	B.	D.
Atlantic	119	414	345
Bergen	187	673	558
Burlington	348	1,072	842
Camden	521	1,092	1,416
Cape May	65	183	132
Cumberland	318	839	642
Essex	1,511	5,028	3,643
Gloucester	190	649	393
Hudson	1,121	2,890	4,483
Hunterdon	248	755	529
Mercer	487	1,097	999
Middlesex	313	1,093	850
Monmouth	453	1,168	885
Morris	308	979	844
Ocean	94	323	198
Passaic	669	1,861	1,450
Salem	147	486	353
Somerset	181	513	405
Sussex	155	295	320
Union	369	1,209	994
Warren	305	865	531
Total for the State	8,109	23,484	20,812

The total number of still births for the State during the year was 1,476

And of reburials, transit permits, &c 481

SUMMARY OF TOTALS FOR WHOLE STATE FOR THE PAST THREE YEARS.

	M.	B.	D.
1879	7,096	23,116	20,440
1880	7,936	23 680	18,967
1881	8,109	23,484	20,812

Return of Deaths from all Causes and Certain Specified Diseases, in the Counties of the State of New Jersey, for the Year ending July 1st, 1881.

COUNTIES OF NEW JERSEY.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Dige-tive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Total deaths from these diseases.	Death rate per 1,000 from these diseases.
Atlantic	67	50	27	96	102	3	345	18,704	18.44	2	9	9	10	......	3	9	39	41	29	27	18	15	38	2	33	5	1	3	....	....
Bergen	107	62	54	178	148	9	558	36,786	18 37	24	10	......	8	1	6	24	44	80	62	43	36	17	41	5	33	15	2	10	....	....
Burlington	178	102	75	244	230	13	842	55,403	15.19	9	30	9	18	9	12	27	97	116	65	48	60	22	83	7	60	11	7	16	....	....
Camden	320	218	175	404	268	31	1,416	62,912	22.49	14	79	144	76	7	10	30	136	180	105	94	70	21	88	6	58	24	3	22	....	....
Cape May	30	10	8	33	45	6	132	9,765	13.51	2	11	......	......	......	5	5	18	9	11	5	7	2	13	......	13	9	......	3	....	....
Cumberland	142	109	70	159	157	5	612	37,687	17.03	4	24	1	23	16	14	36	76	91	64	48	47	24	41	3	32	7	1	3	....	....
Essex	816	539	306	1,277	702	13	3,653	189,929	19 23	79	75	6	56	2	11	278	396	585	485	318	219	130	257	25	166	78	9	66	....	....
Gloucester	96	36	40	109	98	3	382	25,886	14 75	6	11	4	11	1	1	11	61	61	22	29	26	4	31	3	24	9	1	3	....	....
Hudson	1,103	824	481	1,476	571	25	4,483	187,944	23 85	72	119	70	130	8	12	325	545	587	478	513	230	111	221	17	147	84	20	58	....	....
Hunterdon	79	45	52	147	204	2	529	38,570	13 71	18	17	......	9	......	4	29	31	71	41	20	42	15	71	5	41	15	4	12	....	....
Mercer	191	125	77	332	246	28	999	58,061	17.20	17	36	2	34	2	7	27	85	171	93	65	57	32	87	5	59	41	7	15	....	....
Middlesex	181	90	82	273	219	5	850	52 286	16 25	28	18	1	17	1	7	38	100	125	81	38	52	33	56	3	58	21	4	13	....	....
Monmouth	209	115	68	221	264	5	885	55,538	15 93	12	26	1	16	3	1	25	145	109	71	52	68	26	86	1	73	22	2	10	....	....
Morris	156	100	71	261	245	11	844	50,861	16 59	38	14	......	21	......	1	33	69	107	119	51	53	27	99	6	46	19	5	16	....	....
Ocean	34	22	22	51	67	2	198	14,455	13.69	2	4	......	7	......	......	10	22	34	12	6	13	3	17	2	21	5	......	4	....	....
Passaic	366	233	126	457	263	5	1,450	68,860	21.05	40	32	......	15	12	9	90	177	235	174	117	75	57	70	7	59	25	4	16	....	....
Salem	87	45	40	78	101	1	352	21,579	14.32	6	9	2	6	3	4	12	39	49	45	22	21	10	25	4	21	10	2	2	....	....
Somerset	78	32	46	132	113	4	405	27,162	14.91	15	6	3	7	......	3	26	42	70	41	6	24	10	38	2	30	8	7	9	....	....
Sussex	49	38	32	110	90	1	320	23,539	13.59	12	7	......	4	......	3	10	29	44	33	22	25	8	34	2	11	10	2	7	....	....
Union	230	135	93	319	216	1	994	55,571	17 88	24	17	2	24	2	6	43	104	151	120	90	42	25	66	11	53	21	4	7	....	....
Warren	110	58	68	155	138	2	531	36,589	14 51	7	20	......	7	3	......	40	50	73	57	28	28	16	40	8	39	9	4	8	....	....
Total	4,629	2,988	2,016	6,515	4,487	175	20,810	1,131,117	18.39	431	574	254	499	70	119	1128	2255	2989	2208	1612	1213	608	1502	124	1080	451	89	303	17,539	15.50

Return of Deaths from all Causes and Certain Specified Diseases, in the Cities of the State of New Jersey, of Over 5,000, for the Year Ending July 1st, 1881.

STATISTICAL DIVISIONS. Incorporated Cities of the State having by the Census of 1880 over 5,000.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.	Total deaths from these diseases.	Death rate per 1,000 from these diseases.
Atlantic County.																														
Atlantic City	33	23	15	37	25	1	134	5,477	24.46	......	4	......	10	...	3	4	17	9	10	11	7	7	16	...	12	2	1	1	......	......
Burlington County.																														
Bordentown	15	5	8	33	26	...	87	5,334	16 31	2	2	......	3	1	...	......	6	13	5	5	5	3	13	2	5	3	...	3	......	......
Burlington	25	16	13	50	28	1	133	7,237	18.37	4	2	1	......	1	5	......	12	25	11	10	11	5	13	4	9	1	1	3	......	......
Camden County.																														
Camden	222	163	132	271	157	9	954	41,659	22.90	6	32	134	58	3	6	20	93	125	70	61	41	15	47	4	34	18	2	13	......	......
Gloucester City	31	11	11	35	20	...	108	5,347	20 19	3	6	......	3	4	...	3	6	17	11	11	2	1	9	...	6	1	1	3	......	......
Cumberland County.																														
Bridgeton	36	29	15	48	41	3	172	8,722	19.72	1	5	......	6	...	3	23	23	21	11	10	17	5	9	...	12	3	1	......	......	......
Millville	49	43	26	32	23	1	174	7,660	22.71	......	5	......	13	14	7	10	22	23	26	11	8	5	3	...	6	2	...	......	......	......
Essex County.																														
East Orange	22	13	13	34	29	...	111	8,349	13 29	......	4	......	3	1	...	11	9	22	15	6	12	5	5	1	2	3	...	3	......	......
Newark	654	440	247	1,035	498	10	2,884	136,508	21.12	65	51	4	42	2	4	231	306	453	316	246	169	92	188	20	137	61	8	45	......	......
Orange	58	35	19	83	43	...	238	13,207	18.02	1	7	......	4	...	2	14	20	33	44	20	13	7	14	1	5	4	...	5	......	......
Hudson County.																														
Bayonne	44	24	16	45	25	...	154	9,372	16.43	2	......	......	1	...	...	8	16	17	14	30	10	5	3	2	5	......	...	2	......	......
Harrison	37	29	15	42	14	1	138	6,898	20 00	2	8	......	2	...	...	7	20	19	17	23	4	3	4	...	2	4	...	2	......	......
Hoboken	212	166	70	256	81	...	785	30,999	25.32	8	17	9	36	2	1	73	105	93	74	93	32	16	39	4	26	14	10	10	......	......
Jersey City	688	523	322	953	348	17	2,851	120,722	23 61	42	79	43	84	5	10	208	326	390	320	326	151	69	140	7	90	56	9	40	......	......
Town of Union	31	19	7	42	11	...	110	5,849	18.80	2	4	......	1	...	...	14	11	21	6	12	7	3	4	1	5	1	...	2	......	......
West Hoboken	23	23	15	29	15	...	105	5,441	19.29	1	1	......	......	1	...	5	25	10	17	11	9	5	4	...	2	1	...	......	......	......
Mercer County.																														
Chambersburg	21	20	11	27	15	3	97	5,437	17.84	3	3	......	8	2	1	3	11	17	4	4	4	3	3	...	8	4	1	4	......	......
Trenton	117	79	36	191	127	15	565	29,910	18.89	10	19	......	20	...	4	16	48	101	56	46	26	20	40	3	30	17	4	8	......	......
Middlesex County.																														
New Brunswick	78	46	36	94	67	2	323	17,166	18.81	5	10	......	14	1	4	14	44	43	31	16	22	16	23	2	11	8	1	4	......	......
Morris County.																														
Morristown	14	8	5	44	37	1	109	6,837	15.94	2	1	......	1	...	...	5	9	16	7	6	8	7	34	...	4	......	...	1	......	......
Passaic County.																														
Passaic City	48	19	9	40	13	...	129	6,532	19 44	......	......	......	4	1	2	3	20	21	16	12	7	9	6	...	2	1	1	2	......	......
Paterson	287	194	100	378	198	4	1,161	51,031	22.75	24	29	......	11	9	4	83	140	197	144	95	55	41	48	6	50	20	2	12	......	......
Salem County.																														
Salem	17	10	2	20	25	...	74	5,056	14.63	......	2	......	......	...	1	1	5	14	16	1	5	1	6	...	8	1	2	......	......	......
Union County.																														
Elizabeth	140	74	56	193	101	...	564	28,229	19.97	7	8	1	7	2	5	19	59	95	77	58	23	10	32	2	30	11	3	5	......	......
Plainfield	31	22	7	32	35	...	130	8,125	16 00	1	3	1	2	...	1	8	18	21	12	10	5	7	5	2	8	......	1	......	......	......
Rahway	14	11	7	44	28	...	104	6,455	16.11	3	1	......	6	...	..	......	8	11	15	6	6	4	15	3	6	4	...	1	......	......
Warren County.																														
Phillipsburg	34	12	14	35	19	...	114	7,181	15.87	2	7	......	1	...	...	6	9	15	18	6	5	2	6	...	5	1	1	5	......	......
Total	2,984	2,057	1,227	4,123	2,019	68	12,508	590 740	21.17	196	310	193	340	49	63	789	1,388	1,845	1,393	1,146	664	366	729	64	520	241	49	174	10,519	17.80

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

ATLANTIC COUNTY. Population 18,704 — Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Consumption.	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.
Absecon	3	1	....	2	9	....	15	507	.....	....	....	....	....	....	....	....	....	3	1	2	2	1	....	2	....	....	....	....	....
Atlantic City	33	23	15	37	25	1	134	5,477	24.46	....	4	....	10	....	3	4	17	9	10	11	7	7	16	....	12	2	1	1	10
Buena Vista	3	....	....	4	4	1	12	885	.....	....	....	....	....	....	....	....	....	3	2	2	....	....	....	1	....	2	....	....	1	....
Egg Harbor City	7	3	3	15	9	....	37	1,232	.....	....	....	....	....	....	....	1	5	6	4	3	....	....	....	1	....	3	1	....	....	....
Egg Harbor Township (excluding Absecon)	5	14	4	14	19	1	57	3,568	.....	....	2	....	8	....	....	1	5	6	4	2	4	4	3	6	2	5	1	....	....
Galloway, (excluding Egg Harbor City)	8	2	1	5	10	....	23	2,337	.....	....	....	....	....	....	....	1	9	11	6	4	4	3	6	2	5	1	....	....	....	....
Hamilton	3	3	1	4	7	....	18	1,464	.....	1	....	1	....	....	....	1	....	1	1	2	2	1	4	....	2	1	....	1	....	....
Hammonton	7	2	3	11	11	....	34	1,776	.....	1	2	....	....	....	....	1	2	1	2	....	....	....	2	....	1	....	....	....	....	1
Mullica	....	1	....	4	5	....	10	717	.....	....	1	....	....	....	....	1	5	4	1	3	1	3	6	....	4	....	....	....	....	....
Weymouth	1	1	....	....	3	....	5	741	.....	....	....	....	....	....	....	....	....	3	2	....	....	....	1	....	2	....	....	....	....	....
Total	67	50	27	96	102	3	345	.....	.....	2	9	9	10	.....	3	9	39	41	29	27	18	15	38	2	33	5	1	3	11
Death rate per 1,000 for county	.....	.....	.....	.....	.....	.....	.....	.....	18.44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 for county, exclud'g city	.....	.....	.....	.....	.....	.....	.....	.....	15.95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

BERGEN COUNTY. Population 36,786 — Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diptheria.	Diarrhœal 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.
Englewood	16	1	1	12	13	1	44	4,076	.....	2	....	....	....	....	2	2	5	3	6	1	7	....	2	....	1	3	....	2	1
Franklin	3	1	1	6	8	2	21	2,206	.....	....	1	....	....	....	....	....	1	2	2	2	2	....	1	....	2	1	....	....	1	1
Harrington	3	2	4	8	10	....	27	2,570	.....	3	....	....	2	....	....	....	4	3	5	....	1	2	4	....	1	....	....	1	....	3
Hohokus	6	2	6	13	12	2	41	2,920	.....	1	1	....	....	....	....	6	7	10	1	1	1	3	5	....	5	1	....	1	....	1
Lodi	23	11	7	23	17	....	81	4,071	.....	4	....	....	....	....	....	....	11	11	7	12	....	1	3	....	5	....	1	1	....	3
Midland	4	4	2	12	13	1	36	1,591	.....	5	....	....	....	1	....	1	....	4	3	....	2	2	3	....	3	1	....	1	....	3
New Barbadoes	13	10	4	26	15	....	68	4,248	.....	....	1	....	....	....	2	5	1	15	7	8	3	3	7	....	2	....	1	....	....	2
Palisade	5	2	2	5	6	....	20	2,302	.....	1	....	....	....	....	....	2	1	5	1	1	1	2	2	....	2	....	....	1	....	2
Ridgefield	11	5	1	18	14	....	49	3,052	.....	1	....	....	....	....	....	2	1	4	1	1	2	....	6	....	1	....	....	....	....	2
Ridgewood	4	3	5	10	5	....	27	1,478	.....	1	1	....	2	....	....	1	1	3	3	3	....	4	2	....	1	....	....	....	....	....
Saddle River	2	....	5	10	2	....	19	1,355	.....	2	....	....	....	....	....	....	....	3	6	1	1	....	1	....	1	....	....	....	....	....
Union	12	12	8	33	14	3	72	3,164	.....	3	5	....	1	....	2	2	4	3	13	6	3	5	4	....	1	2	....	2	2	6
Washington	5	9	8	12	19	....	53	2,853	.....	1	1	....	3	....	....	3	5	11	1	7	4	1	2	....	1	1	....	2	2	2
Total	107	62	54	178	148	9	558	.....	.....	24	10	.....	8	1	6	24	44	80	62	43	36	17	41	5	33	15	2	10	.....
Death rate, per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	18.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

BURLINGTON COUNTY. Population.....55,403 Statistical Divisions.	DEATHS AT ALL AGES.							Population, census 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and Spinal diseases.	Erysipelas.	Digestion and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bass River	5	1	.....	4	7	.....	17	1,606	.....	.....	.....	.....	.....	1	.....	.....	3	1	1	1	1	1	2	.....	1	.....	1	1	.....
Beverly (city)	6	4	2	5	6	.....	23	1,759	.....	.....	2	.....	.....	.....	.....	1	4	5	3	3	3	1	.....	.....	.....	.....	.....	1	1
Beverly Township (exclusive of city)	2	1	.....	3	2	.....	8	1,369	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	1	2	.....	2	.....	.....	1	.....	.....	1
Bordentown (including township)	15	5	8	33	26	.....	87	5,334	16.31	2	2	.....	3	1	.....	.....	6	13	5	5	5	3	13	2	5	3	.....	3	4
Burlington (including township)	25	16	13	50	28	.....	132	7,237	18.37	4	2	1	.....	1	5	.....	12	25	11	10	11	5	13	4	9	1	1	3	4
Chester	4	6	1	8	17	.....	36	2,855	.....	.....	1	.....	.....	.....	.....	.....	2	2	5	4	8	2	4	.....	1	.....	1	2	1
Chesterfield	5	1	.....	6	12	.....	24	1,525	.....	.....	1	2	.....	.....	1	1	2	2	2	.....	3	.....	6	.....	3	.....	.....	.....	.....
Cinnaminson	8	5	4	13	7	.....	37	2,184	.....	.....	.....	.....	4	1	.....	1	5	3	2	2	3	.....	4	.....	5	1	.....	1	1
Delran	8	3	5	12	.....	2	30	1,760	.....	.....	4	.....	.....	.....	.....	.....	3	3	4	3	1	.....	.....	.....	4	.....	.....	1	2
Evesham	6	3	1	5	5	.....	20	1,602	.....	.....	1	.....	.....	.....	1	1	.....	2	4	.....	1	.....	3	.....	.....	.....	1	.....	1
Eastampton	2	3	.....	3	6	.....	14	566	.....	.....	.....	.....	1	.....	.....	2	1	.....	1	.....	1	.....	.....	.....	1	.....	.....	.....	1
Florence	6	2	1	4	6	.....	19	1,528	.....	.....	.....	.....	.....	.....	.....	1	5	3	3	.....	2	.....	1	.....	1	.....	.....	1	.....
Little Egg Harbor	3	2	2	6	1	1	15	1,881	.....	.....	.....	.....	.....	.....	.....	.....	3	6	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	1
Lumberton	4	8	4	3	12	1	32	1,689	.....	.....	2	.....	2	.....	.....	7	2	3	1	2	3	.....	3	.....	3	.....	.....	.....	.....
Mansfield	4	4	2	4	7	.....	21	1,648	.....	.....	3	2	.....	.....	.....	.....	2	.....	1	1	3	1	1	.....	.....	.....	.....	.....	.....
Medford	8	2	2	8	6	.....	26	1,980	.....	.....	1	.....	.....	.....	.....	.....	5	6	2	1	1	.....	3	.....	.....	.....	1	.....	.....
Mount Laurel	5	6	4	3	4	.....	22	1,739	.....	1	.....	.....	.....	.....	2	3	3	1	3	.....	2	.....	2	.....	1	.....	.....	.....	3
New Hanover	6	2	2	6	11	.....	27	2,373	.....	.....	2	.....	.....	.....	.....	1	2	4	2	1	1	.....	3	.....	2	1	.....	.....	.....
Nortampton	22	4	9	24	23	1	83	4,630	.....	1	3	.....	1	2	2	1	18	12	3	7	5	3	7	.....	3	1	1	.....	1
Pemberton	13	5	6	18	18	2	62	2,885	.....	1	2	4	2	1	.....	1	6	9	1	3	2	3	9	.....	2	2	1	1	2
Randolph	.....	2	1	3	3	.....	9	428	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	2	1	.....	.....	.....	2	.....	1	.....	.....
Shamong	2	4	3	1	2	2	14	1,097	.....	.....	.....	.....	2	2	1	.....	1	1	3	.....	1	.....	.....	1	.....	.....	.....	.....	.....
Soutampton	5	3	.....	7	9	2	26	2,269	.....	.....	.....	.....	.....	.....	.....	.....	2	5	1	1	1	.....	1	.....	9	1	.....	.....	.....
Springfield	5	3	3	7	8	.....	26	1,886	.....	.....	3	.....	2	.....	.....	2	2	1	4	1	.....	.....	4	.....	4	.....	.....	1	.....
Washington	3	.....	.....	2	.....	.....	5	389	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Westampton	3	5	1	6	3	1	19	715	.....	.....	1	.....	1	.....	.....	2	3	6	1	.....	.....	1	.....	.....	1	.....	.....	.....	.....
Willingboro	.....	1	.....	.....	.....	1	4	743	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....
Woodland	2	1	1	.....	.....	.....	4	325	.....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	178	102	75	244	230	13	842	.....	.....	9	30	9	18	9	12	27	97	116	65	48	60	22	83	7	60	11	7	16	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	15.19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 of county, exclusive of cities	.....	.....	.....	.....	.....	.....	.....	.....	14.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

CAMDEN COUNTY. Population.....62,942 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.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Camden City	222	163	132	271	157	9	954	41,659	22.90	6	32	134	58	3	6	20	93	125	70	61	41	15	47	4	34	18	2	13	.....
Centre	9	3	.....	4	2	.....	18	1,538	.....	.....	3	.....	.....	.....	.....	.....	5	2	1	.....	2	.....	1	.....	.....	.....	.....	.....	.....
Delaware	7	1	1	8	7	.....	24	1,481	.....	.....	.....	.....	.....	.....	.....	.....	4	5	1	3	1	.....	1	.....	.....	.....	.....	.....	.....
Gloucester Township	7	7	6	36	30	20	106	2,527	.....	1	36	.....	4	.....	.....	1	6	8	6	4	6	.....	12	.....	11	2	.....	1	.....
Gloucester City	31	11	11	35	20	.....	108	5 347	20.19	3	6	.....	4	.....	.....	3	6	17	11	11	2	1	9	.....	6	1	1	3	1
Haddon	17	4	7	8	18	.....	51	2,551	.....	2	2	1	3	4	.....	3	6	5	5	4	6	2	4	1	.....	.....	.....	.....	1
Stockton	21	24	9	24	13	1	92	3,532	.....	1	.....	6	1	.....	3	1	12	12	6	10	9	.....	4	.....	3	2	.....	4	4
Waterford	3	.....	4	7	10	1	25	2,149	.....	1	.....	.....	2	.....	.....	.....	3	3	2	.....	1	.....	5	.....	2	.....	.....	.....	3
Winslow	3	5	5	11	11	.....	35	2,158	.....	.....	.....	3	5	.....	.....	1	1	3	3	1	2	3	5	.....	1	.....	.....	1	.....
Total	320	218	175	404	268	31	1416	.....	.....	14	79	144	76	7	10	30	136	189	105	94	70	21	88	6	58	24	3	22	.....
Death rate, per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	22.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 of county, excl'd'g cities	.....	.....	.....	.....	.....	.....	.....	.....	22.21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

CAPE MAY COUNTY. Population.....9,765 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 ten.	Twenty to sixty.	Over sixty.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	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 diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Cape May City	6	2	1	5	5	2	21	1,699	.....	.....	1	.....	.....	.....	.....	2	3	2	1	.....	3	2	3	.....	3	.....	.....	.....	1
Dennis	3	.....	3	5	8	.....	19	1,812	.....	.....	3	.....	.....	.....	1	.....	.....	.....	1	.....	1	.....	2	.....	3	3	.....	2	.....
Lower	12	5	.....	7	13	1	38	1,977	.....	1	3	.....	.....	.....	4	2	6	3	4	1	.....	1	4	.....	2	.....	.....	.....	.....
Middle	6	3	3	5	11	2	30	2,575	.....	.....	1	.....	.....	.....	.....	1	5	3	3	3	1	.....	2	.....	2	1	.....	1	1
Upper	3	.....	1	11	8	1	24	1,702	.....	1	3	.....	.....	.....	.....	.....	4	1	2	1	2	.....	2	.....	.....	.....	.....	.....	.....
Cape May Point*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	30	10	8	33	45	6	132	.....	.....	2	11	.....	.....	.....	5	5	18	9	11	5	7	2	13	.....	13	9	.....	3	.....
Death rate, per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	13 51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Its population of 198 is included in Lower Township.

Return of Deaths from all Causes and Certain Specified Causes, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

CUMBERLAND COUNTY. Population.....37,687 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.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	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 diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bridgeton	36	29	15	48	41	3	172	8,722	19.72	1	5	.....	6	.....	3	23	23	21	11	10	17	5	9	.....	12	3	1	.....	.....
Commercial	5	5	1	6	3	.....	20	2,265	.....	.....	1	.....	.....	.....	1	1	3	3	.....	2	3	1	1	.....	.....	.....	.....	.....	1
Deerfield	3	.....	2	5	7	.....	17	1,643	.....	.....	2	.....	1	.....	.....	.....	2	2	.....	.....	1	1	4	.....	.....	.....	.....	1	3
Downe	1	2	1	4	5	.....	13	1,687	.....	.....	.....	.....	.....	.....	.....	.....	1	1	2	.....	2	.....	2	.....	.....	.....	.....	.....	.....
Fairfield	9	6	6	17	21	1	60	3,215	.....	.....	4	.....	1	.....	2	1	8	11	5	1	8	1	5	1	2	.....	.....	1	2
Greenwich	3	4	1	8	5	.....	21	1,245	.....	.....	1	.....	.....	.....	.....	.....	2	5	.....	1	1	2	1	.....	1	.....	.....	.....	2
Hopewell	5	4	2	5	11	.....	27	1,764	.....	.....	1	.....	1	.....	1	.....	2	1	2	3	2	4	5	.....	1	.....	.....	.....	1
Landis	22	10	10	26	24	.....	92	6,005	.....	3	2	1	1	1	.....	.....	7	22	13	13	3	3	8	2	3	1	.....	1	2
Maurice River	7	6	6	4	10	.....	33	2,374	.....	.....	2	.....	.....	1	.....	1	6	2	5	5	.....	8	5	.....	4	.....	.....	.....	.....
Millville	49	43	26	32	23	1	174	7,660	22.71	.....	5	.....	13	14	7	10	22	23	26	11	2	2	3	.....	6	2	.....	.....	3
Stoe Creek	2	.....	.....	4	7	.....	13	1,107	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	142	109	70	159	157	5	642	.....	.....	4	24	1	23	16	14	36	76	91	64	48	47	24	41	3	32	7	1	3	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	17.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 of county, excl'd'g cities	.....	.....	.....	.....	.....	.....	.....	.....	13.89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

ESSEX COUNTY. Population.....189,929 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.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	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.
Belleville	13	13	2	14	16	3	61	3,004	.....	3	.....	1	1	.....	.....	7	9	9	7	5	1	4	7	.....	2	1	.....	.....	1
Bloomfield	16	6	5	17	26	.....	70	5,748	.....	1	1	.....	.....	.....	.....	1	17	12	10	2	5	5	6	.....	1	2	.....	2	1
Caldwell	4	4	.....	9	19	.....	36	3,167	.....	.....	.....	.....	.....	.....	.....	2	3	4	7	1	2	3	4	.....	1	1	.....	1	1
Clinton	6	2	.....	14	13	.....	35	2,742	.....	.....	2	.....	.....	.....	.....	.....	2	5	2	2	3	3	5	1	3	.....	.....	2	2
East Orange	22	13	13	34	29	.....	111	8,349	13.29	1	7	.....	4	.....	2	14	20	33	44	20	13	7	14	1	5	4	.....	5	.....
Franklin	3	3	1	5	8	.....	20	1,617	.....	.....	.....	.....	.....	.....	.....	.....	2	5	3	3	1	1	3	.....	.....	.....	.....	.....	1
Livingston	1	1	.....	5	6	.....	13	1,401	.....	.....	.....	.....	.....	.....	.....	.....	1	4	1	1	3	1	.....	.....	2	.....	.....	.....	.....
Millburn	2	1	3	12	6	.....	24	1,743	.....	6	.....	.....	1	.....	.....	.....	2	7	1	.....	1	.....	1	.....	2	.....	.....	2	.....
Montclair	13	10	8	20	10	.....	61	5,147	.....	.....	4	.....	.....	.....	3	6	4	10	6	5	5	1	4	1	2	1	.....	3	.....
Newark	654	440	247	1,035	498	10	2,884	136,508	21 12	65	51	4	42	2	4	231	306	453	346	246	169	92	188	20	137	61	8	45	.....
Orange	58	35	19	83	43	.....	238	13,207	18.02	1	7	.....	4	.....	2	14	20	33	44	20	13	7	14	1	5	4	.....	5	.....
South Orange	8	8	8	15	14	.....	53	3,911	.....	2	2	1	4	.....	.....	3	5	10	7	5	1	2	4	1	1	2	.....	.....	1
West Orange	16	3	.....	14	14	.....	47	3,385	.....	.....	1	.....	.....	.....	.....	.....	5	.....	7	8	2	4	7	.....	3	.....	1	1	1
Total	816	539	306	1,277	702	13	3,653	.....	.....	79	75	6	56	2	11	278	396	585	485	318	219	130	257	25	166	78	9	66	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	19.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 of county, exclusive of cities	.....	.....	.....	.....	.....	.....	.....	.....	13.18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Division of the State of New Jersey, for the Year ending July 1st, 1881.

GLOUCESTER COUNTY. Population.....25,886 Siatistical 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.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	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.
Clayton	8	3	1	7	5	.....	24	1,981	.....	.....	.....	.....	.....	.....	.....	1	5	3	1	2	.....	1	5	.....	.....	2	.....	.....	1
Deptford	6	1	1	4	6	.....	18	1,520	.....	.....	1	.....	.....	.....	.....	.....	3	1	.....	3	3	.....	2	.....	2	.....	.....	.....	2
Franklin	8	8	7	10	11	.....	44	2,480	.....	1	1	.....	1	.....	.....	3	6	6	5	5	.....	.....	2	.....	4	.....	.....	1	2
Glassboro	7	7	3	7	5	.....	29	2,088	.....	.....	1	.....	.....	.....	.....	2	7	6	3	2	.....	1	2	.....	1	.....	.....	.....	1
Greenwich	12	3	6	14	16	1	52	2,598	.....	.....	1	1	.....	.....	.....	.....	9	7	5	5	2	1	6	1	1	3	.....	.....	3
Harrison	7	1	.....	8	11	.....	27	2,841	.....	2	.....	.....	.....	.....	1	1	2	5	1	2	3	.....	2	.....	2	2	1	.....	.....
Logan	5	1	2	6	5	.....	19	1,765	.....	.....	.....	.....	3	.....	.....	.....	4	4	.....	1	2	1	.....	.....	2	.....	.....	.....	.....
Mantua	6	2	2	14	7	.....	31	1,718	.....	.....	1	2	.....	.....	.....	1	5	5	2	.....	3	.....	3	1	3	.....	.....	.....	3
Monroe	8	4	8	9	4	1	34	1,858	.....	1	.....	.....	.....	5	1	.....	1	4	10	3	2	.....	.....	.....	1	.....	.....	.....	1
Washington	3	2	2	5	4	.....	16	1,366	.....	.....	.....	2	.....	2	.....	.....	1	1	.....	3	3	.....	1	.....	1	1	.....	1	.....
West Deptford	4	1	1	9	1	1	17	1,399	.....	.....	.....	2	.....	.....	.....	1	1	1	.....	1	1	.....	1	.....	3	.....	.....	.....	1
Woodbury	18	2	3	9	13	.....	45	2,298	.....	.....	.....	1	.....	.....	.....	1	11	7	1	3	3	.....	5	1	1	1	.....	1	1
Woolwich	4	1	4	7	10	.....	26	1,974	.....	2	2	.....	.....	.....	.....	.....	3	5	1	.....	6	.....	1	.....	4	.....	.....	.....	1
Total	96	36	40	109	98	3	382	.....	.....	6	11	4	11	1	1	11	61	61	22	29	26	4	31	3	24	9	1	3	.....
Death rate per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	14.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

HUDSON COUNTY. Population.....187,944 Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Bayonne	41	24	16	45	25	.....	151	9,372	16 43	2	.....	.....	1	.....	.....	8	16	17	14	30	10	5	3	2	5	.....	.....	2	.....
Guttenberg	5	3	1	8	5	.....	22	1,206	.....	1	.....	.....	1	.....	.....	.....	5	.....	1	1	1	1	3	1	1	.....	.....	.....	3
Harrison	37	29	15	42	14	1	138	6,898	20 00	2	8	.....	2	.....	.....	7	20	19	17	23	4	3	4	.....	2	4	.....	2	.....
Hoboken	212	166	70	256	81	.....	785	30,999	25.32	8	17	9	26	2	1	73	105	93	74	93	32	16	39	4	26	14	10	10	.....
Jersey City	688	523	322	953	318	17	2,851	120,722	23.61	42	79	43	84	5	10	208	326	390	320	324	151	69	140	7	90	56	9	40	.....
Kearney	5	1	7	7	5	.....	25	777	.....	2	2	.....	1	.....	.....	.....	1	2	1	4	.....	1	3	.....	3	.....	1	.....	1
North Bergen	44	19	25	77	57	7	229	4,268	53.65	10	5	18	2	.....	1	4	23	30	27	7	11	6	17	1	11	6	.....	3	14
Town of Union	31	19	7	42	11	.....	110	5,849	18 80	2	4	.....	1	.....	.....	14	11	21	6	12	7	3	4	1	5	1	.....	1	.....
Union Township	6	9	3	9	5	.....	32	1,310	.....	1	2	.....	1	.....	.....	5	6	3	.....	2	2	1	2	.....	1	1	.....	.....	1
Weehawken	8	8	3	9	5	.....	32	1,102	.....	1	1	.....	1	.....	.....	1	7	2	1	4	3	1	2	1	1	.....	.....	.....	2
West Hoboken	23	23	15	29	15	.....	105	5,441	19 29	1	1	.....	.....	1	.....	5	25	10	17	11	9	5	4	.....	2	1	.....	.....	.....
Total	1,103	824	484	1,476	571	25	4,483	.....	.....	72	119	70	130	8	12	325	545	587	478	513	230	111	221	17	147	84	20	58	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	23.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 of county, exclusive of cities	.....	.....	.....	.....	.....	.....	.....	.....	39.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE—The excess of North Bergen is chiefly owing to the fact that some of the alms institutions of Hudson county are located there.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

HUNTERDON COUNTY. Population.....38,570 Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Alexandria	1	1	1	3	7	.....	13	1,324	.....	1	.....	.....	.....	.....	.....	2	1	1	3	.....	.....	.....	1	.....	2	.....	.....	.....	.....
Bethlehem	5	5	9	13	13	1	46	2,830	.....	1	3	.....	1	.....	1	2	5	3	4	3	3	1	8	.....	3	1	.....	2	1
Clinton Township (including Town of Clinton, below)	.....	2	.....	4	3	.....	9	2,133	.....	.....	.....	.....	1	.....	.....	.....	.....	1	1	.....	.....	.....	2	.....	3	.....	.....	.....	.....
Delaware	3	1	2	7	14	.....	27	3,092	.....	2	.....	.....	.....	.....	1	.....	1	2	1	.....	3	1	5	.....	4	1	.....	1	1
East Amwell	1	3	1	11	14	.....	30	1,696	.....	2	.....	.....	1	.....	.....	.....	.....	4	3	1	3	1	7	.....	2	1	1	.....	.....
Franklin	1	1	1	2	5	.....	9	1,338	.....	.....	1	.....	.....	.....	.....	1	.....	2	1	.....	2	.....	2	.....	2	.....	.....	.....	.....
Frenchtown	2	.....	.....	5	14	.....	21	1,039	.....	4	.....	.....	.....	.....	1	.....	3	1	.....	.....	2	.....	6	1	1	.....	.....	.....	.....
High Bridge	4	1	2	8	7	.....	22	2,249	.....	2	1	.....	.....	.....	.....	1	.....	.....	1	1	4	1	1	.....	1	2	.....	1	3
Holland	2	9	1	6	10	1	29	1,886	.....	2	.....	.....	.....	.....	.....	6	2	2	1	2	1	2	4	.....	3	.....	.....	.....	.....
Kingwood	6	2	1	4	8	.....	21	1,690	.....	.....	.....	.....	.....	.....	1	.....	1	3	2	1	2	2	3	.....	1	.....	.....	1	.....
Lambertville	11	6	13	17	25	.....	75	4,183	.....	3	4	.....	3	.....	10	7	6	11	2	2	4	2	8	.....	4	2	1	1	3
Lebanon	8	3	7	12	5	.....	35	2,099	.....	.....	2	.....	1	.....	1	1	8	4	3	1	2	.....	1	.....	3	.....	1	2	1
Raritan	9	4	2	15	22	.....	52	4,188	.....	.....	2	.....	1	.....	.....	1	4	8	2	2	7	4	7	.....	2	2	.....	3	.....
Readington	8	3	4	14	18	.....	47	3,103	.....	.....	1	.....	.....	.....	.....	3	4	10	2	2	3	1	8	2	2	4	.....	.....	.....
Tewksbury	5	3	3	10	12	.....	33	2,105	.....	1	3	.....	.....	.....	.....	1	.....	7	2	1	2	1	1	.....	5	.....	.....	.....	.....
Town of Clinton	4	1	2	7	9	.....	23	812	.....	.....	.....	.....	1	.....	.....	.....	1	4	1	.....	3	.....	2	.....	2	.....	.....	.....	.....
Union	4	.....	2	8	10	.....	24	1,167	.....	.....	.....	.....	.....	.....	.....	1	2	7	2	1	.....	1	3	2	1	1	1	1	1
West Amwell	3	.....	1	1	8	.....	13	1,039	.....	.....	.....	.....	.....	.....	.....	1	2	.....	2	1	3	.....	2	.....	1	1	1	.....	.....
Total	79	45	52	147	204	2	529	.....	.....	18	17	.....	9	.....	4	29	31	71	41	20	42	15	71	5	41	15	4	12	.....
Death rate per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	13.71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

MERCER COUNTY. Population.....58,061 Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Chambersburg	21	20	11	27	15	3	97	5,437	17.84	3	3	.....	8	2	1	3	11	17	4	4	4	3	3	.....	8	4	1	4	.....
East Windsor	6	4	2	12	13	1	38	2,271	.....	.....	1	.....	.....	.....	.....	3	4	5	2	1	1	1	1	.....	5	1	.....	.....	.....
Ewing	.....	1	1	23	16	3	44	2,412	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	.....	1	3	.....	18	1	1	2	.....	.....	.....
Hamilton	6	5	4	18	16	2	51	3,370	.....	.....	2	1	2	.....	.....	2	3	7	.....	.....	3	.....	4	1	5	3	2	.....	.....
Hopewell	6	4	7	11	15	1	44	4,462	.....	.....	2	.....	.....	.....	.....	2	5	6	2	1	3	.....	5	.....	2	3	2	1	.....
Lawrence	19	6	6	16	7	1	55	3,174	.....	2	5	.....	1	.....	2	1	6	6	2	2	6	3	.....	.....	2	.....	1	.....	1
Princeton	10	3	6	24	23	.....	66	4,348	.....	2	1	.....	.....	.....	.....	2	4	10	6	2	8	2	7	.....	5	6	.....	.....	3
Trenton	117	79	36	191	127	15	565	29,910	18.89	10	19	.....	20	.....	4	16	48	101	56	46	26	20	40	3	30	17	4	8	.....
Washington	3	1	3	7	8	.....	22	1,281	.....	.....	1	1	3	.....	.....	.....	.....	3	3	2	.....	.....	1	.....	2	1	.....	2	.....
West Windsor	3	2	1	3	6	2	17	1,396	.....	.....	2	.....	.....	.....	.....	.....	4	3	1	.....	.....	1	2	.....	.....	3	.....	.....	2
Total	191	125	77	332	246	28	999	.....	.....	17	36	2	34	2	7	27	85	171	93	65	57	32	87	5	59	41	7	15	.....
Death rate per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	17.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000, of county, excl'd'g city	.....	.....	.....	.....	.....	.....	.....	.....	14.83	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

MIDDLESEX COUNTY. Population.....52,286 Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	Remittent fever.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Cranbury	2	1	2	7	13	.....	25	1,599	.....	.....	.....	.....	.....	.....	.....	1	1	8	4	.....	4	2	1	.....	1	3	1	1	.....
East Brunswick	8	5	5	15	17	.....	50	3,272	.....	1	.....	.....	2	.....	.....	.....	8	6	5	.....	2	2	1	1	8	3	.....	.....	1
Madison	4	5	1	10	6	.....	26	1,662	.....	.....	.....	.....	.....	.....	.....	2	5	5	4	1	2	2	2	.....	3	.....	.....	.....	1
Monroe	10	2	4	15	14	.....	45	3,017	.....	2	.....	.....	.....	.....	1	1	3	11	6	3	2	2	1	.....	7	.....	1	.....	1
New Brunswick	78	46	36	94	67	2	323	17,166	18.81	5	10	.....	14	1	4	14	44	43	31	16	22	16	23	2	11	8	1	4	1
North Brunswick	3	2	.....	7	7	.....	19	1,251	.....	.....	.....	.....	.....	.....	.....	2	.....	5	1	.....	1	.....	1	1	.....	2	.....	.....	.....
Perth Amboy	20	7	8	26	18	.....	79	4,808	.....	2	2	.....	.....	.....	.....	3	13	12	7	3	4	1	7	.....	6	1	.....	2	1
Piscataway	7	1	5	20	9	.....	42	3,212	.....	4	4	.....	.....	.....	.....	1	3	4	3	1	3	2	4	.....	5	.....	.....	.....	.....
Raritan	7	1	8	17	18	.....	51	3,389	.....	4	.....	.....	1	.....	.....	2	1	6	4	3	8	1	4	.....	4	.....	.....	.....	.....
Sayreville	5	2	1	9	4	.....	21	1,930	.....	.....	.....	.....	.....	.....	.....	.....	2	4	4	2	2	1	1	.....	1	.....	.....	.....	.....
South Amboy	17	9	6	22	15	.....	69	3,648	.....	3	2	.....	.....	.....	2	5	8	7	4	3	1	.....	3	.....	8	3	.....	1	.....
South Brunswick	7	1	4	14	14	1	41	2,803	.....	3	.....	.....	.....	.....	.....	.....	3	8	4	2	3	.....	1	.....	2	2	2	3	.....
Woodbridge	13	8	2	17	17	2	59	4,099	.....	4	.....	.....	.....	.....	.....	7	9	6	2	4	1	2	7	.....	2	2	1	.....	.....
Total	181	90	82	273	219	5	850	.....	.....	28	18	1	17	1	7	38	109	125	81	38	52	33	56	3	58	24	4	13	.....
Death rate per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	16.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000, of county, excl'd'g city	.....	.....	.....	.....	.....	.....	.....	.....	15.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

MONMOUTH COUNTY. Population 55,538. Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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	4	2	3	8	10	.....	27	1,743	.....	.....	1	1	.....	.....	.....	1	4	3	2	1	2	1	5	.....	2	.....	.....	.....	.....
Eatontown	11	6	1	6	16	.....	40	2,642	.....	4	.....	.....	.....	.....	1	1	7	2	.....	4	3	2	5	.....	5	1	.....	.....	1
Freehold	10	2	2	24	33	1	72	4,302	.....	1	.....	.....	.....	.....	.....	.....	3	12	6	3	14	2	9	.....	6	1	.....	1	.....
Holmdel	4	2	.....	3	8	.....	17	1,575	.....	.....	.....	.....	.....	.....	.....	.....	1	2	1	2	3	.....	2	.....	2	.....	.....	.....	1
Howell	14	6	4	10	15	.....	49	3,374	.....	1	2	.....	.....	.....	.....	3	12	3	5	2	1	1	8	.....	6	1	.....	.....	.....
Manalapan	3	2	1	8	9	.....	23	2,175	.....	.....	1	.....	.....	.....	.....	.....	1	5	2	1	6	.....	3	.....	2	1	.....	.....	.....
Marlboro	6	6	3	7	15	.....	37	2,193	.....	.....	1	.....	1	.....	.....	.....	7	5	6	2	1	2	5	.....	2	2	.....	1	.....
Matawan	10	7	8	19	15	1	60	2,699	.....	.....	7	.....	.....	.....	.....	3	7	10	5	4	3	.....	3	.....	6	2	.....	1	3
Middletown	25	12	5	18	14	2	76	5,059	.....	.....	2	.....	3	.....	.....	4	18	5	5	4	8	3	4	.....	2	2	.....	3	6
Millstone	2	7	1	5	13	.....	28	2,080	.....	.....	.....	.....	.....	.....	.....	.....	5	1	3	2	1	.....	4	.....	6	1	.....	.....	.....
Neptune	32	12	4	24	19	.....	91	4,187	.....	.....	2	.....	.....	1	.....	3	27	7	9	3	5	3	5	.....	11	1	1	2	2
Ocean	32	21	10	25	23	1	115	6,027	.....	3	.....	.....	10	.....	.....	4	22	11	6	12	5	3	8	.....	7	2	.....	1	4
Raritan	15	8	7	18	14	.....	62	3,891	.....	1	3	.....	.....	.....	.....	.....	10	16	1	5	5	1	4	1	5	.....	.....	.....	2
Shrewsbury	19	6	9	25	29	.....	88	6,526	.....	1	3	.....	.....	.....	.....	1	14	13	8	2	6	2	13	.....	8	2	1	.....	2
Upper Freehold	11	3	7	13	13	.....	47	3,236	.....	1	1	.....	2	1	.....	.....	2	9	5	.....	5	2	4	1	2	1	.....	1	3
Wall	11	10	3	11	18	.....	53	3,829	.....	.....	3	.....	.....	1	.....	5	5	4	7	5	.....	4	4	.....	3	3	.....	.....	3
Total	209	115	68	224	264	5	885	.....	.....	12	26	1	16	3	1	25	145	109	71	52	68	26	86	1	73	22	2	10	.....
Death rate per 1,000 for county	.....	.....	.....	.....	.....	.....	.....	.....	15.93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

MORRIS COUNTY. Population 50,861. Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Boonton	9	7	6	12	14	2	50	2,682	.....	4	2	.....	2	.....	.....	3	10	2	3	1	5	7	.....	2	3	.....	.....	.....	3
Chatham	9	4	4	23	21	.....	66	4,276	.....	3	1	.....	.....	.....	.....	1	2	18	8	3	6	2	7	.....	2	.....	.....	1	3
Chester	8	7	3	15	6	.....	40	2,337	.....	2	1	.....	.....	.....	.....	.....	2	6	10	3	6	2	7	2	1	.....	.....	1	3
Hanover	7	3	4	20	45	1	80	4,138	.....	.....	1	.....	1	.....	.....	1	3	10	15	2	4	2	19	3	7	.....	1	2	3
Jefferson	5	4	3	9	6	.....	27	1,792	.....	3	.....	.....	1	.....	.....	1	1	3	6	1	4	.....	2	.....	1	.....	.....	2	3
Mendham	2	.....	2	7	5	.....	16	1,526	.....	2	.....	.....	.....	1	.....	.....	.....	4	2	.....	.....	.....	.....	.....	1	.....	.....	1	2
Montville	2	3	4	6	12	.....	27	1,270	.....	4	2	.....	.....	.....	1	.....	.....	3	4	1	2	3	.....	.....	4	.....	.....	.....	2
Morristown	14	8	5	44	37	1	109	6,837	15.94	2	1	.....	1	.....	.....	5	9	16	7	6	8	7	34	.....	4	.....	1	1	3
Mount Olive	5	5	6	15	7	...	33	1,982	.....	2	1	.....	4	.....	.....	.....	3	6	4	1	2	.....	.....	.....	1	.....	.....	1	1
Passaic	3	5	3	6	15	1	33	1,896	.....	4	.....	.....	.....	.....	.....	5	4	2	3	2	2	3	.....	.....	1	1	.....	1	1
Pequannock	9	6	1	9	13	1	39	2,239	.....	2	.....	.....	.....	.....	.....	3	4	2	4	2	3	2	3	.....	1	1	.....	1	1
Randolph	38	19	11	31	24	2	125	7,700	.....	3	.....	.....	.....	.....	.....	3	2	4	2	3	3	1	4	.....	1	.....	.....	1	2
Rockaway	27	20	12	38	23	1	121	7,366	.....	3	3	.....	4	.....	.....	6	18	8	20	16	9	1	8	1	4	.....	.....	2	6
Roxbury	10	6	6	13	12	2	49	2,139	.....	.....	1	.....	4	.....	.....	1	9	16	28	8	.....	3	9	.....	6	2	2	3	7
Washington	8	3	1	7	5	.....	24	2,681	.....	1	1	.....	4	.....	.....	2	4	7	5	2	3	.....	6	1	2	1	.....	1	2
Total	156	100	71	261	215	11	844	.....	.....	38	14	.....	21	.....	1	33	69	107	119	51	53	27	99	6	46	19	5	16	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	*17.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 of county, excl'd'g cities	.....	.....	.....	.....	.....	.....	.....	.....	*17.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Correct. For fractional difference, see manuscript.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

OCEAN COUNTY, Population 14,455 — 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.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Berkley	2	1	2	4	3	.....	12	683	.....	.....	.....	.....	1	.....	.....	1	.....	4	.....	.....	.....	.....	3	.....	4	.....	.....	.....	1
Brick	5	5	2	11	9	.....	32	2,990	.....	.....	1	.....	.....	.....	.....	1	6	5	2	2	3	.....	2	.....	2	.....	.....	.....	2
Dover	5	2	4	11	8	.....	30	2,439	.....	.....	2	.....	1	.....	.....	.....	2	5	3	1	.....	1	7	.....	.....	.....	.....	2	.....
Eaglewood	4	1	.....	2	2	1	10	592	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	1	.....	.....	.....	3	1	.....	.....	.....
Jackson	3	8	4	3	10	1	29	1,803	.....	.....	.....	.....	4	.....	.....	4	3	3	3	1	2	1	1	.....	1	.....	.....	.....	2
Lacey	.....	.....	2	1	3	.....	6	814	.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....	.....	.....	1	1	1	.....	.....	.....	.....
Manchester	4	2	2	2	8	.....	18	1,057	.....	.....	.....	.....	1	.....	.....	.....	2	2	1	.....	1	.....	1	.....	4	.....	.....	1	1
Ocean	.....	.....	.....	2	2	.....	4	484	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	1	.....	.....	.....	1	.....	.....	.....	.....
Plumsted	7	.....	4	6	9	.....	26	1,561	.....	1	.....	.....	.....	.....	.....	1	4	4	.....	.....	2	.....	1	.....	2	3	.....	1	1
Stafford	.....	1	1	3	6	.....	11	1,088	.....	.....	.....	.....	.....	.....	.....	1	.....	5	.....	.....	1	.....	1	.....	1	.....	.....	.....	1
Union	4	2	1	6	7	.....	20	1,024	.....	1	1	.....	.....	.....	.....	.....	1	4	2	2	2	.....	.....	1	2	1	.....	.....	1
Total	34	22	22	51	67	2	198	.....	.....	2	4	.....	7	.....	.....	10	22	34	12	6	13	3	17	2	21	5	.....	4	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	13.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

PASSAIC COUNTY, Population 68,860 — Statistical Divisions.	DEATHS AT ALL AGES.							Population, census 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																	
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and Spinal diseases.	Erysipelas.	Digestion and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Aquackanonck	5	5	.....	2	10	.....	22	1,781	.....	1	.....	.....	.....	.....	.....	1	3	3	4	1	2	.....	.....	.....	2	1	.....	.....	1
Little Falls	6	4	4	6	9	.....	29	1,404	.....	3	2	.....	.....	.....	.....	1	1	1	2	3	2	1	3	.....	.....	.....	.....	1	1
Manchester	4	3	1	6	8	.....	22	1,513	.....	1	.....	.....	.....	1	.....	1	2	2	.....	2	2	2	.....	.....	.....	.....	.....	.....	2
Passaic City	48	19	9	40	13	.....	129	6,532	19.44	.....	.....	.....	4	1	2	3	20	21	16	12	7	9	6	.....	8	1	.....	.....	.....
Paterson	287	194	100	378	198	4	1161	51,031	22.75	24	29	.....	11	9	4	83	140	197	144	95	55	41	48	6	50	20	2	12	.....
Pompton	5	4	9	8	1	.....	27	2,251	.....	4	1	.....	.....	1	1	1	8	3	1	1	1	.....	3	2	.....	.....	.....	.....	.....
Wayne	4	1	2	7	9	1	24	1,757	.....	3	.....	.....	.....	.....	2	.....	2	3	2	1	.....	.....	2	.....	2	1	.....	1	2
West Milford	7	3	1	10	15	.....	36	2,591	.....	4	.....	.....	.....	.....	.....	1	2	5	5	2	3	1	2	.....	2	1	.....	.....	.....
Total	366	233	126	457	263	5	1450	.....	.....	40	32	.....	15	12	9	90	177	235	174	117	75	57	70	7	59	25	4	16	.....
Death rate per 1,000, of county	.....	.....	.....	.....	.....	.....	.....	.....	21.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000, of county, excl'd'g cities	.....	.....	.....	.....	.....	.....	.....	.....	14.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

SALEM COUNTY. Population 24,579. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diptheria.	Diarrhœal diseases.	Consumption.	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.
Elsinboro	1				1		2	570									1		2	2	2	1	2	1	1				
Lower Alloways Creek	2	3	1	2	6		14	1,373			1					1													
Lower Penn's Neck	5	2	2	3	2		14	1,334			1				1		2	2	4	1	2								
Mannington	11	6	7	13	15		52	2,230		1	1	1					6	6	5	4	6	2	2				1		1
Pilesgrove	11	9	6	13	13		52	3 497		1	1		3	1	1	1	4	11	6	4	3	1	4	1	3	1			2
Pittsgrove	9	1	5	3	5		23	1,778		1			1	2		2	3	1	1	1		1			1	2			
Quinton	6	3	1	1	2		13	1,390					2				1	1	2		1	1		1					
Salem	17	10	2	20	25		74	5,056	14.63		2				1	1	5	14	16	1	5	1	6		8	1	2		1
Upper Alloways Creek	8	4	4	10	8		34	1,917								3	5	6	3	3		2	3		2	3			2
Upper Penn's Neck	10	3	8	7	17	1	46	3 361		3	1	1	1			3	5	5	6	4	2		4	1	4	1			
Upper Pittsgrove	7	4	4	6	7		28	2,073			2				1	1	6	3		2		1	4		1	2		1	
Total	87	45	40	78	101	1	352			6	9	2	6	3	4	12	39	49	45	22	21	10	25	4	24	10	2	2	
Death rate per 1,000 of county									14.32																				
Death rate per 1,000 of county, excl'd'g cities									14.23																				

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

SOMERSET COUNTY. Population 27,162. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Bedminster	5	1	3	13	8		30	1,812		2	1				1	1	1	1	4		2		3		2			2	
Bernards	3	3	4	12	14		36	2,622			1				1	3	3		4	1	1				3	1	1		
Branchburg	3	2	1	4	6		16	1,316		1			1			1	2	3	3			1	2			1		1	
Bridgewater	37	12	17	50	28	2	146	7,997		7	1		1		1	11	16	22	11	4	9	5	11	2	13	3		3	
Franklin	12	5	4	17	17		55	3,818		4	3				1	1	10	6	9		6	2	3		6		1		3
Hillsborough	7	3	3	16	13		42	3,218		1					1	2	1	10	4		1	1	5	1	1	1	4		1
Montgomery	3	1	4	7	9	1	25	1,928					2			1	2	3	2	1	2		3		3	2			2
North Plainfield	6	5	4	9	14	1	39	3,217				3				5	5	7	2		2		6		3				
Warren	2		6	4	4		16	1,204					3			1	2	4	2		1	1	1						
Total	78	32	46	132	113	4	405			15	6	3	7		3	26	42	70	41	6	24	10	38	2	30	8	7	9	
Death rate per 1,000 of county									14.91																				

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

SUSSEX COUNTY. Population ..... 23,539 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.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Andover	3	2	4	5	2	1	17	1,150	.....	.....	1	.....	2	.....	2	1	.....	1	.....	2	1	1	2	.....	.....	1	.....	1	.....
Byram	3	2	3	7	8	....	23	1,406	.....	.....	1	.....	.....	.....	.....	1	5	3	1	.....	1	.....	5	.....	.....	.....	.....	1	3
Frankford	8	4	3	6	10	.....	31	1,682	.....	5	.....	.....	.....	.....	.....	.....	4	3	1	3	1	1	1	.....	.....	.....	.....	.....	3
Green	1	1	1	3	.....	.....	6	727	.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	.....
Hardyston	2	4	1	10	5	.....	22	2,645	.....	1	1	.....	.....	.....	.....	1	2	.....	7	1	1	1	2	.....	.....	1	.....	1	.....
Hampton	2	.....	2	2	1	.....	7	895	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	1	.....	.....	.....	.....	1	.....	.....	1
Lafayette	.....	2	1	5	6	.....	14	781	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	1	3	.....	3	.....	1	.....	.....	1	2
Montague	3	2	1	3	1	.....	10	1,022	.....	1	.....	.....	1	.....	.....	.....	1	2	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
Newton	2	1	2	20	5	.....	30	2,513	.....	.....	1	.....	.....	.....	.....	.....	1	10	3	1	4	1	1	.....	3	.....	.....	2	1
Sandystone	3	4	1	4	7	.....	19	1,195	.....	.....	.....	.....	.....	.....	.....	.....	4	2	.....	1	1	1	3	1	2	.....	1	.....	1
Sparta	10	3	1	16	8	.....	38	2,274	.....	.....	.....	.....	.....	.....	.....	.....	4	3	6	5	2	.....	8	.....	1	1	.....	.....	3
Stillwater	4	2	4	8	12	.....	30	1,502	.....	1	.....	.....	.....	.....	.....	1	2	3	4	2	5	.....	3	1	2	3	.....	.....	1
Vernon	6	4	2	7	5	.....	24	1,811	.....	1	1	.....	.....	.....	.....	2	3	4	4	1	.....	1	1	.....	.....	1	1	.....	.....
Walpack	.....	.....	1	2	1	.....	4	575	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....
Wantage	2	7	5	12	19	.....	45	3,361	.....	3	2	.....	1	.....	.....	1	3	9	5	4	3	2	5	.....	1	.....	1	1	.....
Total	49	38	32	110	90	1	320	.....	.....	12	7	.....	4	.....	3	10	29	44	33	22	25	8	34	2	11	10	2	7	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	13.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

UNION COUNTY. Population ..... 55,571 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.	Undefined.	Total.			Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Consumption.	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.
Clark	4	.....	1	2	1	.....	8	353	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
Cranford	3	7	1	4	8	.....	23	1,184	.....	3	.....	.....	.....	.....	.....	7	1	1	1	.....	.....	.....	3	.....	3	1	.....	1	.....
Elizabeth	140	74	56	193	101	.....	564	28,229	19.97	7	8	1	7	2	5	19	59	95	77	58	23	10	32	2	30	11	3	5	.....
Fanwood	2	3	.....	1	8	.....	14	1,167	.....	1	.....	.....	1	.....	.....	1	1	2	2	2	2	.....	1	.....	1	.....	.....	.....	.....
Linden	5	1	3	12	8	.....	29	1,889	.....	.....	3	.....	3	.....	.....	.....	2	1	2	.....	2	1	1	4	1	1	1	.....	.....
New Providence	5	.....	3	4	2	.....	14	781	.....	2	.....	.....	.....	.....	.....	.....	2	2	.....	.....	1	.....	.....	1	.....	1	.....	.....	.....
Plainfield	34	22	7	32	35	.....	130	8,125	16 00	1	3	1	2	.....	1	8	18	24	12	10	5	7	5	2	8	4	1	.....	1
Rahway	14	11	7	41	23	.....	104	6,455	16.11	3	1	.....	6	.....	.....	.....	8	11	15	6	6	4	15	3	6	.....	1	.....	.....
Springfield	1	3	.....	6	6	.....	16	844	.....	3	.....	.....	1	.....	.....	1	1	5	.....	.....	2	.....	1	.....	.....	4	.....	.....	.....
Summit	4	.....	3	6	6	.....	19	1,910	.....	1	.....	.....	.....	.....	.....	1	1	1	2	3	1	1	1	.....	2	2	.....	.....	.....
Union	4	6	3	8	5	.....	26	2,418	.....	2	.....	.....	1	.....	.....	.....	5	5	1	3	1	1	1	.....	2	1	.....	.....	.....
Westfield	14	8	9	7	8	1	47	2,216	.....	.....	2	.....	3	.....	.....	6	6	4	6	5	1	1	2	2	2	.....	.....	.....	.....
Total	230	135	93	319	216	1	994	.....	.....	24	17	2	24	2	6	43	104	151	120	90	42	25	66	11	53	21	4	7	.....
Death rate per 1,000 of county	.....	.....	.....	.....	.....	.....	.....	.....	17.88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Death rate per 1,000 of county, excl'd'g cities	.....	.....	.....	.....	.....	.....	.....	.....	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending July 1st, 1881.

WARREN COUNTY.
Population 36,589

Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Undefined.	Total.	Population, census of 1880.	Death rate per 1,000.
Allamuchy	2	1	1	3	2		9	648	
Belvidere	3	1	4	11	5		21	1,773	
Blairstown	4		2	6	10		22	1,458	
Franklin	3	2	3	7	6		21	1,529	
Frelinghuysen	2	1		3	9		15	1,042	
Greenwich	5	8	9	13	10		45	2,554	
Hackettstown	6	3	3	14	8		34	2,502	
Hardwick				1	1		2	583	
Harmony	3	1	3	3	6		16	1,359	
Hope	3	3	3	5	11		25	1,569	
Independence	4		1	8	2		15	1,018	
Knowlton	3	1	2	1	8		15	1,476	
Lopatcong	6	2	4	4	4	2	22	1,591	
Mansfield	5	2	3	9	11		30	1,709	
Oxford	16	11	6	17	12		62	4,591	
Pahaquarry			1	2	1		4	418	
Phillipsburg	34	12	14	35	19		114	7,181	15 87
Washington, Borough of	11	8	5	5	7		36	2,142	
Washington Township		2	4	8	6		20	1,452	
Total	110	58	68	155	138	2	531		
Death rate per 1,000, of county									14.51
Death rate per 1,000 of county, excl'd'g city									14.18

Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Smallpox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrhœal 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.
Allamuchy		1						2	3	1			1							
Belvidere	1	2					1		5	4			1	4	2					1
Blairstown	2							1	3	3	1			2	3	5				
Franklin							2	1	4	1	1	1	1	3	1	1	1	2		1
Frelinghuysen		1					1		4	2				2		3	1			
Greenwich	1	1					7	5	8	6	3			3	1	3	1			2
Hackettstown							1	4	7	3	4	2		3		4			1	1
Hardwick																1				1
Harmony							1		2	2	3	1	1			2	1			
Hope							5	2	2	1		1	1	2		3	1			2
Independence								1	5	3	2	1	2							
Knowlton							1	2		1	1	4	1	1		1				
Lopatcong		1			1		2	2	4			1	1	2		1				2
Mansfield		2					2	3	4	2		2	1	3		5	2	1		1
Oxford	1	5		1			6	12	2	6	4	6		3		1	1		1	2
Pahaquarry				1					1	1		1								
Phillipsburg	2	7		1			6	9	15	18	6	5	2	6		5	1	1	5	6
Washington, Borough of				2	2		4	5	2	2	3	2	2	2		4				1
Washington Township				2			1	1	2	1		1	2	4	1				1	2
Total	7	20		7	3		40	50	73	57	28	28	16	40	8	39	9	4	8	
Death rate per 1,000, of county																				
Death rate per 1,000 of county, excl'd'g city																				

MEMORANDUM AS TO VACCINATION.

The series of facts already secured by the Committee on Vaccination, seem to enforce the importance of a careful re-study of the potency of the various forms of the vaccine virus in the prevention of smallpox. There is need, also, of close personal observation and investigation on the part of medical men. It has been thought best to postpone the paper promised on this subject until another year, and in the meantime to enlist the attention of the physicians of the State. We invite correspondence and the expression of opinion upon the following points, and such others as may suggest themselves to practitioners:

I. Should the use of bovine virus supersede the use of humanized virus?

II. What phenomena, if any, have occurred in the use of bovine virus, as distinct from what has been heretofore noted as to the humanized Jenner virus? Such as (*a*) time of maturity; (*b*) degree of sickness; (*c*) proportion of local to general effect; (*d*) as modified by the number of pustules; (*e*) as showing herpes or other skin irritation; (*f*) as to period of protection, etc.

III. Are we able to arrive at any law as to how frequently vaccination should be repeated?

IV. Should there be a law of compulsory vaccination?

V. How far should *revaccination* be insisted upon in attendance at public schools?

VI. How far can we determine the efficacy of the vaccination by the scar?

VII. Should we not adopt the plan of giving certificate of vaccination, so that the facts as to its proper doing may be more fully known?

VIII. In what way shall practitioners be assured of the purity and freshness of virus?

Our desire is to get at the accurate experience of practitioners in this State. The history of vaccination is well known. But we seek

the facts in evidence as to all changes wrought by animal virus, and shall be glad to aid or be aided by those who will help to perfect the art of vaccination. Such outlines of facts as those furnished by Dr. Boysen, of Egg Harbor City, or Dr. Daly, of Rahway (page 159), are of much value. We seek the careful opinions of physicians as to the significance of the facts they observe in the use of vaccine. Thus we seek to aid in making the knowledge as to vaccination so definite, with physicians, as to allay the fears and prejudices of families, and to secure the largest protection to the greatest number.

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ERRATUM.—In Hoboken, Hudson county, scarlet fever is 36, instead of 26.

NOTE.—See page 207 for instructions to Health Boards. Assessors must see to it that the health report is kept for the Board.

NOTE.—The Commissioner of Agriculture has, at the desire of the Board, kindly furnished to our Local Boards of Health a copy of the excellent report on the contagious diseases of animals. It must be kept for permanent reference.

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