

THIRD ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY

1879.

CAMDEN, N. J.:
PRINTED BY SINNICKSON CHEW.

1879.

STATE BOARD OF HEALTH.

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REPORT OF THE SECRETARY OF THE BOARD.

To His Excellency, George B. McClellan,

GOVERNOR:—The State Board of Health of the State of New Jersey begs leave to make report to your Excellency as follows:

The year which has just closed has been one of increased activity for this Board. Our citizens are realizing more and more that the public health is a great material interest over which the State must exercise oversight. Many of the causes that affect the physical condition of the population are within the sphere of its control. The sickness and death rate of the population are greatly influenced by localities, surroundings, density, modes of living and other circumstances. Social conditions, in the common interests of the citizen, need the advisory or regulative concern of the governing authorities. The State must acquaint itself with the avoidable burdens which localities, employments, conditions and circumstances cast upon the citizens, and study the relations of the individual so far as they most deeply concern the public welfare. The recognition of this principle led to the formation of a Health Board. Each year has thus far accumulated new evidence of its importance, while evidence of its appreciation by the people is afforded by the increasing calls upon it for information and advice.

The past year has been one exempt from any wide-spread epidemic. As far as inference can be made from the general reports of sickness in previous years, it is believed to have been a period of unusual health.

The report of the Board last year in reference to the epidemic of typhoid fever at Jamesburg, as well as the report of the Trustees as to existing defects led to an appropriation by the Legislature which provided for important changes as to sewerage, drainage and water supply, as well as for better hospital accommodations and an increase of apartments, so as to prevent over-

crowding. Your Excellency, in March last, directed the Board of Health to put itself in communication with the Superintendent and Trustees of the School, so as to advise with them in reference to improvements deemed desirable. We are glad to be able to report that a thorough reconstruction has been carried out; that a new family house has been erected; a hospital building provided, a new water supply secured, and such precautions taken as we trust will prevent the recurrence of any such preventible disease as afflicted the institution the last year. While the plans and work have necessarily been executed under the supervision of special architects and engineers, the sanitary views of the Board were adopted so far as financial resources would permit.

As the Legislature last year appointed a commission to consider what general laws could be advised for the government of cities, the Board of Health responded to an invitation to appear before the commission and present arguments for general laws and ordinances, which should secure to every city or borough a Board of Health, with such powers as would enable it to exercise needed jurisdiction where the public health was imperilled.

As we have examined into the health codes of our cities and became aware of the entire absence of any well-regulated sanitary administration in many of them, we have been convinced of the need of such legislation as is already fully sustained in other States and cities, and as should be required in all towns upon which municipal privileges are conferred. The commission seemed fully alive to the need of some action and have the whole subject under careful advisement.

As a part of this report will be found the letter presented to the Commission by the Board.

The Board is able to record with pleasure the evident increase of interest there is among the people at large in sanitary affairs. The discussion that is now taking place as to the best methods to be used, the frequent articles in the public press, the formation of voluntary associations in some of our cities, indicate that the people are becoming sensitive about this great social and State interest. The circulation of the Health Reports has been quite general through the State, and the demand for them is upon the increase.

During the summer it was thought necessary to issue a Health Circular, addressed to householders, city authorities and boards of health. (See Appendix.) It sought within a brief compass not only to give advice, but to direct as to methods for improving household and other local conditions, and to give in precise form directions as to the use of those alteratives or disinfectants which might be needed. This circular by thousands has found its way into the families of the State, and we have occasion to know it has been serviceable as a ready directory in some of the details of health administration.

SANITARY APPLIANCES.

In household administration and in the necessities of congregated life, as found in cities, very many appliances are needed in connection with the care and delivery of household offal and debris. Drainage, sewerage and water-carriage devices, filters, traps, earth closets, ventilators, disinfectants, represent a few of the hundreds of articles offered to expedite household or municipal delivery in the interests of the public health. These inventions have become so numerous in England that a great sanitary exhibit is held each year, lasting ten days, and attracting large attention, because of the advantage it affords for examining sanitary contrivances, and testing and comparing their merits and securing the opinions of experts in regard to their value. The State Board of Health, believing that such an exhibit would be of great service to our citizens in connection with the annual fair of the State Agricultural Society, proposed a plan to its officers, which was accepted. The display this year, although not large, was regarded as very satisfactory. Plans have already been entered upon to secure a large competition and display for the coming year. An exhibit of the most valuable appliances in use in Great Britain will be secured. As a means of informing the people of the State as to what is desirable in this line, this exhibit cannot but come to be highly appreciated. The officers of the State Fair have kindly provided premiums, and have shown a zeal in oversight and co-operation for which they deserve the thanks of our citizens. It is the intention of the Board to collect also a museum of sanitary appliances, for permanent retention at the State House, so that our citizens may have access to the best models in sanitary inventions. Donations have already been

made, a room provided, a valuable library is also being gradually collected by the Board, which will be accessible to citizens of the State, and add to sanitary information.

EPIDEMICS.

The year has not been marked by any increase of epidemic influences in New Jersey. Our country has again been visited by the epidemic which last year so stirred our sympathy and affected our national interests. There are few evils without some suggested or associated good. Much of our progress in sanitary administration has resulted from the distressing and expensive experience of some invading scourge. It has been said that no great outbreak of disease has been allowed to pass away without giving a new impulse to sanitary measures. This has been realized in our own country in the formation of a National Board of Health, and in active local measures in various States for facilitating the control of disease and dealing with the causes which deteriorate the public health. It is a fact well known to sanitarians that yellow fever this year was held in check and confined to localities only by the most rigid isolating methods. The feasibility of such antecedent, timely activity, has been fully vindicated. New evidence is afforded in favor of this ever-vigilant care which can prevent or limit so many of human ailments. The country does not yet know how much it owes to the co-operation of the National and of Health Boards in limiting this great plague, as well as in devising methods which are silently and effectively being put in operation for the closer scrutiny of preventible diseases. Our own State records but a single case of yellow fever for the year, and that in the person of a non-resident. The State Board of Health took early precaution to provide for any case of exposure which might arise. Through the ready co-operation of your Excellency, our cities were apprised of the disposal that could be made of any reported case, if no local provision had been arranged.

The Quarantine authorities of New York consented to the transfer by their own Hospital boat of any case found within our territorial limits, at a cost merely covering actual expense. Our thanks are due to the Commissioners and to the Physician of Quarantine for the facilities afforded, and for their prompt transfer in the case which occurred. Due precautions were also

taken at Perth Amboy, and other points where yellow fever once prevailed.

It had been the intention of the Board to continue its report upon the diseases of animals. The Legislature however at its last session made temporary special provision as to diseases of cattle. There should be some permanent State oversight as to the diseases of all animals, rendered all the more important by the "fictitious facts" which so innocently and easily accrue from the present low state of veterinary science and art in our State. As it is still made the duty of this Board to have oversight of the great interest, we shall hope to aid in the prevention and limitation of the diseases of all animals by a close system of analysis and inquiry.

SANITARY NEEDS OF LOCALITIES.

During the year our advice has been sought in several places as to local sanitary measures and the best methods of procedure. In some of our cities the civil authorities have been making careful inquiries into actual conditions as preliminary to future advisement and wise administration.

The great embarrassment to effectual work has been an absence of such accurate vital statistics as shows the comparative death rate, and where continuous exceptional degrees of sickness from year to year indicate insanitary conditions. There is besides often a want of recognized and efficient agents to carry out any systematic work of sanitary reform, as well as absence of a precise intelligence as to methods.

In order to any effective movement or administration, there must first be a conviction on the part of the leaders of public sentiment of the actual existing insanitary state, of the possibility or feasibility of its correction, and a confidence in the agency through which it is to be effected.

In parts of cities the insanitary condition is demonstrated by observation, but the facts in detail can only be shown by accurate house to house inspections as well as street examination.

Dr. Farr, of the Registrar General's Office, of England, recently showed from the record of five hundred and ninety-three registration districts of England and Wales, extending through a period of ten years, that the yearly mortality of rural

districts, with one hundred and sixty-six persons to the square mile, was seventeen per thousand, while with a population of sixty-five thousand eight hundred and twenty-three to the square mile, the yearly mortality was not less than thirty-nine per thousand. A similar comparison for five years, by Dr. Russell, of Glasgow, as to Scotland, shows similar results. Still further he compares different parts of the same city of Glasgow, which shows a death rate of nineteen per thousand in the healthiest district, with a density of thirty-five per acre, with a death rate of forty-five per thousand in another district, with a density of five hundred and twelve per acre. It is also shown by the former death rate of nineteen per thousand how it is possible, with a reasonable degree of density of population, to bring down the average of a well-kept part of a city, since "the contrast is greater between the healthy and the unhealthy parts of Glasgow than between Glasgow as a whole and the open country; or, to put it in another way, you have even within the municipality of this city twenty-three thousand people, whose mean annual death rate for five years was only two above that of the rural population; yet a few hundred yards from these very people you find eighty thousand whose mean annual death rate, during the period of these same years, ranged from thirty-five to forty-five per thousand. Now, whatever may underlie this fact, it proves this, that it is not the situation, the soil, the climate, or any other physical circumstance common to the whole area, which produces this high death rate. In short, whatever the cause or causes may be, * * * they are not necessary, and therefore our condition is not absolutely hopeless, but eminently hopeful." This is equally true of contrasts which we will yet cause to appear between city and country, and even between different parts of this State, where there are other modifying conditions beside density of population. It is of great importance that while we are comparing country and city, and our cities with each other, that the local authorities should be comparing each part of their own municipalities by wards and districts, so as to learn the relative death and sickness rate, and be able to locate and deal with the non-essential breeding places of disease. With these and other equally significant facts, the people will come to inquire for methods of prevention. As to these science, art and experience are so demonstrative, and such tabulated and

authenticated improvement of health have been secured as to make indisputable the feasibility of the undertaking.

The corrections to be made are only to a limited degree within the sphere of individuals. Officials whose intelligence and integrity can be trusted, and laws and ordinances giving adequate authority and jurisdiction are the most pressing demand. The matter belongs to the State and to the local governments, because it concerns the citizens in their most intimate relations. As such it must be reached by authority. If only we first find out what ought to be done and how to do it, there is no department of conferred power which is so likely to be administered faithfully and to be eventually recognized as economic and valuable.

The burden of unchecked disease and prevalent avoidable sickness on the one hand, and on the other hand the "dabs" of sanitation by which jobbery has been permitted to take the place of well-conceived, well-executed economical improvements, are alike to be avoided. But lessons as how not to do a thing, are never to lead to the inference that a thing ought not to be done. Gathering wisdom from the past we are now prepared considerably to proceed to plan both for the present and the future, and to execute with all the clearness and economy of method which the vital and financial interests of the citizens alike require.

We refer to the report of Vital Statistics for evidence as to the need in which many localities stand of better sanitary administration. We have been waited upon by citizens of Jersey City, Hoboken, Newark and New Brunswick as to the need of more active administration and greater attribution of sanitary power. We have evidence that other cities are suffering from the want of clearly defined powers and systematic cleansing. Complaints also come from country districts that there are no laws adequate to the removal of admitted nuisances.

In a few cases, nuisances have been brought to our attention, which by advisement we have been able to assist in limiting or abating.

An appeal from citizens of Millstone, as to the wastes of a distillery, was responded to by the Board. The nuisance was found to be of an extended character. When we came to confer with the proprietors we found them regretting the complicating circumstances which had caused it, and ready to co-operate with

us in methods of relief. The evil, however, illustrated the necessity of some general enactment to reach such cases, as we can not always be sure of the success of argument and presented facts. Odors injurious to health, generally become most intolerable and dangerous during the heat of summer, when grand juries and courts are not in session, and when, therefore, the evil does not admit of abatement by indictment and civil process. Such evils are wisely placed under the summary jurisdiction of Health Boards whose knowledge and judgment are the guarantee that large powers will not be abused, but will be strictly used in necessary defence of the public health.

SEA-SIDE RESORTS.

The Board still has occasion to express some anxiety as to the sanitary provision and preparation, in respect to the new and increasing cities along our sea-coast line. In the present advance of sanitary knowledge these new and crowded settlements have no excuse for merely tentative measures, while the work which should be done is so much easier than when the land will have been covered with buildings. Even the summer tent, with its crowded occupancy and its possible untidiness, and the continuous camp meetings of various kinds, need sanitary discipline. The water supply must be excellent and the refuse of life must be disposed of by exact art. In a sandy soil too much reliance is generally placed upon the ready disappearance of water from the surface and the assumed natural purity of the wells. But it is to be remembered that there is an absence of ready vegetation to consume the decaying materials, and that sand is not nearly so good a percolator as it seems to be. Sandy spots like Savannah often mislead in this regard. Some time since the deaths in Northampton, England, ranged at forty-one in one thousand.

Dr. Hunter, the Health Officer, in accounting for it, says: "In this spongy sandstone, cess-pools once made are made and closed; they are hardly ever cleaned out and are always nearly empty. The meaning of this is that the ordure infiltrates all around, far and near, and their gases exhale from the surface." The dependence is upon well-water. "None of the cess-pools were cemented, and indeed it is a principle with the Northampton builders that the cess-pool needs no drain so absorbent is the

sandy stratum. This is a fatal convenience, which may to some extent account for the great development of fever in the sandstone counties."

Even wells sunk to an unusual depth in such a soil are found to become contaminated by surface juices. We notice with interest that bored and artesian wells are being sought for water supply in many districts. Yet there is need to consider that geological structure and surface conditions modify the sanitary significance of the number of feet.

As the sea-shore is a resort for invalids, persons or families often go thither when being attacked, or when just convalescent from communicable diseases. Especial precautions need to be used lest there are local conditions which may give extension to such infections. This subject has attracted large attention at English watering places by the occasional outbreaks of disease which have occurred. Large hotels unoccupied in winter may all the more easily become the resorts for summer disease. It is not enough that honest owners inspect and assure of their perfection. Sanitary inspection is expert work, and the services of a sanitary engineer is often needed.

SMOKE AND STENCH NUISANCES.

Complaint continues to be made of the emission of smoke from factories laden with organic material and other sources of impurity connected with glue, bone-boiling, poudrette, rendering and other factories. A perfect furnace should send out only invisible carbonic dioxide, a little acid and vapor, and a few salts of ammonia. "Smoke is the result of distillation with partial combustion of the product." In a usual furnace we have a process partly of combustion and partly of distillation, while in contaminated smoke we have not merely noxious gases, but unconsumed fetid organic particles scattered through the air. To all this is added the gases and particles of decay which are emitted from the material on hand, and from the saturation of the buildings and all that appertains thereto. All such tainted air is not fit for breathing, while there are abundant facts which show that like all other filth it affords a ready fertilization to filth diseases. That all are not affected, or that some become acclimatized proves no more than is proven when some withstand cholera or yellow fever.

Our attention needs to be directed to such nuisances, because to Bayonne and Elizabethport, and to the district as far as Newark, at Camden and other points, such factories resort, being driven out of larger cities on account of their unhealthfulness and the discomfort they cause. We need not refuse such industries, but we must bring them into conformity to laws which will prevent this injury to health, and a nuisance to all lines of public travel, as well as to the residents in the vicinity. Ballard and other authorities have shown how fully most of the evils of offensive trades can be obviated, how the smoke and odor nuisance can be abated, if only the owners will incur the additional expense of new and effective machinery for smoke consumption, and for the absorption of organic matter, and put them in the charge of competent stokers. Our authorities must insist upon the abatement of these evils which are already hazardous to health, and so disturb the senses as to convert discomfort into positive nuisance and jeopardy of health. English law no longer exacts proof that foul smoke or organic particles, or the gases of decay in a given case destroy life, but rather accepts the general fact of their deleterious nature. Besides both in a sanitary and civic view the public have a right to be protected from such evils as by common consent are regarded as nuisances, when they are the results of systematic methods, and abridge the comfort of the people in their homes or on the thoroughfares. Common law arises out of common rights, and should fully meet such cases as these.

SANITARY SURVEY—INSPECTION.

It was early the sentiment of this Board that it is desirable to select some city or thickly settled and exposed portion of the State for a precise method of sanitary survey and examination, so that we could furnish an example of thorough sanitary inquiry, and at the same time secure facts and statements with the precision which is characteristic of exact sanitary research into the causes and prevalence of disease.

Our attention was early directed to Hudson county, which by reason of its locality, its exposure, its recorded death rate and its massed population, evidently stood in need of special sanitary inquiry. It has a County Health Board which would gladly do

more if it had requisite financial appropriations, and City Boards recognizing the need but crippled in resources. It thus became necessary for us to seek out feasible methods for conducting the investigation which is recognized by all local health authorities as desirable.

Availing ourselves of a local committee, which, under the auspices of the New Jersey Sanitary Association, but without funds, had been making some inquiry as to the soil, drainage and sewerage of certain sections of Jersey City and Hoboken, and in their relations to the death rate, this Board, by an appropriation of fifty dollars, so aided and supplemented this work, as to secure maps that will be important for permanent sanitary reference. But it was apparent, that it is impossible for any voluntary committees to do the work needing to be done in such a large and populous locality. The insanitary condition of this section, not only affects its inhabitants, but by its intimate relations to New York Bay and Harbor, and to the inter-state travel as represented in the termini of great trunk railroad lines, involves the interests of commerce and internal traffic, and affects the nation at large. We therefore felt authorized, under the act of Congress creating a National Board, to ask a small appropriation to enable us to carry on a work for which no sufficient State or local aid could readily be secured. The National Board responded to our application, and under the superintendence of the New Jersey State Board of Health, a sanitary survey and inspection of the shore line and adjoining districts is being carried on. The services of skilled engineers have been secured, on terms that make them participators in the beneficence of the undertaking. The survey and investigation command the interests of the County Board, the local City Boards of the voluntary sanitary associations of the county, and of private citizens.

Already, the persons appointed to the work have made commendable progress. By another year we hope to be able to present such an outline of facts and such a method of inquiry as will commend itself as a model. Just such survey and inspection is needed in several of our cities as preliminary to sanitary administration that must be provided in the near future. Each city needs an underground and contour map which shall show soil, drain, sewers, connections, excavations, etc., as also the in-

equalities, grades, constructions and embarrassments of the surface and thus a close knowledge of all "building and house" conditions, such as shall enable them in the future to have ascertained facts in possession as the foundation of judgment, and of plans of execution, when public opinion, or the governing authorities, shall vote the evils too threatening or too burdensome to be longer endured.

It is just such work as this, connected with a careful return of vital statistics, that has been of such admitted usefulness in England, the evidence being diminished sickness, diminished death rates, greater prosperity and acknowledged recognition by the people of the benefits accruing. The Registrar General's Reports have for many years past given quarterly and annual statements of death rates in various parts of the Kingdom, with comparisons of localities as to insanitary conditions, and tables showing the results of sanitary works through a series of years, at numbers of places, sufficient to eliminate sources of error which might arise from temporary increase or decrease, or from limited areas. While density of population tends to increase the death rate, it has often been shown that there are compensatory methods of reduction, so that the death rate of most towns may be kept much lower than it really is. In illustration we quote from some of the quarterly and annual reports of General Graham, Dr. Farr and Dr. Russell. If the mortality of towns had been at the same rate as the mortality in the other districts, the deaths (for the quarter) would have been upwards of seventeen thousand fewer than they were. What was the cause of the great destruction of life? Evidently the violation of the plain, natural laws of life. * * * The intelligent classes of this country will, however, never acquiesce in the continuance of its present imperfect sanitary condition, and the resulting diseases which it brings down upon the heads of the population."

"The mortality of the districts in which the sanitary conditions are the least unfavorable, can be employed as the standard measure until happier times supply the real standard of vitality. Sixty-four districts in various parts of the country are found where the mortality of the people ranged, on an average extending over ten years, from fifteen to seventeen deaths in one thousand living. This is not accidental. The mortality only fluctuates in such places slightly from year to year, and the

death rate under the same circumstances will not be exceeded. * * * Here we stand upon the actual. Any deaths in a country exceeding seventeen in one thousand annually, are unnatural deaths. If the people were shot, drowned, burned, poisoned by strychnine, their deaths would not be more *unnatural* than the deaths wrought clandestinely by disease in excess of the quota of natural death. But it may be said that this standard cannot fairly be applied to determine the excessive mortality of large towns, which can never become so healthy as the country. How healthy towns may become we do not know. It is only proved that the population of parts of many towns experience a mortality little above the natural standard, and that the prevalent diseases are referable to causes which evidently from their nature admit of removal." Graham states the number of deaths in the United Kingdom at about six hundred and sixteen thousand, and the number constantly sick is about twice the number of annual deaths, or one million two hundred thousand and thirty-two. "One hundred and forty thousand of them die every year unnatural deaths, and two hundred and eighty thousand are *constantly* suffering from actual diseases which do not prevail in healthy places." Most of our American cities and no small portions of well-populated country in the United States and in our State, show a higher death rate than that upon which this statement is founded. (See Fig. 69.)

We hope it will yet be said of the cities of New Jersey as Graham said of London: "The improvement 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 sound sanitary doctrines, and all further progress is in the hands of the people. They can work out their own salvation with God's blessing. The causes of disease are numerous; but every one that has hitherto been discovered can be to a certain extent controlled." Dr. Russell in his admirable lectures of this year on the "Prevention and Control of Infectious Diseases," gives many similar facts and illustrations.

In 1869 Registrar Graham says: "The large amount of preventible mortality has frequently been alluded to in these reports, but the statement sometimes has all the freshness of novelty.

As an illustration of this waste of life, it may be repeated with advantage, that during the ten years between the last two censuses, thirty large towns, having a mean aggregate population of two and one-half millions, lost *every year* 32,735 persons more than would have died had they been subject only to the rate of mortality prevailing in the healthy districts.

The English Reports, through a series of now just forty years, teem with facts, with statistics which give them the test of accuracy; with contrasts between country and city, and between cities that have adopted or neglected the most approved sanitary measures that are as demonstrative as inductive reasoning can be, that the health and life of the population is to no small degree a determinable quantity. Upon it turns the welfare and progress of localities, and of the State not less than that of individuals. The statistics of American States, so far as reliable, show similar facts. It is through the light derived from these and from recognized causes of insalubrity and from corresponding efforts at removal of causes, that we are to hope for that appreciation of public health, which will diminish one of the greatest burdens of society, and so add to the happiness and prosperity of the citizens. Our healthiest country districts show an average lower than that of England, while some of our cities outvie them in prolific sources of disease.

MIASMATIC DISEASES.

Reports that reach us from various localities, and which are fully confirmed by the medical transactions of various societies, make it evident that the miasm which causes chills and fever, intermittent and remittent fevers, dysentery and certain forms of neuralgic affection, is prevalent in many portions of the State. While the word "malaria" is often loosely used and made the name for some unclassified ailments in which the identification is not accurate, it can not but be recognized that a sickness excited by causes without the human body and having periodicity as a prominent diagnostic symptom, is wide-spread in its prevalence, and is a severe tax upon the industry, labor and health of our people.

While some points as to this "influence" are obscure, there are some ascertained and guiding facts which have obtained the

general consent of practitioners of medicine and studious observers.

Its origin is exterior to man.

It is chiefly, if not entirely, communicated to the human system through the atmosphere, by means of the inbreathed air.

The air becomes supplied with this particular miasm chiefly as a result of conditions which interrupt or complicate the natural processes of vegetable decay and provide no means by which the products of such "metamorphosis" or disintegration can be rapidly enough appropriated by plants or in some other safe way disposed of or kept dormant.

As heat and moisture are essential to these decomposing changes by which the super-abundant and unappropriated organic matter, in the absence of natural or proper artificial measures, becomes a source of disease, it is especially during or soon after continued heat, or during moisture and heat, that this particular miasm is produced. This fact is not disproven by the other fact that periodical fevers often occur soon after a severe drought. By it organic matter deep down and long buried, with its own sufficient moisture is reached by the heat and so stirred into activity. Or a heavy rain after long heat and drought, especially if followed by close or moist warmth, is apt to excite rapid fermentive action in it and in other unused vegetation.

Such miasm is not carried, as a rule, to very great distances from the locality of such decay, and therefore the origin is generally to be sought in the region in which the effect is manifest. It is true that we can not control certain conditions of atmosphere, of moisture or temperature, which especially favor the production of the miasm or its characteristic effects on individuals at particular seasons. But by controlling any one or more of the co-operating conditions which produce it, and which are essential to its manufacture, we prevent its production. This is chiefly to be accomplished by effective drainage, and by an interruption or compensatory interference with these forced and accumulated conditions of decay with which the occurrence of periodic fevers is associated. The value of this does not depend upon the assertion that the origin is purely vegetable, for decay of organic matter in any form whether in the mineral, animal or vegetable outside of man can only be properly provided

for where there is no stagnant water. The following recent utterance of Russell illustrates it:

"It has been conclusively proved by experiment that the cleansing power of soil depends on its porosity rather than its chemical composition; in other words, upon the proportion of air it contains. Hence a wet soil possesses but feeble oxidizing power, and the first steps towards the restoration of this power is to remove the water by drainage and allow it to be replaced with atmospheric air. The best illustration of the relative activity of air, earth and water, as decomposing agents, as well as of the conditions most favorable to the speedy completion of the process by each of those agents, is afforded by their action upon dead bodies. The organism to be destroyed is visible, but these microscopic particles of organized matter which constitute the most dangerous portions of our excreta are destroyed in those media under exactly the same laws. A carcass laid in the open air upon a hill-side is swept by the free air, whose activities are also stimulated by the sun's rays, and the tissues which clothe the skeleton soon disappear. If laid in a shallow, running stream, or moored near the surface of a deep river, the same result follows; and if buried in a porous, dry soil, after a time nothing but the bones and the denser parts, such as hairs, nails, or claws, &c., can be discovered. Under all these conditions there is more or less rapid renewal of the active agent. But if we enclose the carcass in a bog, or plunge it in stagnant water, or bury it in soil which is saturated with water, instead of a clean and harmless skeleton, we get a repulsive mass of putridity and offensive complex organic gases which impregnate air, water and soil."

Both Price and Milne, in the commercial interests of life insurance, long ago demonstrated the high mortality of towns and of marsh lands.

Many of the English Reports exhibit the insalubrity of undrained lands by comparing several country districts of similar area and habitation, but differing in this one regard.

Eight districts thus compared showed a mortality of 2.45 as against 1.80 and 1.40 in the drier districts. This is the more significant, as this class of disease entails an amount of ill-health and repeated suspension from labor quite in excess of the usual rating afforded by the percentage of mortality. In 1859, speak-

ing of another district, the report says: Wisbeach, once so unhealthy, lost only one hundred and thirty-seven persons by death against three hundred and sixty-seven in Northampton, out of a population exceeding it, being thirty-six thousand one hundred and twenty-five. The successful result of the drainage of the district will, it may be hoped, lead the proprietors of the low, ill-drained parts of the basin of the Thames and of our other rivers to imitate the spirited conduct of the proprietors of the valley." "Such facts justify the remark that ague and rheumatism are not now frequently fatal in this country, but they occasion an incalculable amount of suffering, disability and secondary disease, which will disappear when the soil is effectively drained."

Ely, in one of the old Fen Islands, was so wet that its Bishop, without a river, went in his boat now and then to Cambridge. In 1851 it started its noted sanitary plans. In 1876 we have this record:

"The great land drainage works have had great influence in improving the health of the Isle of Ely. By this means the atmosphere has been purified and dried, and the returns for Wisbeach, in a comparison of twenty years, shows a marked diminution of consumption in the last ten years. Similar facts are recorded as to Orsett and Salisbury and Sheppy. (XIX 1874.)

The relief which time and again has come to armies and to persons by change of locality, shows the localized character of the malarial miasm. Again the oft-recorded results secured by efficient drainage and regulations as to the disposal of vegetable accumulations, have fully shown that it is in the power of every such State as ours to remove or largely diminish this source of ill-health.

Such diminution is feasible not only as adding to health, and so to the productive capital of individuals, but also as permanently adding to the value of land, and so promoting the interests of agriculture and of all arts identified therewith.

So far as drainage is concerned, no State of the Union has a more satisfactory basis for procedure. The geological structure is well defined, the natural water courses or the indications and methods for artificial ones are determined. There is only need of an apprehension of the necessity and a promotion of the work by such schemes as have already been approved by our Legisla-

ture, and as only call for the co-operative action of a majority of the citizens of any particular locality.

The time is well nigh past when any particular district can conceal the prevalence of so well-known an enemy. A study of the vital statistics of the present year furnishes some facts in evidence. It is the part of such communities or districts first to inform themselves of the actual number of cases that have occurred in their particular districts, to note the special lines of exposure, and then to adopt such measures as are sure to abate the nuisance.

It may often occur that by reason of prevailing winds one side of a sluggish stream or of a marsh furnishes more cases than the opposite one, or that one house is shielded by trees while in another the exposure is increased by the direction given to currents or by the moisture they add to a soil already saturated. But in general, so soon as a close study of a locality is resolved upon, there are not wanting facts and evidence which serve to satisfy the majority of those who are seeking for the truth.

In a former report we have adverted to what has already been done at the Great Meadows, by which over five thousand acres of land in Warren county have been successfully drained. There is a tract of eleven thousand acres on the Passaic river in need of just such relief. The State Geologist has well said, "It is greatly to be desired that this drainage should be done. It would bring a large area of excellent land into profitable use, and thus increase the wealth of the State. It would be a public benefit in removing a fruitful source of disease."

Not less do our people suffer in health from smaller swamp areas. Large swamp tracts serve to keep off population, and so many are not subjected to them. Besides, when wholly uninvaded, they are not sources of miasm to the degree that are the smaller areas which are pressed upon by civilization. Nature in these larger swamps, has yet some of her natural water courses, and the laws of vegetable decay, so efficient when left alone, are not so largely disturbed as near populous places. It is when towns and villages and cities crowd upon, or are in close proximity to undrained lands; when natural water courses are obstructed and usual vegetable decay interrupted or greatly supplemented by artificial conditions, when factories, and roads, and embankments, and excavations disturb competent natural condi-

tions and substitute artificial ones; when soil and locality, which would naturally rid itself of undue moisture, is covered with buildings and strewn with products of decay without growth, to utilize these, that imperfect drainage, suspended evaporation and unappropriated decay together enforce the penalties which always attend such flagrant breaches of law. On the lines where town and country meet, where art intercepts nature and breaks her laws, what wonder that there should be shaking, and that both city and country send up into the inbreathed air vapors prejudicial to health? What wonder that with such products of animals as are added in crowded places, and with all the offal of house and city life, we have diseases so mongrel as scarcely to define their type? Malaria has typhoid appended to it, and a whole group of diseases spring into existence, for which the highest authority of the age can find no name so appropriate as that of "filth diseases." Until in city and in country we learn that there is economy, health and necessity in avoiding stagnant water, befouled air and stagnant filth, or in providing for their abatement wherever they exist amid the homes of human kind, we shall have to pay to invalidity, disease and death, and to all the crippled forces of life, a folly and poll tax for city, county and State, heavier than war or politics can levy.

Problems, which arise out of civilization and its crowded or artistic accompaniments, must be met by adequate counter-provisions or else race-disease, race-degeneracy and death are the penalties.

These considerations are of importance, not only because of the medical testimony of previous years, as to the prevalence of periodic fevers, but the evidence gathered from our own correspondence and from the transactions of medical societies is still more decisive this year.

No one class of diseases has been so prevalent the past year as that in which the element of periodicity as generally characterized by the terms "miasmatic" or "malarial" has been either the causal or the largely complicating factor. Nor can this be alleged to be a general atmospheric condition, as when an influenza or an epizootic passes over the land. The increase is, in many instances, traceable to changed local conditions arising from disturbance of soil, additional sources of decay, stoppage of natural water courses, or other changes incident to new occupa-

tion of land and increase of population. Where these have occurred alike at different localities, and some are affected and some not, it is often because the character of soil and geological structures beneath determine how far nature is capable of ridding itself of these unfriendly conditions.

As an illustration of this miasmatic tendency, we may quote from the reports of District Medical Societies, as contained in the last "Transactions of the New Jersey State Medical Society."

In Bergen county it is said "Malarial fevers have prevailed as extensively as heretofore, and with a decided remittent form, with hepatic, intestinal and splenic complications."

The Essex county report begins by saying: "For the past year, as for several years, malarial diseases have made an important element in practice."

In Hudson county the record is that intermittent and remittent fevers were prevalent a part of the year. The Mercer county report says: "In Trenton we have a large increase in malarial fevers. Intermittent neuralgia has been quite prevalent; indeed all diseases to a more or less extent have shown a tendency to periodicity." In Morris county there was "a marked increase in the number and severity of malarial disorders." In Passaic county "intermittent and remittent fevers have been more than ordinarily prevalent during the year." The same record is made as to parts of Somerset county. In Sussex county "intermittent and remittent fevers, and neuralgia of malarial origin seemed to have prevailed to an unusual extent in every locality heard from." Intermittent and remittent neuralgia are reported from parts of Union county. Warren county, at Washington, Oxford, etc., notices the great prevalence of periodic fevers. Although this report relates in part to the summer and fall of 1878, our own inquiries in 1879 show the same tendencies and occurrences continued. In Middlesex county there has been an increase, and reports from special localities in other counties show no diminution. The counties in the northern and western portions of the State seem to have suffered most, although the banks of the Delaware are never exempt. Towns and cities suffer much, while in the large and more rapidly growing of these there are mixed symptoms in disease which, by their mongrel character, show the trace of a distinct periodic type, and yet so commingled as almost to

constitute new forms of infection. This is especially noticeable where city and country meet, and marsh lands press closely upon the suburbs. It is not the abstract question whether a luxuriant marsh will care for itself, or whether the salt in an undisturbed salt-grass meadow will aid in guarding decomposition, but rather whether, after interrupting natural drainage and natural vegetation, we can send out from a city its own decaying vegetation and animal compost and sewage and make of the whole, broth and gases conducive to health. We must guard the border land or else it will be a point of attack and not a defense. This entire subject of drainage and water-delivery in the interests of public health demands far more attention from our citizens than it has yet received.

The only other disease which has prevailed in our State since the last report, and yet does not make its record by name in the classification of vital statistics, is influenza. Several counties and cities of the State report it to have occurred in an epidemic or epizootic form. Its effects are only severe on older persons, with whom by reason of bronchial affections it sometimes proves fatal. It is quite probable that under the more general name of bronchitis it has added to the large list of acute lung diseases. A careful review of the report on vital statistics shows, as never before, the actual causes of death, and enables us to compare localities in every township and city of the State.

As a part of the report of this Board to your Excellency, the several papers herewith submitted will, we believe, be found of interest to yourself, to the honorable members of the Legislature, and of profit to all citizens of the State. In the securement of these very great care of selection is exercised, and in general the principles and methods advocated are such as command our approval.

THE PAPER ON HOUSE DRAINAGE AND SEWERAGE

Is designed to draw attention to the best methods of connection with mains, so that the house itself, with its inmates, shall be secured against the intrusion of deadly gases. The experience of a practical sanitary engineer, as also of a practical plumber, is given, and such directions as must greatly aid in the comprehension and application of methods. A clear statement of the

objects sought and of methods proposed will enable all to adopt these views or suggest any others which can stand the test of actual observation and experience.

THE PAPER ON ASPHYXIA, WITH SPECIAL REFERENCE TO THE RESUSCITATION OF DROWNED PERSONS

Has been carefully prepared, after close investigation and experiments on the part of the author and with the aid of all the literature on the subject. The same principles of management apply in most cases, of asphyxia, while our long line of seashore and our river communications point to dangers and accidents not infrequent. Our estimate of the importance of the subject is much increased since we find, by our vital statistic returns, that from July 1, 1878, to July 1, 1879, one hundred and ninety-three (193) persons in this State perished by drowning. In the light of recent investigations and disquisitions as to methods, a review of the whole subject was needed. To it some members of the Board have directed careful attention. We think that this paper will be found worthy of careful study. There is need of more provision along our coast line, for the safety of bathers or of those capsized in small boats. We commend the subject to the attention of all those who seek recreation by water.

THE ADULTERATION OF FOODS

Is so weighty a public concern that there is need that it be carefully watched under the oversight of experts. Public analysts at moderate expense are greatly needed. While the paper offered seeks to counteract a recent tendency to overstate adulterations, it recognizes the importance of constant inquiry. It is likely that a more extended examination of specimens would reveal new facts, and it is the desire of the Board that the public health be thus guarded. There are many other articles of which examination should be had, while the author desires a more extended series of tests as to some of those already examined.

No new examinations of kerosene have been conducted, but our accident list records several cases of fatal burns therefrom. There is pressing need of some legislation which shall protect our people from unrefined oils or from mixtures containing more naphtha and other ingredients than petroleum oil.

DISINFECTION AND DISINFECTANTS.

It has been the aim in the paper on disinfection, to select the authenticated materials for use, to the exclusion of most of those unnecessarily protected by patents. The range here afforded is sufficient for all known indications, and directions are given so plainly as to be available to all. While these can not take the place of cleanliness they often greatly aid in securing it while disease exists. It can not be too much insisted upon that it is the duty of each householder to see to it that causes of foul air are removed, and that the air itself is so dealt with as to remove from it noxious ingredients. The circular is reprinted for ready reference.

METEOROLOGY.

The importance of the study of meteorology in its relations to disease is recognized. Yet there are many difficulties that embarrass us. This article commends it to the careful inquiry of physicians, and presents suggestions as to some special points. It is only by long and close observation and the tabulation of facts that progress can be made. The close observation of individuals is magnified as to be considered along side the records of instruments of precision.

GOVERNMENT OF FORCES.

The letter presented to the State Commission on the government of towns is reproduced because it presents some of those reasons which commend the subject to the towns themselves. There is a spirit of inquiry in this direction, and our cities may profitably study the problems which ere long will force a more public and official consideration.

UNDERTAKERS AS RELATED TO PUBLIC HEALTH.

The Board has had occasion for considerable correspondence with undertakers. Their work is regarded as so special that in some of our States a license is required. The more intelligent of this useful class of citizens have come to feel the importance of accurate death returns, and have responded to the requirements of the present law. In country districts some do not promptly enough return the certificates to assessors, and the Board is about to institute more rigid methods of inquiry. It is evident that the undertaker in his contact with families during the prevalence of sickness or after death is capable of aiding much by sanitary advice, and no class need to be more accurately informed. Also there are great errors that occur in the sanitary conduct of burials, which can only be corrected when our undertakers are intelligent as to the sanitary requisites of their calling. It is more than a mere art of adornment or act of burial. It should include all that knowledge which secures a due preservation of the dead for a limited time, and which best protects the living from the evils of foul air or the infection of contagious diseases. Often more depends upon the undertaker than upon all the other attendants or assistants combined. It is now possible to practice this calling as an art, and to do much to protect from the extension of disease. We direct their attention to this article and to that on disinfectants, as imparting knowledge with which they need to be familiar, and for which they will find frequent use.

The meteorological notes for the year are not as perfect as we had hoped. By reason of the sickness of observers, there have been some interruptions.

Instruments are now placed at desirable points, and observers secured so that we shall hereafter, it is hoped, present the readings with accuracy. This is a department of observation in which we accomplish something by adding to the general stock of climatological information, but need to be slow in drawing or accepting conclusions.

As the domain of sanitary legislation and the powers to be conferred on Health Boards, need to be better understood, we are glad to secure a report upon this subject from an able mem-

ber of the New Jersey bar. We invite to it the careful attention of our law-makers, and of all who recognize the need of some enactments and decisions, to prevent the litigation and delays which now so often embarrass local authorities and permit nuisances to imperil the general health.

The report of the Medical Superintendent of Vital Statistics commences with July 1st, 1878, and extends to July 1st, 1879. It is the first attempt in this State to make a tabular study of the causes of disease. While some valuable facts are already indicated, yet it is chiefly by comparing five or more years, that we get at the precise death and sickness rates of localities. The report, with the tables accompanying, is commended to the careful study of physicians, and of all who recognize the significance of such facts as to the population. Although, by law, this report is made a part of the annual Health Reports, the service is a bureau of the State Department, and under the Secretary of State. To him the Medical Superintendent is greatly indebted for his official co-operation and for valuable suggestions, as well as to the Board of Health, which recognizes these studies as a virtual and essential basis to sanitary science, and its application in practice. The experiences of the past year fully certify the practicability of the general methods adopted, while such improvements will be made as practice and study may indicate.

HOUSE-DRAINAGE AND SEWERAGE.

BY EZRA A. OSBORN, C. E.

The introduction of water into houses and the system of drainage necessary to carry off waste, all of which comes under the head of plumbing, has become a matter of importance, inasmuch as great danger to life and health arises from gases generated in the sewers and cesspools, which we feel safe in saying, in a majority of cases, find their way into dwellings in consequence of the careless and unscientific manner in which this kind of work is done. This is, perhaps, not to be wondered at, when it is considered that in most cases this matter is entrusted to the mechanic who offers to do it for the least amount of money. The builder fails to appreciate the danger to which the occupant of the house, when finished, will be subjected, in consequence of the unskillful arrangements of pipes, traps, &c. Ignorance in a matter, the result of which is so frequently fatal to life, may justly be termed criminal. In order to arrive at a better appreciation of this important branch of mechanics, we desire to explain, in a simple manner, our views as to what is essential to safety in all cases where house drains are connected with sewers.

First essential: "Every vertical soil or waste-pipe should be extended at least full size through the roof. No traps should be placed at the foot of vertical soil-pipes to impede circulation. Traps should be placed under all sinks, basins, baths, wash-trays, water-closets, &c., and as near to these fixtures as practicable. All traps under fixtures, whenever practicable, should be separately ventilated, in order to guard against syphonage. Such vent-pipes should not branch into a soil-pipe below where any drainage enters it. In some cases it is preferable to carry it to the outer air independently. Rain-water leaders should not be used as soil-pipes, and when connected with house drains they should be made of cast iron in preference to galvanized sheet iron or tin, there being less liability of corrosion. Joints should

be gas and water-tight, to preclude possibility of drain air entering open windows. No safe-waste should connect with any drain, but it should be carried down independently to a point where the discharge would indicate the existence of a leak or any overflow above. No waste from a refrigerator should be connected with a drain. Unless the water supply is ample, so that it will rise to every part of the building, insuring at all times the proper flushing of fixtures and traps, a cistern should be provided, into which the water will rise at night, or into which it may be pumped. Said cistern should be large enough to hold an ample daily supply, and be kept clean, covered and properly ventilated. The overflow-pipe from it should never be run into any drain under any circumstances. The supply for drinking water should not be drawn from it, but from a direct supply, *i. e.*, direct from the street main.

Water-closets should not be supplied direct from street pressure or by a pipe from which branches are taken for drinking water. Where the water-closets are preferred to those that are supplied from a small cistern immediately over them, then the supply should be taken to a storage-tank, from which it can be conveyed to the valves on the closets, thereby insuring an equable pressure and securing more reliability in their working.

All drain-pipes within a house should be of metal in preference to stoneware, owing to the liability of the latter to crack, and the difficulty of keeping the joints tight. It is best to run them along the cellar wall or ceiling with a good incline. They should never be hidden under ground, as there leaks will not be perceptible. In some places it is common to paint pipes white, so that any leakage will show itself to the most careless observer. All drains should be kept at all times free from deposit; and if this cannot be effected without flushing, special flushing arrangements should be provided, so as to effectually remove all foul matter from the house-drains to the public sewers. All drains should be laid in a straight line, with proper falls, and should be carefully jointed and made water-tight. No right-angled junction should be allowed.

A drain passing under a dwelling house should be constructed of cast-iron pipes with lead caulked joints, laid so as to be readily accessible for inspection. Whenever dampness of site exists it should be remedied by laying sub-soil drains, which

should not pass directly to the sewer, but should have a suitable break or disconnection. Water supply and drain-pipes should be concentrated as much as possible, and not scattered about a building. Horizontal pipes are objectionable.

Plumbing fixtures should not be hidden behind walls and partitions where their condition is never apparent. They ought to be made easily accessible and so situated that any leak will be readily detected." In no case should lead waste-pipe be connected to iron pipe with cement or putty. Connection can be made by the use of a brass ferrule or thimble, one end of which should be caulked into the iron the other soldered to the lead, or a good and more economical plan is to turn the end of the waste-pipe over a ring of some metal and caulk into the iron pipe. Without claiming to have exhausted this subject we have endeavored, and hope we have succeeded in our endeavors, to make easily understood the fundamental principles which should be observed in the arrangement of soil, waste and ventilating pipes, in order to secure immunity from danger by reason of allowing the poisonous emanations from sewers to pass freely into dwellings. Next in importance we remark that care should be exercised in the selection of plumbing materials as regards quality, especially water-closets and traps. The former should be so constructed as to positively prevent the back-flow of foul air or sewer gas; and the traps of such kind and shape as will be least likely to be emptied by suction or syphonage. In fact all modern fixtures and appliances for the convenience and comfort of our homes should be thoroughly understood practically and scientifically, and so constructed that it shall be impossible for any evil to arise from sewer-drains, water-closets, basins, traps, &c. So many contrivances are based upon this one idea, it surely seems that all of them should answer the purpose of pure sanitation. Diseases caused by foul air that can be prevented, requires one very essential condition, *i. e.* cleanliness, and to become clean, all filthy matter must be cared for without offense. Now the question is, how can this be accomplished effectually and economically? The different inventors of sanitary appliances have as many modes as there are inventors. For the purpose of bringing such articles and appliances before the public, the New Jersey State Board of Health proposed to make a public exhibit of appliances for per-

fecting house drainage. Upon conferring with the New Jersey State Agricultural Society, (it being partly supported by the State), it was arranged to have an exhibition of sanitary appliances in full operation at the Annual Fair at Waverly. Inventors and dealers in sanitary appliances to some extent, responded to our circulars, and so made the exhibit a good beginning to an important yearly display. The Board of Health not having any funds to erect the proper buildings, water supply, &c., necessary to show water, sewer and plumbing arrangements, by solicitation of said Board, E. Dunn & Bro., practical plumbers and sanitary engineers of Newark, N. J., undertook, at considerable expense to themselves to provide for this part of the exhibit. With great diligence they prepared some specimen plumbing, as well as a complete system of house drainage, with drain and trap ventilation. It was put in full operation, in such a position that every part could be seen, the water being supplied to a tank by a Rider atmospheric pumping engine. The whole sanitary exhibit was very carefully and critically examined by a committee of ten experts, comprising professors, physicians, civil engineers, &c. For the purpose of assisting the public to comprehend how house-drainage should be done, we present the system and plans as thus shown:

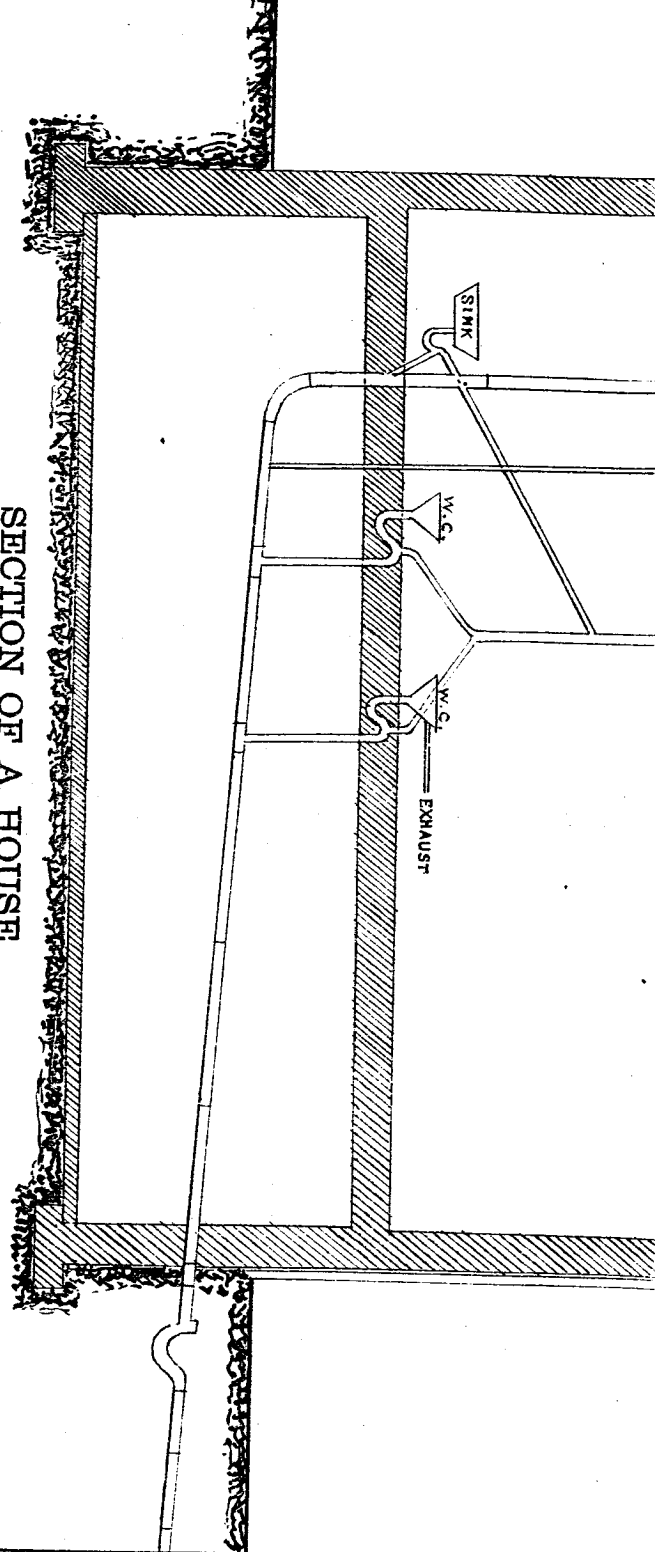
[SEE DIAGRAM.]

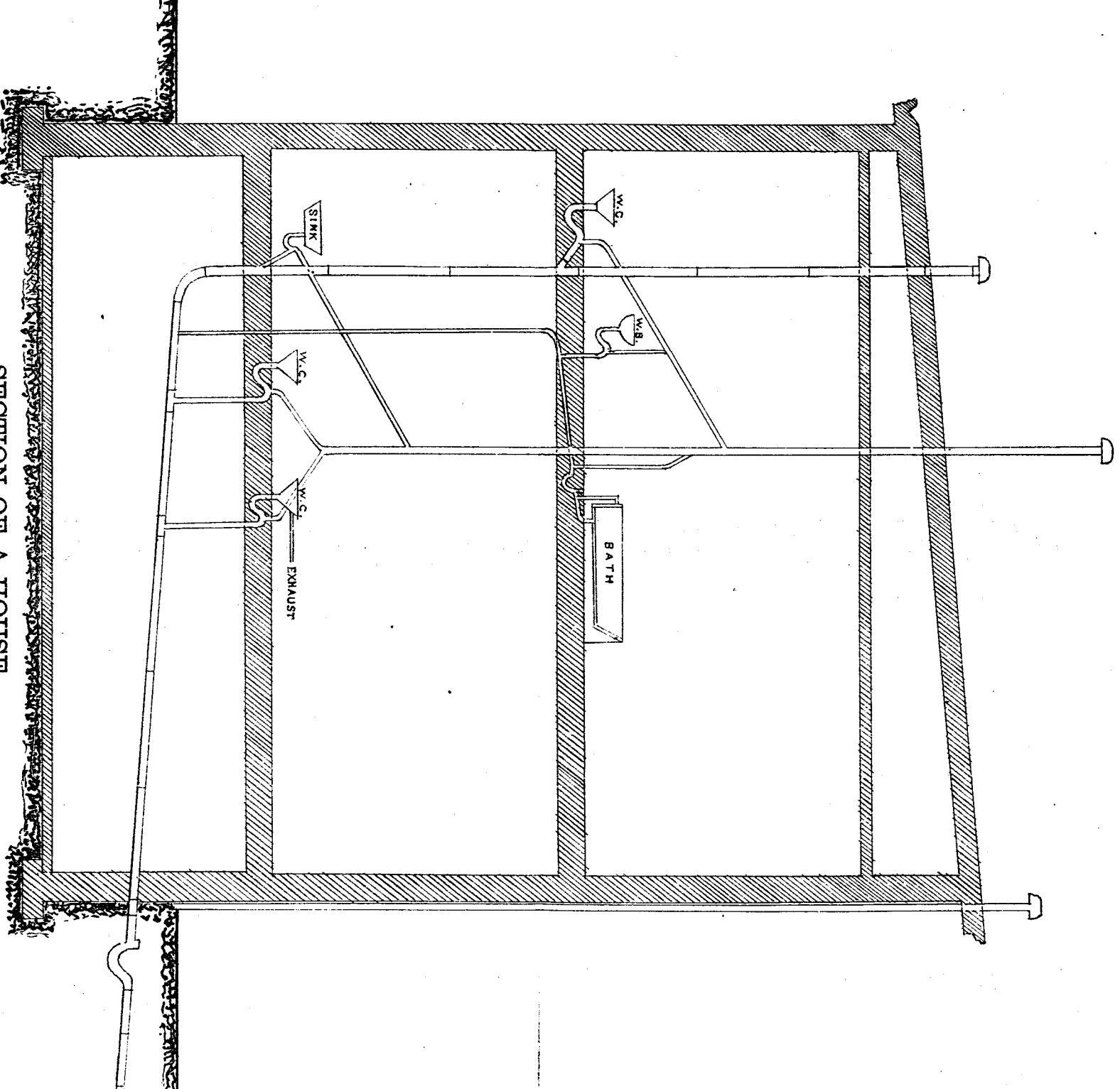
The diagram of this exhibit is presented herewith, shows that a trap is placed outside of the house (which should be in a vault, of easy access for the purpose of cleaning), and close to this trap, next to the house, a ventilating-pipe carried above the roof. The soil-pipe is carried full size through the roof.

In connection with each line of waste and soil-pipe there is a circulating air or main vent-pipe running independently to the roof, and above the soil-pipe, the main vent. A branch is connected from each trap on that line, thus maintaining an easy circulation, it being impossible to syphon the traps. To understand the practical working of currents of air through these pipes, the committee had them bored, which, by the application of a lighted match, fully demonstrated the direction and force of the air currents.

System of Sanitary Plumbing
AS EXHIBITED AT STATE FAIR, AT WAVERLY, N. J.
By E. DUNN & BRO., NEWARK, N. J.

SECTION OF A HOUSE,
SHOWING





SECTION OF A HOUSE,
SHOWING

System of Sanitary Plumbing

AS EXHIBITED AT STATE FAIR, AT WAVERLY, N. J.

By E. DUNN & BRO., NEWARK, N. J.

It is to be hoped that from year to year various plans of house drainage, sewerage and ventilation will be thus exhibited.

The exhibit was visited by a large number of persons in and out of the State, who manifested a great interest, and were greatly pleased to have the chance to investigate a system in practical operation. The matter of house drainage and ventilation is not intended to be confined to dwellings or houses we live in, but relates to all places where people congregate or are employed, whether churches, work-shops, schools, stores, depots, cars, &c., &c. It does seem, that with the many plans of reducing foul air and completely deodorizing all kinds of filth that any person of ordinary intelligence should live in a clean and decent manner without any legal compulsion. In our suburban houses and country places there does not seem to be any excuse for evil effects from house sewerage, privies, &c., where dry earth and ashes are always at hand. The writer when building his house in 1852 arranged in a rude way for using marl, with a very little trouble, for privy and other filth, thereby keeping down all the odors, &c. The plan works well at a nominal cost; in fact the compost made as a fertilizer more than pays for the trouble. But many say that while their neighbors have all kinds of decaying matter about their premises there is little use of their doing much with the nuisance just along side. We have had many such complaints, some of which have been published. It seems as if our State must take notice of such evils and by legislation have the same abated, and our Legislature make such laws as will conduce to the public good by summary statement of filth nuisances. The sanitary care of premises is best said in a single suggestion of J. C. Bayles, author of "House Drainage and Water Service:" "The first essential condition of healthfulness is cleanliness. The shovel, the broom, soap and water, sunshine and ventilation are the agents upon which we must mainly rely in guarding against unhealthful conditions in our surroundings. How, when and where the broom, shovel and scrubbing brush need to be employed the reader must decide for himself. I can only say in a general way that anything and everything which can be properly classed as "dirt" should be put where it belongs. It will then cease to be dirt. There are few things so dangerous that we cannot rob them of their power for mischief by putting them in their proper places."

A very practical country physician was once asked by a neighbor, who was not over-particular as to the condition of his premises, what would be the best disinfectant to get for use before hot weather came on.

"I will give you a prescription if you will get it filled and use it," said the doctor.

This was agreed to, and the doctor wrote as follows:

| | | |
|---|------------------|---|
| R | Rake..... | 1 |
| | Shovel..... | 1 |
| | Wheelbarrow..... | 1 |

Sig.—Use vigorously every twenty-four hours, until relieved.

The hint was taken and the premises were cleared up. Air and sunshine did the rest.

ASPHYXIA.

WITH SPECIAL REFERENCE TO THE TREATMENT OF THE DROWNED.

BY T. G. CHATTLE, M. D., OF LONG BRANCH.

The economy of the animal system provides that the blood must be aerated or supplied with oxygen, by the absorption of common air into the lungs. To this end these organs are composed of a net-work of minute cells, or air vesicles, into which, if anything else other than common air is introduced, it becomes a foreign body, and as such, needs to be immediately rejected; also, if common air is merely excluded, they cease to perform their natural functions.

The result of the aeration of the blood, is the evolving of internal heat, and that action of the vital fluid, upon which depends the healthy action of the brain, as well as the systematic contraction of the ventricles of the heart, and the origination of that nervous fluid, or influence, through which the motions and sensations of life are derived. Whatever interferes with this aerial supply, destroys the normal action of the whole vascular system that is dependent upon it, and life itself is soon extinguished.

The inspiration or breathing in of oxygenized air, and the expiration or breathing out, of carbonized air is known as respiration, and is performed directly through the lungs, under the mechanical action of other organs. The most prominent of these is the diaphragm, which, being situated midway between the extremes of the animal system, aided by the muscles of the chest and abdomen, conducts any expulsive effort that the system may be called upon to make. Its importance in the mechanism of breathing is such, that should it become inactive, or paralyzed, a speedy death would result to the individual from the want of breathing power. This organ, whether active or inactive is very sensitive to the external influences, and is readily stimulated or quieted, by external force or injury. It also, in turn,

is under the control of the inter-respiratory, or phrenic nerve, whose branches are distributed over its whole under-surface. When the nerve-force ceases to be exerted, the diaphragm ceases to act, and the respiratory movements of the chest are quiet, but as soon as this is stimulated by mental influence, or mechanical causes, the expansion and contraction of the chest ensues, and respiration is performed.

The substances and organs thus concerned in sustaining life, are the lungs, as the receptacles for air and blood, the air supplying the elements of blood purification, the blood producing nerve-force, the phrenic nerve originating action in the diaphragm and its attendant muscles, and the diaphragm itself, which is the lever that raises or depresses the chest in its bellows-like movements during respiration. Whatever prevents the healthy action of the blood or the action of the diaphragm, causes a cessation of the forces sustaining life, whether it be physical injury, the breathing of poisonous gases, impeded respiration or the non-elimination of carbonic acid gas.

In the functions of the heart and lungs, there may be a real or apparent cessation, while the apparent by a prolongation, may become real. The apparent cessation is asphyxia; the real, is death. Asphyxia in its technical sense, signifies a want of pulsation, but in its common acceptation is used to indicate a condition of suspended animation, whenever this suspension occurs from a retarded respiration. There may be apparent suspension of the heart's action, without entire suspension of respiration, as in syncope, and there may be apparent suspension of respiration without entire suspension of the heart's action, as in apnoea, and there may be apparent suspension of both functions, as in catalepsy. But when a real suspension takes place in the functions of respiration, it must soon be followed by a similar suspension of the heart's action or vibrations, indicating death. The same forces that prevent the normal action of the respiratory nerves and muscles, as smothering, drowning, strangulation, carbonic acid, and other poisonous gases, are all causes of asphyxia, either mechanically or otherwise impeding the acts of respiration, and place the patient in a condition that without relief must end in death.

Where different organs are successively affected, in close connection with each other, by disease or accident, it is difficult to

give the exact order of the phenomena as they occur, but the experience and observations of those who have examined the matter closely, would seem to indicate the following as the order of the arrest of the vital functions in asphyxia. Any obstruction to the entrance of air into the lungs, renders the flow of blood slower in the whole vascular system. It gradually becomes filled with carbonic acid gas, which so thickens it, that it cannot circulate through the capillaries. The brain is only supplied then through the larger vessels, and being sluggish from the want of oxygen, it enfeebles the action of the cerebrum, destroying its influence over the nerves both of motion and sensation, which involves the cessation of the action of the phrenic nerve, and its attendant muscle the diaphragm. Capillary congestion ensues as the respiratory action is weakened, which demands increased labor on the part of the heart, while from the want of purification of the blood the labor becomes more and more difficult, until exhausted from the loss of nerve force, its contractions cease entirely and life becomes extinct.

It has been generally believed that the contractions of the heart ceased soon after the close of respiration, and authorities have been experimenting for years with a view of arriving at some definite knowledge concerning this matter. While the result of their investigations has brought them to different specific conclusions they have still indicated one general average. Experiments have been made on pups, rats, rabbits, cats and other animals, where they have been submerged, or placed in carbonic acid gas for various lengths of time, and have been examined at different periods after life had been apparently extinct, varying from two minutes to an hour, and various results have been found. In experimenting on twenty different animals, in two cats it was found after a complete submersion of one for ten minutes, and between five and six minutes after asphyxia had thoroughly taken place, in the other after a complete submersion of eight minutes, and an examination in four minutes after complete asphyxia, that the ventricles were in active contraction, with a convulsive tremor of the respiratory muscles, as if a slight respiration were taking place or endeavoring to re-establish itself. The shortest time in which all heart action was noticed to have ceased was in a pup, where in two minutes and ten seconds there was not a sign of life to be discovered. In the

remaining seventeen, the time varied from two and a half minutes to three and a half and four minutes, making the average duration of the contractile power of the heart about eight minutes after submersion, and about three minutes after complete asphyxia.

As it is sometimes the case that bodies are taken from the water after the lapse of a considerable time, and efforts are made at restoration, it becomes a matter of some importance to know how long a body may remain under water and be revived, or at what precise point the vital functions are so far destroyed as to make it impossible to call them again into active duty. Although the length of time during which action of the heart continues after asphyxia, has been well determined by experiment, as also the time that a body can be drowned and yet revived, has been well determined by observation, so that there would seem to be but little variation, yet circumstances do exert great control in cases of this character. Three minutes is the established rule, after which there can be no recovery, if it be real drowning, but persons have been recovered who have remained under the water in an asphyxiated condition for four and five minutes. The last is the longest possible time after which resuscitation could take place, unless the case be one of syncope or nervous shock, when persons have been revived even after fifteen minutes apparent death. Those capable of inhaling and retaining a large amount of air into the lungs, and those who retain their presence of mind in the greatest degree are those who resist the dangers of submersion for the longest time, and are the most readily revived, while those who force nearly all the air from their lungs at the first shock, can seldom be recovered.

As the vast majority of asphyxiated cases are those of drowning, and as the specific treatment is nearly the same in cases of whatever character, it is deemed only necessary to turn the attention to the care and treatment of the drowned especially.

DROWNING.

In drowning, the organs that are primarily affected are those of respiration, those secondarily affected are those of circulation, and the phenomena that present themselves during the act of drowning are as follows:

When a person falls into the water or is exhausted by the act of swimming, he goes beneath the water, then again comes to the surface, aided by the buoyancy of the air in the body and in the clothing. In coming to the surface, realizing danger, he instinctively assumes the upright position, springs from the surface, and throws up the arms for help, at the same time endeavoring to relieve the desire for breath, by an inspiration, and to express the desire for aid, by calling out. This effort takes in water as well as air, and produces a slight spasmodic cough during which act the body goes beneath the surface the second time. As the consciousness of sinking becomes more acute, there is an agonized expression of the countenance which is indescribable, but which, when once seen, will be ever remembered and recognized—and at the same time frantic efforts are made to grasp everything that can be seen, whether within reach or not, and this desire continues even after having sunk, as oftentimes bodies are found clutching the weeds, grass, or stones, that may be found at the bottom of the water.

Sometimes the air is so exhausted from the system, that the body does not come to the surface after going down the second time, but generally there is sufficient inflation to bring it once more to the surface, when as soon as the head comes above the water, the urgency to take breath has become so great that a full inspiration is made without due caution, and a large quantity of water, and a small quantity of air is taken into the system. The water penetrating into the bronchial tubes produces a second fit of coughing, expelling what little air may be left, and the body sinks just below the surface or goes to the bottom.

Along the sea coast casualties of this character generally occur to those who are expert swimmers—they becoming exhausted by too severe an effort in this direction.

However, it is not always the case that those who are said to be drowned are really so. Death in the water may arise from exhaustion, nervous shock, cerebral congestion, or apoplexy. In cases occurring from other causes than drowning the body seldom sinks immediately, but floats upon the surface, and it is desirable to know when a body is taken from the water, whether the condition is one of asphyxia from submersion, a condition of syncope, or a condition of death from some other cause. It is useless to endeavor to resuscitate a body dead from nervous

shock or apoplexy, while it would be criminal to allow one to perish that might have been resuscitated by proper means.

The face of a person drowned is of a dark livid color. The eyes protrude and the vessels of the neck stand out full and turgid. Froth or foam oozes from the mouth and nostrils, sometimes white, but generally rusty or streaked with blood. The tongue is swollen, and almost always marked by indentations from pressure against the teeth. Such are the prominent appearances within a few moments after drowning. The later appearances do not interest those whose desire it may be to restore the recently drowned.

For years it has been the study of scientists in physiology and hygiene to elaborate the most practical method of resuscitating drowned or asphyxiated persons, and to establish a code of rules best adapted for the purpose under all circumstances. Fortunately for the patients and for science, the old plan of suspending the patient by the feet and then rolling the body on a barrel, the object of which no one could divine, has become obsolete among well-read people, and more improved plans have been largely adopted.

The method, which has become the most prominent, because it was the first laid down in accordance with any fixed rule, is that generally known as "Hall's Ready Method," and was originated by Dr. Marshall Hall, of London, as follows:

1. Place the patient gently on the face for a moment to allow the escape of fluids from the mouth.

2. Turn the patient on his back and irritate the nostrils by snuff, a feather, ammonia, &c., and dash hot and cold water alternately upon him.

3. Place the patient on his face, with the wrist under the forehead, then turn the body gradually, but completely on the side and a little more, then back again on the face. When replaced on the face, apply pressure along the spine and ribs, then proceed as before, repeating these measures sixteen times in a minute only.

4. Rub all the limbs upwards, firmly but energetically.

5. Replace wet clothes by such other covering as can be procured.

A later method proposed by Dr. Sylvester, and a better one than the preceding, is as follows:

1. Clear the mouth and throat of dirt and saliva, and draw the tongue forward by the thumb and finger or by a pair of forceps.

2. Place the patient on his back with his shoulders slightly raised.

3. Let the operator kneel behind the head of the patient and grasp the arms just above the elbows, drawing them gently and steadily upwards until they meet above the head; then bring them down again to the sides of the chest, compressing it in a slight degree, so as to imitate expiration. This is to be done sixteen times in a minute.

That known as the "Howard Method," is as follows:

1. Turn the person on the face, with a bundle of clothes beneath the stomach, at the same time pressing on the spine to eject the fluids.

2. Then place the patient on the back, with the bundle of clothes underneath, to elevate the pit of the stomach.

3. Let the operator kneel astride or beside the body, near the hips, and with the ball of the thumbs resting on either side of the pit of the stomach, let the fingers fall into the grooves between the ribs, let the operator throw himself forward and squeeze the waist, then let suddenly go. At first make four or five movements of this character in a minute, and gradually increase up to fifteen.

The method recommended by the Life Saving Association, of Michigan, is embraced in the following:

1. Place the patient on his face.

2. Bestride the body, and grasp the clothing over the shoulders; or if the body be naked, thrust your fingers into the armpits, clasping the thumbs over the shoulders.

3. Raise the chest as high as you can without lifting the head from the ground, holding it until you can count one, two, three, very slowly.

4. Then let the body rest on the ground, the forehead on the flexed arm, the neck straight and nose free.

5. Then place the elbows inside your knees, and with the hands on the sides of the patient's chest, over the ribs, press downward and inward with increasing force long enough to count one, two. Suddenly let go the waist and clasp the shoul-

ders, as before, raising the chest. Repeat these movements ten or fifteen times a minute.

The directions laid down in the Regulations of the United States Life Saving Stations, are as follows :

1. To arouse the patient. Unless in danger of freezing, do not move the patient, but instantly expose the face to a current of air. Wipe dry the mouth and nostrils, rip the clothing so as to expose the chest and waist, then give two or three quick smarting slaps on the stomach and chest with the open hand.
2. To throw off the water. If the jaws are closed separate them and keep the mouth open by a cork or a bit of wood. Turn the patient on his face, having a large bundle of clothing tightly rolled, placed beneath his stomach. Then press heavily over it for a moment, or as long as the fluid keeps flowing from the mouth.
3. To produce breathing. Clear the mouth and throat of mucous by introducing the finger, covered with a handkerchief, into the throat; turn the patient on the back, the roll of clothing being placed under the back so as to raise the stomach above the level of the other parts of the body. If another person be present, let him hold the tip of the tongue out of the corner of the mouth, with a piece of dry cloth, while with the other hand, grasp forcibly both wrists, and keep the arms stretched back above the head, thereby increasing the prominence of the ribs, which tends to enlarge the chest. Kneel beside the patient's hips, and with the balls of the thumbs resting on either side of the pit of the stomach, let the fingers fall into the grooves of the short ribs so as to afford the best grasp of the waist. Using the knees as a pivot, throw all the weight forward on the hands and at the same time squeeze the waist between them as if you wished to force everything in the chest up out of the mouth. Deepen the pressure while slowly counting one, two, three, then suddenly let go with a final push, which brings you back to a kneeling position. Remain erect on the knees, while counting one, two, three, then repeat the same motion as before, gradually increased to fifteen times a minute, imitating the same regularity observable in the natural motions of breathing.
4. If natural breathing be not restored after a trial of the bellows movement for the space of four minutes, then without

interrupting the artificial respiration, turn the patient on the stomach a second time, and rolling the body in the opposite direction from that in which it was first turned for the purpose of freeing the air passages of any remaining water, continue the artificial respiration as above.

5. Rub the limbs briskly, and upwardly, with a firm, grasping pressure and energy. Warmth should also be promoted by applying hot flannels.

Dr. Satterthwaite, in the first number of the medical journal, *Public Health*, lays down a plan of treatment that is far more scientific and sensible than the majority of the plans that so often appear in medical periodicals. His plan is as follows :

1. Try and get something warm to exchange for wet clothing. Send at once for hot water or have a fire built, into which bits of metal or stones may be thrown and heated, and from which you may warm blankets and the bystander's clothes, which are to be applied in rapid succession.
2. Try and get rid of the water by slightly elevating the body while the mouth is wedged open and the tongue depressed. To do this effectively, roll the person on the face, raising the body, lower extremities and feet slightly, then wedge the mouth open with a bit of wood or knot in a handkerchief, then place the left forefinger on the back of the tongue and depress it. The finger will not be bitten, because the mouth cannot close. This opens the windpipe better than if the tongue is drawn out. Then getting beside or astride of the person, press with the flat of the hand upon the bowels, pushing them upwards at the same time. In half a minute or less the water will be driven out sufficiently to commence artificial respiration.
3. Turn the patient on the back, with the head still a little lower than the body, and make upward pressure on the bowels. Press the right hand upwards toward the spine until you hear the air passing out of the mouth. Commence first slowly, and having driven the air out, remove the hand that the air may enter again. Then make upward pressure again, trying rather to exhaust the air thoroughly than rapidly. Three or four motions will be sufficient at first, then gradually increasing to ten or fifteen a minute, until there are evidences of life, or it is plain that it is extinct.

The writer, who, from a residence for a number of years near the sea-coast, has been called upon to manipulate with drowned bodies, has been compelled from the force of circumstances to devise a method that might be carried out irrespective of any help. In reasoning out a method, the deductions were made from the explanations given in the first part of this article.

1. That air is necessary to sustain life.
 2. That certain organs are used for the reception and dissemination of air through the blood.
 3. That certain organs are used for the introduction of air into the first-named organs.
 4. That a certain systematic mechanical movement is necessary to set these organs in motion and keep them going.
 5. That nature has adopted the easiest way of producing such movements.
 6. That all substances should be removed that would impede such movements or the reception of air.
 7. That natural warmth must be restored.
 8. To use such agents as will effect the work speedily.
1. Cleanse the mouth, nostrils and face with a cloth or handkerchief, before the body is disturbed.
 2. Tie a knot in a cloth or handkerchief, and draw it in the corner of the mouth between the teeth. This presses down the tongue, and keeps the mouth open, saving the necessity of an assistant to pull out the tongue.
 3. Turn the body toward the right side, over on the face, with the head resting on the arm of the body, or anything else, to raise it three or four inches from the ground. By turning the body toward the right side, the gravity of the fluids in the stomach will force a certain amount through the pylorus, which is relaxed in asphyxia. After the body is turned on the face, clasp the arms around the body, interlacing the fingers just below the hollow of the breast bone, or over the pit of the stomach, then give several quick jerks with the interlaced fingers, upward, as if trying to jerk the breath out of the body. This produces the same movement that the stomach undergoes in vomiting, and will eject the contents of the stomach, also it will force from the trachea, froth, water, or other foreign substance that may have penetrated to the lungs. A few seconds will serve for this purpose.

4. To excite respiration, turn the body on the back; with one hand press heavily and suddenly on the pit of the stomach, while with the other hand just above it press the chest inward and upward, then release it quickly, then grasping the body around the waist, with the operator's arms under the patient's arm-pits, raise the patient forward gently and quickly to a sitting posture then lay it down again and press the pit of the stomach as before. The pressure upward creates an impulse toward the heart, as well as an expiration. In lifting the body, the weight of the abdominal viscera serves to draw the respiratory muscles down, which produces inspiration, while laying the body down, and, pressing upon it, pushes the diaphragm up, producing expiration.

5. As the body is grasped to raise it, the operator should slap the sides of the chest below the ribs, to excite action of the phrenic nerve. These motions should be repeated about twelve times a minute. As soon as breathing is established, remove the wet clothing, replacing it with that which is dry and warm, even if it be the operator's own coat. The above can all be accomplished by one person, and had better be done mostly by one, even if assistants are near.

When there are bystanders or assistants at hand, while the operator is going through the method of respiration, let some of the others strip the patient of wet clothing, keep the chest bared to the waist, get hot water and dash it upon the chest to produce shock. Let others rub the extremities and limbs briskly and upwardly, either with the hand or warm cloths or blankets.

If when a person is taken from the water the fingers are contracted or hands clasped, it may be considered an evidence of remaining vitality, and should stimulate to exertions until relaxation shows returning consciousness or the presence of death.

After persons have been recovered, they should be warmly covered and remain undisturbed, if possible; or, if necessary to remove them, let it be gently done, and give them a little coffee, with animal broths, to aid returning vitality, as there is danger of a secondary shock after apparent recovery from drowning, which is just as severe as the original asphyxia.

Galvanism has been recommended, but the only really serviceable way in which it can be applied is by means of needles

thrust into the intercostal, pectoral and diaphragm muscles, so as to reach the branches of the phrenic nerve and the larger nerves of the solar plexus.

Government, like a good parent, has expended vast sums of money to save the lives of her children along her maritime coasts, but the outlay has not always been judiciously made. Except the regulations given above, there is nothing placed in life saving stations, in the way of appliances, for restoring the drowned. There should be a galvanic battery and abundance of blankets, as well as the means of providing warm water in case of need, in much larger quantities than could be obtained from a small stove and small kettle. There should be also some means of communicating from station to station when assistance is needed, as is sometimes the case. But in all probability the deficiencies that may be apparent in the Government life saving appliances, will be remedied ere long.

Below is given the record of some cases where the parties have been successfully treated by the writer's method:

Some years ago an accident occurred at Tom's River, in this State, where a number of persons were precipitated in the water. Master W. was taken from the river in about eight minutes after the accident, as nearly as the time could be computed, and was resuscitated in about thirty minutes.

At the same time Miss S. was taken from the water, while the attendants were engaged with Master W., so that she must have been in some time longer. She was fully resuscitated in an hour, but came very near dying from secondary shock in about two hours after resuscitation, and was saved after only the most strenuous exertions by means of artificial respiration, friction and stimulants. She, however, fully recovered, and is still living.

Master D. while sailing in the river had his boat capsized by a flaw of wind, and sank after about one minute's struggle. The coachman, seeing the accident, procured a boat and rowed to his assistance. He found him grasping the grass at the bottom of the river, in water about four feet deep. From the time that the accident occurred until he was taken from the water, not less than ten minutes must have elapsed, and from the time he was brought to shore until medical assistance could be obtained was fully ten minutes more, so that twenty minutes elapsed before efforts for artificial respiration were made. In fifteen minutes

he gave the first gasp, and was breathing regularly in forty-five minutes. He was still living a few years ago when last heard from.

Miss A., from the South, while bathing in the ocean, was carried beyond her depth by the force of the current. From the time of the discovery of the accident until the bathing master could reach her with his boat, not less than six minutes could have elapsed. To obtain medical assistance occupied ten additional minutes. Natural respiration commenced in fifteen minutes after first manipulation.

Mr. R. while fishing was upset in a collision, and becoming entangled in his boat, was dragged some distance. When rescued he was inanimate, but there was no means of determining the length of time he had been so. When brought to shore, there were persons who had seen artificial respiration practiced, and commenced efforts at restoration. When medical assistance arrived, it was more than an hour after the accident, and he was breathing regularly. Those present thought they had been occupied about fifteen minutes before he gave a sign of returning animation.

Fortunately, the opportunities for exemplifying any rational method of treatment for the drowned are rare. A period of years necessarily elapse before any system can be verified, except by way of experiment upon animals, which as far as artificial respiration is concerned, is very unsatisfactory. Hence the writer has had no opportunity of comparing his plan with that of any other person operating. His attention was called to the subject by reason of living near the sea-side, where casualties occur every year. It was evident that some method of resuscitating the drowned should be devised, where one person could do the whole work in the easiest and speediest manner. Much valuable time is often wasted in giving others directions what and how to do, and in having these inefficiently carried out from the over-zeal or over-excitement of those assisting. Hence this simple plan which we have found effective, together with some reasons therefor, derived from a study of natural methods, and tested by the demands of actual practice.

November 7th, 1879.

ADULTERATION OF FOOD, ETC.

ALBERT R. LEEDS, PH.D.

There are certain well-understood and natural standards, by which the purity and genuineness of any commodity used as food are judged, and any willful debasement below these standards for purposes of gain is adulteration. The adulteration may be effected either by the addition of substances for the purpose of increasing the bulk or weight, or to change and improve the appearance, or to artificially increase the strength, or it may be effected by the abstraction of some of the more valuable constituents. When willfully done, all of these alterations are *fraudulent*; when they arise in the process of growth or manufacture without intention, they are to be classed as *accidental*, and blameworthy only when a want of due care can be proven. Of the fraudulent adulterations, there are three kinds—the harmless, the deleterious and the poisonous. The examinations given later were made to find out the character and extent of these three classes of adulterations at the present time. And it should be carefully borne in mind that hasty and sweeping generalizations upon these subjects are of necessity misleading, because the nature and extent of the adulterations practiced from time to time, vary with the abundance or scarcity of particular commodities, with the sharpness of competition in trade, with the ignorance or alarm of the community, and with the absence of, or unwise or wise, legislation upon the subject. But sufficient, I think, has been done to warrant me in asserting, that adulterations of a kind advantageous to the pocket but not injurious to the health, though extensive, are by no means so great as is popularly supposed; in the second place, that deleterious adulterations are limited to a few commodities, and that with the exception of the use of poisonous pigments to a very limited degree in candies, and of arsenic in wall-papers and articles of use and wear, there is no good evidence of the use of poisonous adulterants whatsoever. The statements which have been going

the rounds of the press to the effect that cayenne pepper, mustard, curry powder and other spices, are adulterated with compounds of lead and mercury, that sulphuric acid is commonly used in the making of vinegar and certain wines, that milk is ordinarily adulterated with anything more dangerous than water, that pickles are frequently colored green by copper, that teas contain salts of copper and arsenic, etc., etc., are, in the light of any investigations made by chemists of good repute in this country, utterly false. While no pains should be spared by Boards of Health to ascertain the facts, and from time to time warn the public concerning adulterated commodities, yet the reiterated publication of such absurd and exploded fictions as the above, should bring down upon their authors, as it has, the contempt and derision of a better instructed community. With these words of introduction, let us pass to a consideration of the results obtained in the examination of certain of the principal articles of food.

BREAD.

It is stated that potatoes are frequently, and indeed commonly, used in the making of baker's bread. They cannot properly be called an adulteration, because the bread so made is excellent and palatable, as I have found from the constant use of such bread in my own household. The receipt used calls for half a pound of boiled potato to three and a half pounds of flour. The objection is that bread made in this manner, and by the use of potato yeast as well, holds more moisture than that made entirely from wheaten flour, which is an extra profit to the baker when the bread is sold by weight. We did not specially inquire into the substitution of inferior or damaged flour in place of superior flour, for two reasons. In the first place, at the time of making these inquiries the price of flour was exceptionally low, and the temptation to lower the quality of the bread proportionally small; and in the second, the buyer must and does discriminate between sweet and nutritious bread and the reverse. It is the attempt to improve the appearance of bread made from inferior or damaged flour, by the use of deleterious substances, such as alum, blue vitriol, borax or white vitriol, that is more especially inimical to health, and to the search for these bodies, and for chalk as well,

which is said to have been detected in some instances in bread, our efforts were directed. But in no case, though a number of loaves made by bakers largely supplying the poorer classes were examined, were any of these adulterants found except alum. In the ash of two samples an amount of alumina was found, corresponding to seven grains of alum to a four-pound loaf. In another sample, alumina corresponding to a weight of eight grains of alum in a four-pound loaf; in another to fifteen and one-quarter grains; in another, and the worst sample, to twenty-three grains. Admitting that as much alumina as would be equivalent to eight grains of alum might be derived from the ash of the flour in its natural condition, an admission usually made in the analysis of bread by the public analysts of England, yet the above results would appear to warrant us in believing that the use of alum in bread-making is practiced to a certain extent.

According to Liebig, the addition of alum renders the bread very light, elastic, firm and dry, but at the same time a combination with the phosphoric acid present is probably formed, and this phosphate of alumina being with difficulty soluble, tends to diminish the digestibility of the bread so made. Moreover, according to Liebig, alum forms with the gluten of the meal an insoluble compound. These opinions of Liebig are much disputed at the present time, but in the absence of very convincing arguments to the contrary, we prefer to adhere to the teachings of that illustrious chemist. With regard to blue vitriol (a poison), which has the same effect on poor or damaged flour as alum, there is no question. As above stated, I have no positive testimony gained from analysis performed in my own laboratory, but in this connection it is important to note the results obtained by Dr. E. Waller, in the examination of bread sold in the city of New York.*

Of the fifty-one samples examined, he found all but fifteen contained minute amounts of copper. But as the amounts were excessively small he was led to examine other articles which might at times be used in bread-making, such as potatoes, white and yellow Indian meal, and found they contained traces of copper. In baker's yeast, no traces could be found. Besides the above sources of copper, in the majority of cases the amounts of

*Report of Board of Health of New York, 1873, p. 449.

copper found were not greater than might have been derived from the use of copper utensils in preparing the bread, or the materials used in making it. In only two cases was the amount of copper so great as to render it probable that it had been intentionally added in the making, and in these cases probably did not exceed two-fifteenths of a grain of sulphate of copper to the pound of flour. Six other samples were probably adulterated with alum, and two contained both alum and copper.

SALERATUS.

The probability is strong that but little systematic adulteration of this substance is practised. In various samples purchased in Hoboken, and examined for impurities, none were found.

Of twenty-eight samples sold in the city of New York, and examined by Dr. E. Waller,* all but two consisted of bicarbonate of soda more or less pure. The impurities were mainly common salt, sulphate of soda, lime and silicic acid, and were due to the process of manufacture of the bicarbonate. In one of two exceptional cases, the adulteration consisted in the addition of flour, a harmless though fraudulent dilutant; in the other, in the addition of nearly twenty-five per cent. of sulphate of lime, or *terra alba*.

CREAM OF TARTAR.

The cream of tartar examined by Dr. Waller, was found to be in all cases adulterated with *terra alba*. To such an extent was this injurious substance added, that in most samples, the *terra alba* predominated. In one case 61 per cent. of *terra alba* was found, in another 86 per cent., so that, according to Dr. Waller, "the cream of tartar sold in New York is shamefully adulterated—more so, probably, than any other article sold by the grocers."

Among the samples purchased in New Jersey, sulphate of lime was found to be a common adulterant, the percentage in one instance amounting to 34.04 per cent. The adulteration is one so easily carried on, and so unlikely to be detected by the casual buyers, that it appears to be very extensively practised.

*Report of Board of Health of New York, 1872.

BAKING POWDERS.

The essential constituents in the best baking powders are cream of tartar and bicarbonate of soda, to which are sometimes added tartaric acid and carbonate of ammonia, the salts being prevented from mutual decomposition by the addition to the mixture of a little starch. A number of samples examined by the author were found to be unadulterated. They were of kinds in extensive use and bore an excellent reputation, two of them having been ordinarily used in my own household. But during the course of the past year, very many analyses of these powders have been made by Dr. H. A. Mott, and he has found that they are largely adulterated, alum, *terra alba*, etc., being used in the manufacture of a large number of them. In one variety, known as the "Patapsco Powder," there was 20 per cent. of burnt alum; in "Andrews," 22½ per cent.; in the "Charm" baking powder, 30 per cent., and in "Dooley's Standard Baking Powder," 26½ per cent. No cream of tartar was used in any one of these powders, while in one of them the starch amounted to 57 per cent. Since the time of his earlier publication,* the statements therein having been challenged, Dr. Mott has continued his inquiries, and has already reported twenty-three brands of baking powder as being made with burnt alum, the total number probably being much greater.

SUGAR.

Several samples of white sugar, differing in the fineness of the granulation were examined. They were found to contain no mineral substances, except those naturally contained in the minute amount of ash, *no metallic bodies, even in traces*, no glucose, and no flour or starch. So far as the chemical tests applied could show, and to the best of our knowledge and belief, these sugars were pure. They were purchased at the meanest shops in the poorest neighborhoods.

With regard to the use of glucose in brown sugar and molasses, I am unable to speak from personal knowledge. It is the opinion of Prof. Sharples, that if the former is the case, it must be very seldom, since he records but one case within the last two

*Scientific American, Nov. 16th, 1878.

years.* According to Prof. R. C. Kedzie, the adulteration of table syrups with glucose is practiced to a very great extent. While the glucose itself is harmless, it is a loss to the consumer in the respect that its sweetening power is much less than cane sugar, one pound of the latter having, it is said, the same sweetening power as two and a half pounds of glucose. Moreover, in the table syrups examined by Prof. Kedzie, the glucose was frequently accompanied by large amounts of deleterious substances, one sample containing, in the gallon, 71.83 grains of free sulphuric acid, .28 grains of sulphate of iron, and 363 grains of lime. The serious illness of a family was attributed to the use of this particular syrup, and there were other samples examined in which the adulteration was still greater. Of seventeen specimens of syrup examined, two were made of cane sugar, and fifteen of glucose.

CONFECTIONERY.

In an extended examination made by Dr. H. Endemann† of the candies sold in the city of New York, special attention was paid, 1st, to those substances which were employed to take the place of the sugar, in other words to give "bulk;" 2nd, to materials used in coloring; 3d, to extracts employed in flavoring. Of substances of the first class, clay, gypsum, starch, and lamp-black were found; the first body named being present to the extent of 3.6 per cent. in some lozenges. The last as an admixture in liquorice gum-drops.

The red coloring matter was found to be either carmine or analine red, both of which, when used in such small amounts, are harmless. Other red colors, like vermilion and minium, which are poisonous, were not detected.

Blue colors were either ultra-marine or Prussian blue. The yellows were chromate of lime, chromate of lead, chromate of baryta, gamboge, saffron and various yellow plant extracts. Of ten samples of yellow colors examined, five were found to consist mainly of chromate of lead. No copper or arsenic was detected in the green colors examined.

While the flavoring extracts were mainly artificial, and while the ethers composing them are poisonous when taken in consid-

erable quantities, yet it is questionable, according to Dr. Endemann, whether, when taken in a highly-diluted state, they are to be regarded as poisonous. According to Prof. S. P. Sharples* even the perfectly white candy, which is free from injurious coloring matters, is frequently flavored with fousel oil (essence of banana), oil of bitter almonds (nitro-benzole), prussic acid in various forms known as almond flavor, and various other essences and extracts which are poisonous in their nature, and which are used in large excess by the makers in order to give a strong flavor. The same authority states that glucose sometimes makes up almost the entire bulk of candy, and that most candy probably contains it to a greater or less extent. In such cases, the injury arising from the adulteration does not result from the glucose, but from the free sulphuric acid and the excess of sulphate of lime which commercial glucose is apt to contain.

I have quoted thus largely from the results of examinations made in New York and Massachusetts, for the reason that my own analyses of candies, which were confined to the search for *deleterious* constituents and flavoring matters, did not show their presence. And while there can be no question of the existence of injurious adulterations, yet that they are universally or even generally practised would appear not to be the case.

STARCHES AND FLOUR.

An examination of several samples of starch was made with the microscope, but no impurities were detected. Their chemical and physical properties, also agreed perfectly with those of genuine starch. No examinations of flour were made, because there was no reason for suspecting that any adulteration of this article was practised at the present time in this country, the employment of flour made from damaged wheat not being a matter coming within the scope of the present inquiry.

MILK.

A great amount of sensational literature has been published concerning the adulteration of milk, it having been asserted that it is customary to add to the milk sold in our large cities whiting,

*Treatise on Hygiene and Public Health, Vol. II, p. 370.

†Report of Board of Health of New York, 1872.

*Adulteration of Food. Treatise on Hygiene and Public Health, vol. II, p. 363.

magnesia, chalk, and even sheep's brains. These statements are entirely negated by the testimony of all the gentlemen who have been officially charged with the inspection of milk, *the addition of water to dilute and of caramel to color*, according to their statements, being the sum of the adulterations. It was, of course, quite needless to multiply analyses of milk under these circumstances—the important matter was to discover what means had proven effectual in suppressing the evil. At the outset great difficulty was encountered for the lack of an authorized standard as to what should be entitled pure milk. This difficulty has been overcome, the New York Board of Health having succeeded in establishing in the courts of law that the specific gravity of pure milk shall be taken at 1.029; while in Massachusetts, Rhode Island and Maine a chemical analysis of the milk is required by law, and it must be shown not to fall in the percentages of its essential constituents, below certain standards generally accepted at the present time in this country and in England.

It is stated that during the years 1874-75*, thirty-seven convictions were obtained in the city of New York under the sanitary ordinance covering the adulteration of milk, and the opinion is emphatically expressed that the arrest and prompt punishment of those who tamper with an article of daily use has already been attended with salutary effects, and, if successfully continued, must ultimately stop the evil. "The practical lesson to be drawn from the experience of many years, and of many City Boards of Health, is that statutes alone are powerless to guard against the watering of milk, which will always be practiced to a greater or less extent, unless the watchful supervision of a competent inspector is brought to bear against the evil." The same result has followed the systematic warfare which has been waged in Boston and elsewhere, against the practice of watering milk, as may be seen from the writings and reports of Messrs. Sharples† and Merrick,‡ State Assayers of Massachusetts, and Mr. H. W. Vaughan, State Assayer of Rhode Island.

*Report of Board of Health of New York, 1874-75, p. 64.

†Milk Analysis, Proc. Amer. Pharm. Ass'n. Milk Analyses, Proc. Amer. Acad. Arts and Sciences, Boston, Vol. XII, 1877.

‡13th Annual Report, Boston Milk Inspector, 1878, p. 21.

TEA AND COFFEE.

In the examination of teas, attention was directed to the determination of the percentages of ash and of tannin; to the analysis of the ash for the discovery of foreign mineral substances, and to the examination of the structural characters of the leaves under the microscope, in order to detect the presence of other plants.

An analysis by Mulder of black and green teas, gives for the percentage of ash in the former 5.24 per cent., in the latter, 5.56 per cent.; his determinations of tannin, give for black tea 12.88 per cent., for green tea 17.80. While the analysis of various kinds of tea, representing tea grown on various soils, in different seasons and collected at different ages of the plant, afford other percentages for the ash and tannin, yet it is safe to say that any wide discrepancy from the above results, would indicate either that we were dealing with teas containing foreign mineral substances, or with teas largely admixed with the leaves of other plants.

A sample of what was sold as medium Japan tea, yielded, according to one analysis, 6.6 per cent. of ash. A duplicate specimen of the same, gave 7.0 per cent. of ash. This high result pointed to the probable presence of foreign mineral matter. Under the microscope, many leaves other than those of the tea-plant were found.

Mixed tea, sold at the price of thirty cents per pound, yielded 6.5 per cent. of ash, and contained 7.9 per cent. of tannin. It was free from foreign mineral matters, but had abundance of other leaves.

"Mixed" tea, sold at twenty-five cents per pound, yielded 6.9 per cent. of ash, and contained 8.2 per cent. of tannin.

Examinations were made of a number of low-priced teas in a similar manner. After soaking, the leaves were mounted on glass slides, and compared under the microscope, both with the leaves of what was sold by the most reputable grocers of New York, at the highest prices, for genuine tea, and with the microscopic enlargements of the genuine leaves of the tea-plant, figured in Hassall's standard work on the "Adulteration of Food." In the lowest priced teas it was difficult to find in

this manner, any genuine leaves whatsoever. The low percentage of tannin found in such samples, likewise indicates the probable presence of a large proportion of foreign leaves.

It is stated that plumbago, indigo, Prussian blue, clay, soapstone, gypsum, etc., are employed either in the facing of teas or to give weight. The small percentage of iron found in the ash of the teas examined, would appear to show, that if Prussian blue were employed at all in facing them, the amount used must have been insignificant. The other mineral matters enumerated in the list given above, we did not succeed in finding. Sufficient evidence, however, was afforded by the microscopic and chemical examination, to show that while the adulterants of tea are mainly harmless, they are added to such a degree as to make it one of the most adulterated articles of food.

The samples of coffee examined, on the contrary, did not appear to be mixed with chickory or other foreign berries, and although of very poor quality in many instances, they were not adulterated.

MUSTARD.

Mustard is made from the seeds of the black and white mustard plant, and, when pure, consists of the flour made by crushing and sifting these seeds, together with more or less of the husk. Any foreign substance, whether vegetable or mineral, is an adulteration. It is stated that clay, chrome yellow, chromate of potash, cayenne pepper, gypsum, gamboge, turmeric, ginger, yellow ochre, potato starch, pea flour, wheat flour, and the flour of various foreign seeds have been used as adulterants, but of this list none were found in the various samples of mustard analyzed, except clay, gypsum, turmeric and wheaten flour. The samples analyzed were purchased at the localities named: No. 1, ———, Hoboken; No. 2, corner of ——— and Willow streets, Hoboken; No. 3, corner of ——— and James streets, Newark; No. 4, "Bovine" mustard; No. 5, "Colman's" mustard. The table of analyses gives, in addition to the adulterations found, the percentage of ash and fixed oil. Pure mustard contains from 3.7 to 4.7 per cent. of ash, and if the percentage falls below this amount, some organic adulterant is probably present; if, as is more likely, the percentage exceeds this amount, some mineral

substance. The percentage of fixed oil, in like manner, should be included within 33.9 and 36.7 per cent. The amounts of mustard given as present, were calculated from the amounts of fixed oil found, and, of course, can be regarded only as approximate determinations. The clay and gypsum might, to a certain extent, have been introduced in the form of dirt, and, as such, would be classed as accidental adulterations. The flour and turmeric have been customarily added to mustard to improve, it is so stated, its palatability, and to heighten the color. The practice, it is moreover said, is so well known and allowed, that the adulteration should be regarded not only as harmless, but in no sense fraudulent.

TABLE OF ANALYSES OF COMMERCIAL "MUSTARD."

| Sample. | Ash. | Oil. | Mustard. | Wheat Flour | Turmeric | Clay. | Gypsum |
|---------|------------|-------------|-------------|-------------|----------|---------|----------|
| I. | 4.60 p. c. | 17.45 p. c. | 44.74 p. c. | Present. | Absent. | Present | Present. |
| II. | 11.67 " | 24.00 " | 63.40 " | " | Present. | (Salt.) | " |
| III. | 4.64 " | 21.30 " | 55.60 " | " | " | | |
| V. | 18.38 " | 20.28 " | 52.70 " | " | Absent. | Present | Present. |
| V. | 3.78 " | 30.14 " | 81.10 " | " | " | Absent | Absent. |

No. II. contained a large quantity of common salt, together with vinegar. As it was already prepared for table use, these ingredients were introduced in the process of mixing.

No. III. contained very slight traces of mineral substances, not fairly attributable to the ash.

The percentage of ash in No. IV. is very great, 18.38 per cent. and it is difficult to account for so large an excess above that found in genuine mustard, except on the supposition of intentional addition.

The application of the name mustard to "mixtures" of mustard and flour, though sanctioned by immemorial usage and defended on the ground that mustard, without the addition of flour, is too pungent for table use, we regard as a serious mistake, and one, which, if corrected would benefit both the purchaser and honest manufacturer, for were the spice sold as a mixture, the

amount of pure mustard it contained being stated, the honest manufacturer would be put into a position to secure the just reward of his honesty, and the purchaser would know how much of what he paid for was mustard and how much was flour or something else.

VINEGAR.

The adulterations looked for, were the mineral acids, nitric, hydrochloric and sulphuric, though more especially the latter: the organic acids, pyroligneous acid, tartaric, malic and citric acids; metallic substances of every kind, but more particularly, lead, copper, arsenic, zinc and tin. The percentage of acetic acid in every case was likewise determined, since in good vinegar, this percentage should not fall below 4 per cent., and a lower percentage than this indicates the presence of an undue amount of water.

The samples were purchased as follows: No. 1, corner of — and Willow streets, Hoboken. No. 2, corner of — and Grand. No. 3, corner of — and Grand. These, with another sample, No. 0, whose place of purchase was not noted, were all purchased at the price of five cents a pint, and this price was asked, so far as we could ascertain, by the grocers generally throughout the city. And yet the purchaser could have ascertained by his own taste and inspection, that the vinegars thus sold were of very different strengths and quality, the amount of acetic acid in one case being as much as 25 per cent. greater than in another.

No sulphuric or other acid, except acetic, was found in any sample.

No copper or other metal was found, except lead.

Lead was present only in traces; even in No. 2, a white vinegar in which the largest amount of lead was found, the quantity was very minute. Sample 1 contained 4.2 per cent. of acetic acid; 2, 4.10 per cent.; 3, 3.4 per cent.; 0, 4.5 per cent. So far then as the strength of the vinegar is concerned, none of the samples can be regarded as falling below the standard, except No. 3, which contained only 3.4 per cent. of acetic acid. The sample No. 1 contained myriads of the "vibrio aceti," and other animalcules, multitudes being visible even to the naked eye.

PICKLES.

Diligent search was made for pickles of suspicious appearance, and numerous stores were visited with the expectation of finding some pickles to which a bright color had been communicated by artificial means; but the search was unsuccessful, and the samples analyzed in the laboratory afterwards, proved to contain no deleterious ingredient. Especial attention was given in the search for traces of *copper*, but none whatever were found.

These remarks apply not only to pickles of superior quality, like those bottled and labelled by Thurber & Co., N. Y., and Crosse & Blackwell, England, but to samples bought haphazard in numerous stores and not bottled.

CANNED VEGETABLES AND MEATS.

Uneasiness in the use of canned vegetables and meats has been created by reports of many cases of sickness so arising. When the meats have been tainted or improperly canned, sickness might be so produced; but to discover by the examination of canned articles that they were of a dangerous quality was, obviously, a very difficult matter. We contented ourselves, therefore, with an examination of canned corn, tomatoes and other vegetables, for metallic impurities, especially lead, tin and copper. In the cans which were examined such impurities were not found. In one instance, however, several globules of mercury of considerable size were discovered, probably due to the accidental breaking of a thermometer employed during the canning. The following important paragraph has been condensed from a report published in an English scientific journal concerning the use of *canned peas*.

In the city of London, in 1877, the vendors of several cans of prepared peas, in which the analyst of the district, Mr. C. H. Piesse, had found quantities of copper, varying between a quarter and a half grain, were fined. In the medical evidence adduced in connection with the case, Dr. Parry took the ground that since copper is found in minute traces in the human body, it might legitimately be used in the preparation of peas for human food. But Dr. Guy, Dr. Dupre and Dr. Tidy all took the ground that the *smallest* admixture of copper, when contained in any

preserved article of food, ought to be viewed as an adulteration. The copper, it is well known, is added solely for the purpose of improving the color of the preserved vegetables, and so giving a fictitious value to an otherwise inferior article.*

CAYENNE PEPPER.

No compound of lead or mercury were found in the samples examined. In one sample the ash amounted to 5.4 per cent. and in another to 15.6 per cent. Both contained some red ferruginous earth, the latter sample in considerable quantity. It is stated that the ash of the unground pods is colored red from the presence of oxide of iron, and the red ferruginous matter may possibly have been derived from this source; but the very large percentage of the ash in one sample certainly makes it questionable whether or no in this instance the adulteration is to be regarded as an accidental one. Terra alba as well was found in the latter sample.

LIQUORS.

The charge constantly made that liquors are enormously adulterated, has not been substantiated in the cases where analyses have been made by competent persons. In the report made by the Massachusetts Inspector and Assayer of Liquors, he states as the result of his examinations during the past two years, that in the ardent spirits (brandy, whisky, gin, rum, etc.,) examined, water, sugar, caramel or like coloring matter, and in one case methylic alcohol, were the only adulterations found. No cocculus indicus, strychnia, picric acid, nor any other bitter except that of hops and malt, was found in the samples of beer examined, and the wine contained nothing but what was naturally derived from the grape.

A great number of samples of whisky, including what was vended at the meanest liquor saloons of the city, were examined a short time ago under the auspices of the New York Board of Health, and the badness of the samples consisted in the increasing amounts of *water and fousel oil*, which they contained.

This result is similar to that recorded in the Report on Food and Drugs, recently published by the English Commissioners of

*The Analyst, vol. I, pp. 183, 203.

Internal Revenue. The samples of whisky which were sent up to the Board for examination, were carefully examined, but no adulteration was found, except the presence in one of the samples of some pungent matter resembling cayenne pepper. The suspicions had probably been caused in large degree, by the use of new spirit containing an excess of fusel oil and other natural impurities.

In the two samples of gin which were sent upon the charge of adulteration with water, the Board did nothing except to make a determination of the strength, leaving, in the absence of a standard as to the degree to which gin may be adulterated, the question of undue watering or otherwise to the consideration of the Justices. Of the beer examined, one sample contained a certain amount of salt, which, on examination, proved to be no greater than what was naturally present in the ingredients used in brewing; two brewers were detected using grains of Paradise, and one was found using licorice.

The same report supplies much evidence to show that the popular impressions concerning adulteration are greatly exaggerated, for of the 14,244 samples of suspected articles examined at the government laboratory at Somerset House, but a comparatively small number were shown to be adulterated. Besides the liquors just mentioned, a few of the more important articles may be spoken of by way of illustration. A sample of pepper was alleged to be adulterated with sand, but the quantity which was found was not more than may be present in pepper in the whole state, as imported. Of three hundred and twenty-five samples of tobacco, sixty-eight were found to be adulterated, the adulterations being sugar and licorice; cigars, certified by the local analyst to contain opium, proved, on examination at the government laboratory, to contain not the slightest trace of that drug. Coffee, however, was found to be frequently adulterated; the adulterant most recently detected being date stones, which after being roasted, ground and mixed with the coffee, readily deceive the general public.

COSMETICS.

Since substances detrimental to health are frequently employed in the preparation of cosmetics, some well-known articles of this class were examined with the following results:

Mme. Rachel's Toilet Cream.—Purchased at a pharmacist's in Washington street, Hoboken, at the price of sixty cents per bottle. It consisted largely of finely powdered carbonate of lime or chalk, and carbonate of magnesia, suspended in water to which some perfume had been added. No metallic salts were present, except a trace of iron and some oxide of zinc—the latter in not inconsiderable quantity.

McNeil's Sulphur Cream.—It is composed of sulphur and oxide of zinc. No other substances were found except traces of lime and magnesia.

Lily White.—This consisted of gypsum and a fine white variety of unctuous clay, with no organic matter, other than that due to the small amount of perfume present. This was probably the least deleterious of the cosmetics examined, and while having a tendency to close up the pores of the skin, would probably do as little injury as any of the bodies of its class.

The various preparations used in dyeing the hair were not examined, since the presence of lead in large quantities in these dyes has been recently exposed in the reports of the New York Board of Health, and the many serious consequences to life and health resulting therefrom abundantly pointed out.

DISINFECTANTS.

There is considerable danger of the public being imposed upon by the sale of disinfectants, which have received fanciful names, and while containing nothing but low-priced and familiar disinfecting substances, are sold at prices much exceeding their commercial value. It is safe to say that the best disinfectants are generally well known, and have been put to extended use and most severely tried by sanitary authorities in this and other countries. The State Board of Health of this State has circulated thousands of circulars, giving precise directions concerning the nature and employment of the most reliable disinfectants. Hence the advertisement of these bodies, or mixtures of these bodies either with one another or with inert foreign substances added to increase bulk or weight, under fanciful names which give no indication of the true composition of the disinfectant, can have the tendency only to mislead, and to a certain extent defraud, the purchaser. Where copperas,

chloride of zinc, blue stone, etc., are sold under their own names, the amount to be applied can be intelligently determined. But if disinfectants of unknown composition are used, the amount to be applied cannot intelligently be decided upon, nor can the remedy of the proposed evil be certainly brought about.

Of this character is the "Instantaneous Disinfectant Powder," sold by the New York Deodorizing Company, 170 Broadway, New York, at the price of twenty-five cents per pound. It consists principally of ferruginous clay, with some common salt and sulphate of iron.

The same remarks apply to the "Sanitary Solution," sold by the same company, at the price of fifty cents per pound. It is a solution of blue stone and chloride of zinc in water.

ARSENICAL COLORS.

Although a subject not directly connected with the adulteration of food, etc., yet the common employment of arsenical colors in objects intended for household use early attracted the writer's attention. The presence of large amounts of arsenical pigment in the brilliant green wall-papers in very common use, was confirmed by the examination of a great number of samples. Recently, the State Board of Health, of Michigan, in order to impress upon the people the extent to which this manufacture of arsenical wall-paper is carried, has issued to the principal libraries of the State one hundred copies of a volume containing samples of such papers, and reports of the very numerous cases of sickness resulting therefrom.

It would be difficult to enumerate all the articles of common use in which arsenic is present, sometimes very unexpectedly. Recently, the author found in a green taper, used by the children in a toy house, a considerable amount of the arsenite of copper. Besides wall-paper, letter-paper, fancy paper of various kinds, card-board, printed tickets, etc., are colored with arsenical pigments. Artificial flowers, green papers used in the ornamentation or wrapping of candies, green tarlatan employed as an article of dress or in the protection of picture-frames, chandeliers, &c., are similarly colored. Since these arsenical pigments are simply fixed upon the fabric by the use of starch

or size, they readily detach themselves, and float in the surrounding air.

CONCLUSION.

Having endeavored to ascertain, as far as the time and means at our disposal would allow, the facts concerning the matter of adulteration, it will be proper in conclusion to say a few words concerning the means of regulating the evil, and of restraining it within as narrow limits as possible. We regard these as:—

Primarily, a sensitive public morality upon this matter, aided by the co-operation and sympathy of the press. These we have; the public being heartfelt in its denunciations of the crime, and the press being keen and vigilant to ferret out and expose the adulterator and his wares.

Second, the duty of Health Boards to examine at frequent intervals into the purity and genuineness of articles of food and medicine, and to keep the public instructed upon these points.

Third, to discover what legislation would be wise, and then to have it so explicitly enacted that the laws would really defend the public, and not, as has frequently been the case, shield the adulterator.

Finally, the appointment of a suitable number of public analysts and inspectors, whose duty it shall be to see that the provisions of the law are carried into effect; since otherwise, the experience in England and elsewhere has shown, the laws concerning adulteration remain but dead-letters on the statute-book.

DISINFECTION.

EZRA M. HUNT, M. D.

The design of disinfection is to remove from the air about us either those infective particles which are the cause of specific diseases, or to correct any deterioration of air which is unfriendly to general health. The air for instance may have in it atoms floated off from a scarlet fever patient. If so, we seek by scattering them to diminish the probability of infection. Or by active ventilation we may drive them completely away. Or it is possible that we may so neutralize them by some chemical or other action, or so absorb them, as to remove their infectiveness. Or it may be that by a treatment of the person we may place him or the parts of him which come in contact with the air in such a condition as to be refractory to the reception of the floating particle. Practically it is found that free and continuous dilution of the air greatly limits its infectious power. It is probable that this is more than mere dilution or driving away. Where air is actively in motion, it is so brought into contact with infected particles as the more rapidly to change them, so as to deprive them of their power to impart a special disease. At any rate no fact is more fully established than that ventilation is favorable to the limitation of the infective diseases.

There is also demand for disinfection of such air as may not be laden with specific infective particles like those of scarlet fever or small pox, but which nevertheless is befouled by organic matters of various kinds. Such air is greatly prejudicial to health by causing a lowering of vitality or an irritation of important organs, and so often gives rise to consumption, stomach and bowel affections, and to other maladies affecting the whole system. So much is this the case that foul air is believed to be generally the most potent excitant of disease. Mere dust in the air may irritate mechanically, or its conditions of heat and moisture may favorably or unfavorably affect those who breathe

it or are surrounded by it. These however do not come within the remedial agency of disinfection. Neither does odor necessarily demand sanitary disinfection, since all odors are not infectious, and all apparently odorless atmospheres are not the safest. As, however, bad odor is so often a result of the gases of decay it is usually an indication for the use of disinfectants, and the cessation of the odor is an indication that the disinfectant used has been effective. We must not confound the substitution of a new odor with the destruction of a former one. When any article, having no odor of its own, uniformly counteracts foul odors, we may safely value it as a disinfectant.

AIR AS A DISINFECTANT.

Even in so elementary an outline, it is evident that we can never vacate or supersede air as a disinfectant. Air, above and beyond all other things, is the material on which we must rely to purify air. It often needs to be air in perceptible motion, and without draught upon persons, and yet moving at a rate to cause draught. Its condition of heat or moisture will have some bearing on its effectiveness as well as its own condition of purity or impurity when introduced. There is room for plain common sense and thought, as well as for scientific study on the subject.

We do not always purify a room or disinfect its air by opening a window. The direction of the wind, the condition of moisture, the unraised curtain or the distance of some corner in the room may leave the child in its bed breathing a very different atmosphere from that which exists just at the crevice made at the open window. Many a room so needs flushing with air in every corner and crevice that it can only be done when unoccupied. Five minutes of such airing is often a greater disinfectant than a window raised for a day. While it is not in our plan to discuss ventilation, we cannot properly advert to disinfection without an endeavor to impress the availability of air as a disinfectant, and the imperfect method in which it is sometimes applied, even when its general importance is recognized. In some states of the atmosphere, and in some conditions of crowded houses or close rooms, there is such necessity for rapid and general diffusion of new air, in cases of sickness, that we are ever to be on the alert to secure a thorough ventilation. Often there is far more risk

from closeness than from draught. Where there is danger from draught we often get help, but never complete substitution, by the use of disinfectants. When air is warm faster currents can be borne. The value of natural light, too, is not to be lost sight of, since it also aids in the purification of air.

WATER AS A DISINFECTANT.

Water can not be said to have a direct chemical action as a disinfectant. Yet it has an important service to perform. Moisture may so locate infective particles as not to leave them flying about in the air to be readily inbreathed. To this end oiling or wetting the skin in scarlet fever has been recommended as a method of fixing the particles which are shed from the skin in what is called the desquamative process. Water itself, with the air it contains, has some power of oxidizing infective particles. It is chiefly, however, as a promotive of cleanliness that the use of water is advocated for disinfection. Either in solution or suspension it conveys away organic material or promotes those chemical changes, which render them innocuous. Yet it is to be remembered that moisture sometimes seems to promote the infectiveness of particles by dissolving or suspending them so as to be more easily absorbed. If heat is added to moisture, it awakens decay and stirs matter into activity, and so may render it more hurtful.

It is to be borne in mind that constant dampness is not favorable to cleanliness. In hospitals during an epidemic, it is not usual to scrub the ward floors and walls, as water fastens some particles to surfaces, and together with heat, seems to promote their active and deleterious agency. This does not apply to the usual working of households, or to that agency of water by which surfaces can be better cleansed than in any other way; if only for a little time the sick can be removed during the dampness or evaporation incident to the drying process. For the cleanness of the skin, of the clothing and of much of the surrounding material of our homes, there is no substitute for water.

Neither can any system of artificial disinfection take the place of the time-honored house-cleaning so common with good housewives. The thorough cleansing of floors and walls, the overhauling of closets, bureaus and corners must be occasionally

done in this formal inspecting way, while the scrubbing, and wiping, and carpet-shaking and removing into the open air and lime-washing make up a process too important to be superseded. In many cases of sickness, there needs to be the same methods, as applied to rooms, which should be adopted as soon as they can be vacated by the sick. Garments which are often the vehicles of infective particles are best cleansed by shaking in out-door air or by immersion in boiling water.

To those who will not thoroughly cleanse the house, the bed clothing, and furniture and all garments, at stated intervals, frequent movings are blessings in disguise, as they do afford some opportunity for pure air to come in contact with soiled materials.

OZONE.

It is claimed by some that nature has provided in the atmosphere an element in a state ready of appropriation by which disinfection can be secured, and that when not sufficiently found in the atmosphere it can be made available by artificial methods. It may be called an extra atom of free oxygen, a little more ready than the usual oxygen of the atmosphere and holding itself ready to compensate for any defilement of pure air for which its services are desirable. It is defined as three atoms of oxygen, occupying the same space as two atoms of ordinary oxygen, capable of yielding up one atom of oxygen, and yet ordinary oxygen remains. So it is a powerful oxidizer. The exact availability of this agent is not yet fully defined, but it is attracting so much of scientific attention, experiment and hopefulness that we need thus to make reference to it.

SULPHUROUS ACID OR SULPHUROUS ANHYDRIDE.

This substance stands at the present at the head of chemical disinfectants. It is made by burning roll sulphur, which, coming in contact with the moisture or aqueous vapor in the air is changed into sulphurous acid. The vapor thus formed is destructive to insect life and to man himself, if continuing to breathe it for a length of time. It is, therefore, only applicable to the thorough disinfection of ships, rooms or houses from which all persons can be removed. But its great penetration

even into trunks, clothing, etc., and its power of neutralizing the gases of decay and destroying the infective power of atoms, makes it of great and essential service. Although the odor is unpleasant in clothing and other articles subjected to it, this is dissipated by airing.

A house or room is disinfected with it, thus: Close the chimney and all access to the outer air, except the doors for egress. Break in small pieces the sulphur to be used and place it on an iron plate or in a metallic dish or pan, and set this on a pair of tongs or cross-bar over an iron pot in which there is water, or over a large box of sand, so as to avoid any danger of fire from small particles of the burning sulphur. A little alcohol placed in the pan and set on fire, or a few burning coals from the stove, will light the sulphur. A pound and a half of sulphur will be needed for each one thousand cubic feet of air space. Thus a room ten feet wide and ten feet long, and with ceiling ten feet high, $10 \times 10 \times 10 = 1000$, would need this amount; or a room $8 \times 8 \times 8 = 512$, about half as much. So soon as the sulphur begins to ignite the person should leave and close the door tightly. The burning will continue until the sulphur is consumed, which, if the room is properly closed, should mean until the oxygen of the inside air is converted into sulphurous acid. If the room at the start is not below a temperature of fifty, the change is more rapid. It should be kept closed for from four to six hours after the burning has ceased, and then should be well aired four hours before occupancy, but should not be slept in until eight or ten hours after being opened and aired. It will hasten the disappearance of the odor of sulphur to wash the wood-work and cleanse the walls. Although the sulphur process is a little troublesome, yet it is also troublesome to catch disease from an infected building or room. We may improve the air of a room in usual cases by other methods, but we cannot rightly disinfect an infected room with the people in it. Sulphurous acid thus formed, by its pungency, its penetration and its active oxidation is now believed to be of the greatest value for this purpose. The penetration of the sulphurous acid fumes is shown by the fact that test litmus paper, placed under the carpet and between the leaves of books, is turned bright red. It was not found that colored silks or bed and bedding were injured, while feather beds, pillows or clothing, hung up and in

the room, are penetrated with the sulphur fumes. Where there has been a disease like small-pox, or any infection which has shown great virulence, or which is actively transmissible, this mode of cleansing is to be advised. Chlorine gas has been used in the same way, but is no better, and is destructive of metals and colors.

The sulphurous acid fumes, although they will by long continuance effect vegetable colors, attack iron, and be absorbed by cloth, leather, etc., do not seriously injure these in so short a time, unless it might be some very unstable colors of cheap prints.

Chlorinated Soda, Chloride of Lime. As it is very frequently desirable to purify the air of a room, when the sick person, or a family, cannot remove from it, we have, in some of the preparations containing chlorine, articles of much utility for this purpose. It is said that the value of chlorine, as a disinfectant, came to be noticed first by the exemption from cholera of the Lancashire district, where the chlorides were used by the operatives for bleaching purposes. Its value is no longer questioned. It is most available for sanitary uses in two forms.

The *Liquor Sodæ Chlorinatæ*, or *solution of Chlorinated Soda*, is a liquid generally offered in the market under the name of Labarraque's Solution, from the Parisian apothecary who introduced it. It is convenient for washing or bathing, and if of proper strength is a quick and valuable disinfectant. This can only be known by purchasing it from reliable sources. Saucers containing two or three tablespoonfuls should be used until there is no other odor perceptible in the room, and should be replenished as indicated by this criterion. At present prices a pint bottle is worth twenty-five cents.

Chloride of Lime (Calcic hydrochlorite) is cheaper, and valuable for most disinfecting purposes. The lime itself has some value, but in this preparation is chiefly of service as a means of holding, and giving off, chlorine gas, which, being readily liberated, any organic matters are seized upon and changed as to their constituency. Commercial chloride of lime contains from thirty to thirty-five per cent. of chlorine ready to be thus liberated, under proper methods of use. Where it is to be produced in large quantities it should be tested, as it varies in its charge of chlorine, and so in its corrective or disinfecting value. But it is ess

variable than many other preparations, and as put up by reliable dealers in pound packages, at from six to eight cents per pound, is very available. In quantities it can be had at two cents per pound. It is a most excellent disinfectant, and, even in the sick room, can easily be borne in moderate quantity, unless there is special irritation of the breathing apparatus.

Two tablespoonfuls of the dry powder is placed in a saucer here and there, in the room, and just moistened with a little water and stirred with a penholder or small stick. If the atmosphere is already perceptibly bad it is best to moisten it with vinegar and stir briskly, and to add more of the dry powder when the odor lessens. There should be frequent stirring and replenishing of two or three teaspoonfuls each day, enough to keep a slight odor of chlorine perceptible in the room. If left unstirred it becomes encrusted with a carbonate of lime, and the air is not brought into contact with it sufficiently. The nurse soon comes to judge of the amount needed by the odor. When the saucers come to emit much smell of chlorine their contents should be thrown into any place where disinfectants might be of service. The chloride should not be kept in closets among china or steel ware, as it slowly tarnishes and corrodes these. It should also be kept, when not in use, in a dry place, or in a sealed fruit jar. Chloride of lime, either alone or mixed with recently-slacked lime, may, with advantage, be scattered about drains or any places where there are foul smells. In common use the indication of amount can only be measured by frequent repetition, until there is a cessation of the foul odors.

Oxide of calcium or quick lime is that prepared in lime-kilns. When broken in small pieces or recently slaked in its usual preparation for land, or for mortar, or for lime-wash, it is valuable as a disinfectant, both as an absorbent and as neutralizing some of the gases of decay. It may be used in all cases where there is exposed filth, and where a powder can be scattered upon it. It should be freely strewn about, day by day, until all odor is corrected. Since, in large masses of filth, it may hasten the escape of gases faster than it neutralizes them, powdered charcoal or an equal amount of common plaster may be added.

The popular "Calx powder" is made by powdering one bushel of dry, fresh charcoal and two bushels of stone lime and mixing them. Common lime and crushed charcoal may be thus mixed

but are not quite as effective. Ivory black or animal charcoal made from bones, and thus pulverized, presents with the same weight a larger surface than wood-charcoal, and is a more active absorbent.

The value of this and other absorbents is in the fact that they can take up many times their volume of gaseous products.

If, for instance, fresh powdered charcoal is mingled with a liquid or semi-liquid decomposing matter, the gases of decay will be condensed in its pores and rendered inactive until changed. If, instead of being mingled, the charcoal is placed over the mass so that escaping gases have to come in contact with it, a septum is furnished between the decaying mass and ourselves. As it does not act chemically, and we cannot measure the amount of gases emanating from the mass, one chief test must be the removal of odor. Gypsum, or plaster of Paris, dry coal ashes, dried peat, lime and well-dried earth have similar qualities. Not only as absorbing the foul gases, but as absorbing moisture they suspend or take away one of the conditions of putrefaction. It is important to secure for any thing that is foul, air deprived of moisture. There are many house-disinfectants, such as dry, sifted ashes, soot, charcoal and dried earth, which are quite available and well suited for drains, cess pools and out-houses and for all that kind of disinfection which seeks the entire removal of odor.

CARBOLIC ACID.

We do not give as great prominence to the use of carbolic acid as is generally given to it in the catalogue of disinfectants.

To it, undoubtedly, attaches the value of the creosote and coal-tar series, but its value is most difficult of adjustment.

As usually in the market, it is an indefinite mixture of phenol compounds of varied strength and potency. It is difficult to know what proportion is water, as the scent of a small quantity of these crude compounds is exceedingly persistent. The percentage of crystallizable acid is only known when it is ordered in quantities by sanitary officers under test. The public are not likely to get a uniform dilution.

Dr. Endemann, the chemist of the Board of Health, who is still an advocate for its use as an ingredient of disinfecting

fluids for general purposes, in the last report of the New York City Board of Health, speaks of it thus:

"Our ordinary methods of disinfection seem to be fully equal to the demand, yet there are customs which I consider entirely unwarranted, if we compare them with the results of the experiments described. I refer here to the use of carbolic acid for the impregnation of the air in sick rooms. If we should evaporate carbolic acid in the air to such an extent as would be required, the smell would be so strong that no human being could endure it for any length of time. It may therefore be asked why I have not recommended a discontinuance of the system. In answer to this I will state that I consider this homœopathic application of carbolic acid of practical value in so far as its smell, better than posted notices, warns strangers of the danger to which they expose themselves by remaining in an infected atmosphere." Again, he says, "from my statistics of the last six years, I have come to the conclusion that * * * the action of carbolic acid and its preparations has been more than doubtful, unless they were applied in such strength or quantity as is within the limits of the experiments I have cited. This can, however, but rarely be done, on account of the disagreeable and very lasting smell of this substance."

With such views we can hardly see how this chemist can advise a pint of fluid carbolic acid to five gallons of water, or a weak solution of forty to one hundred parts of water to one of fluid carbolic acid for out-of-door use merely "to warn strangers of an infected atmosphere," since it conveys an assurance of false security to those not strangers. If we could be assured of the quality of carbolic acid, a study of the experiments and experience of other authorities leads us to give to it, in common with other coal-tar compounds, some credit as a disinfectant. If it can be had, as prepared by Squibb, of certified strength, it is available, although not so good as some of the articles heretofore mentioned. The boiling of tar in any room where an infective disease exists, is of some service, and secures some of the benefit of the phenol compounds.

Dead oil or heavy oil of coal tar has been extensively used for the same purpose as carbolic acid, because it is cheap. It has in it carbolic acid, naphtha, benzine and the heavy oil of coal-tar, all of which have some antiseptic value. There is now a process

by which the carbolic acid is extracted. For this and other reasons it is of uncertain strength, and should not be purchased by citizens without testing.

Thus far we have desired to confine attention mostly to articles which may need to be used for an infected room or house, or for the immediate vicinage. Next we note *disinfection of the person*. When there is need to use some disinfectant wash for the sick person, two tablespoonfuls of the chlorinated soda, before referred to, in a pint of warm water, is very good. A tablespoonful of chloride of lime in a pint of water, although not so agreeable, will answer the same purpose. A tablespoonful of borax in powder thus dissolved is also cleansing.

Permanganate of potash, which comes in purple crystals and keeps without change, is one of the best disinfectants for the person. It is most convenient for physicians, undertakers, etc., to carry with them for ready use.

A few grains are quickly dissolved in water in the proportion of a drachm to a quart. It is a very rapid oxidizer, of all kinds of organic decay, is odorless, and although colored, does not, in such dilution, cause any stain. An ounce of sulphate of zinc (white vitriol) to a quart of water answers also the same purpose.

DISINFECTION OF SECRETIONS OR DISCHARGES.

It has been quite positively shown that the infective power of cholera, typhoid fever, or other communicable diseases, resides in the discharges, or results from changes taking place in them a few hours after voidance. In scarlet fever, diphtheria, and whooping cough, there is reason to think that the scarf skin, the membrane and the sputa convey infection. It is always wise in sickness to take good care at once of all that separates itself from the patient. There is a sense in which it is correct to say that the person sick and his surroundings are not infective, if only the tidiest care be taken of all the products of the sickness. A breath saturated with antiseptics, a skin impregnated or anointed with deodorants and every excretion cared for limit the possibilities of disease, and make a sick room healthy to a degree not to be substituted by any other methods. It is a safe rule in all sickness to take early care of all discharges of any kind, to receive them into vessels containing a sure disinfectant, or

to at once add it thereto until such time as the discharges can be disposed of. Spittoons and all vessels should be thus cared for. Either one ounce of sulphate of zinc (white vitriol,) or one ounce of sulphate of copper (blue vitriol,) or one half pound of sulphate of iron (green vitriol,) or one ounce of chloride of lime may be put to a quart of water, and either of these used in a quantity about equal to the discharges they are to neutralize.

One half of a fluid ounce of chloride of zinc (butter of zinc, Burnett's solution,) in a quart of water is of similar service. All discharges should be disposed of within a few hours. They should not be thrown in exposed places or in a water closet in common use, if the sickness is of any infectious character. When buried in earth large quantities should not be put in one place, nor the burial be too deep, since the design is to place them where oxidation by the air can take place without too rapid escape of odor, and yet not be so entirely suspended as to collect a mass for future rapid change. If much in quantity any of these disinfecting liquids may be poured on the ground above them or dry absorbents be used. Next in importance is

THE DISINFECTION OF CLOTHING.

As to the bedding and linen used, and the garments worn, by reason of closeness of contact there is often saturation with unhealthy air or secretions. The best disinfection of clothing is by dry heat. In some cities and in many hospitals, hot air chambers have been erected in which infected clothing is hung or spread, and subjected to a heat of about 250° Fah. In Dublin there is a furnace of this kind for refreshing the woolen or outside clothing of the working classes, which, from being long worn without washing, often becomes greatly soiled. We have already referred to similar fumigation by sulphur at less heat. Some good is accomplished if clothing is kept for some time in a hot oven, and so subjected to dry heat, or hung up in smoke houses over a tar or wood fire. When soiled clothing is placed in water, by the soaking, any particles are rendered less transportable and if covered with the water the exclusion from the air is something. But this is not a process destructive of the particles. Such clothing should be boiled before washing. Thus

the heat of water or steam serves much the same purpose as dry heat.

Sometimes it is not convenient to use these means at once. In such cases it is best to place the garments in water to which some disinfectant has been added. Often, too, it is well to add some of these to the water in which the clothes are to be boiled. The Board of Health, of New York City, has recommended that clothing, until ready for boiling or washing, be immersed in water to which there has been added two ounces of sulphate of zinc, or one ounce of carbolic acid to each gallon of water; or a half-pound of sulphate of zinc, alone, may be used to three gallons of water. It will not stain or discolor fabrics. One ounce of chloride of lead, dissolved in a pint of hot water, and then a pailful of water added, into which a handful of common salt has been thrown, serves a similar purpose.

Permanganate of potash, the colored crystals already alluded to, is valuable as a disinfectant of clothing. Condly's Fluid, so well known as a disinfectant, is a mixture of permanganate of potash and soda, although varying often in the proportion of the different permanganates. The permanganate may be used in the proportion of a dram to a quart of water. It has this advantage that, by the color, you can nearly test whether the organic or soiling material contained in the garments you are soaking is neutralized. The solution is to be repeatedly added to the water, with short intervals, so long as it becomes colorless by standing. When a slight discoloration of the water is maintained we know that enough has been used. The clothing may be boiled in the fluid. Parkes recommends two ounces of commercial chloride of lime, one ounce of sulphate of zinc (white vitriol), or one-half of a fluid ounce of chloride of zinc (butter of zinc) to be added to each gallon of the boiling water in which the garments are thrown. As some of these articles are poisons when taken into the stomach, although from their taste not apt to be touched, they should be kept from the reach of children.

The chlorinated soda solution before spoken of is also excellent as an addition to water for purifying clothing. A half pint of Squibb's carbolic acid solution, for common use, added to three gallons of water will do where the odor, which is dissipated in drying, is not objected to.

When any carbolic acid solution is used alone for soaking or in washing clothing it must not be stronger than one part of the fluid acid to sixty parts of water, and as much of vinegar as of the acid should be added that drops of the oil may not injure clothing. The clothing should also be rinsed out in water having washing soda in it. With these precautions it may be used. Articles that cannot be washed and have been well beaten or shaken and aired, may, in some malignant diseases, be still further freshened by sprinkling upon them the sulphate of zinc solution.

DISINFECTION OF HOUSEHOLD ACCUMULATIONS OUTSIDE OF THE HOUSE.

For these the general rule is somewhere outside to have an opening between the sewer and the house by which fresh air can gain access. This opening should not be too near the building, or at least should be so constructed that disinfectants, if necessary, should be so used that any unpleasant odor is quickly neutralized.

Sulphate of iron (copperas) in the proportion of one pound to a gallon of water is among the most valuable and available disinfectants. It may be poured into pans or closets to the amount of a pint twice a day at the cost of one cent, or sprinkled over masses of decomposing matter or filth-sodden ground, until it oxidizes all that might escape to the detriment of health. As the carbolic acid is of some service and the out of door odor not afflictive, a pint of the crude acid of Squibbs stirred into ten gallons of water with the copperas increases its disinfecting properties.

When masses of offal or compost have to be overhauled or removed, the mingling of dry earth, lime, plaster, charcoal or ashes, takes up or neutralizes many of the gases of decay and so counteracts odor and adds to the fertilizing value of the mass.

While it is not always certain that secretions or masses of matter not unpleasant to the senses, are harmless, it is nevertheless true that the nose is a licensed detective, and that repeated use of a disinfectant without odor of its own, until the unpleasant odor of the mass ceases, is an available and reliable guide in most cases.

What is known as Sirel's Compound is easily and very cheaply made and of much service. This is it:

Sulphate of iron (copperas) 40 lbs.

Sulphate of lime (gypsum or plaster of Paris) 50 lbs.

Sulphate of zinc (white vitriol) 7 lbs.

Powdered bone charcoal, 2 lbs. (If common charcoal, 6 lbs.)

It may be scattered over or into decomposing matter or slightly wet and made into balls and so kept ready for use or stirred in water in the proportion of a pound to a gallon of water.

What is known as the "lime and salt mixture," is not only valuable, agriculturally, as an addition to composts but has valuable disinfectant and deodorant properties. It is prepared by adding one bushel of salt to three bushels of fresh slaked lime, and frequently stirring the mixture under cover until it absorbs sufficient moisture to be slightly adherent when dry earth may be mixed with it to a small amount, and the whole scattered when needed.

Another mode of preparing it is to pour a saturated solution of salt water upon unslaked lime in the proportion of one bushel of salt to three of lime. Stir it every day for a week under cover. In this process the chlorine of the salt unites with the lime, and a chloride of lime is formed. This is a ready and valuable mode of preparation. The compound may be freely scattered in cellars or about outbuildings. It is inexpensive, and when thrown on heaps of compost has a fertilizing value which pays for it.

There are other articles which act as disinfectants, but the list already given affords sufficient variety and presents those which are cheapest and most efficient. There is little need to resort to any of the patented preparations since the real efficiency of these is not easily tested.

A good disinfectant either has in it oxygen, which it readily gives up to organic matter undergoing decomposition, and so renders it harmless, as do the various metallic substances we have named, or like charcoal, dry earth, etc., can act as an absorbent of the gases of decay, or like lime, while hastening the processes of decomposition, when in immediate contact, also breaks up ammoniacal products, or disposes of them. As some of these

articles act doubly we cannot accurately classify them, but thus associate them as in one way or another dealing with decomposition and its products, so as to render them less perilous to health. From the variety given anyone, either for home or public use, may easily select a good disinfectant. Chlorine, carbolic acid and the permanganate salts, if used together, interfere with each other. As to several of the articles we have named there are differences of preference which are more those of taste and habit than difference in their value. We believe that with the proper use of air, water and cleanliness, and resort to these when indicated, very much sickness can be prevented, and the risk from infectious diseases and bad air greatly diminished.

Herewith, for permanency of reference, we append the circular which the Board of Health issued last July, on the care and disinfection of houses, cities, &c., as embodying the principal facts and directions needed for guidance in the use of the various articles we have considered.

CIRCULAR
OF
NEW JERSEY STATE BOARD OF HEALTH

TO HOUSEHOLDERS, CITY AUTHORITIES, BOARDS OF HEALTH, ETC.

I. *Look to the Condition of your House.*—Begin at the cellar or basement. Have nothing there that can decay, or that causes foul odors. If damp, let in air or sunlight, or drain the surroundings if needed. If by cleansing, by whitewash or by repeated airing there is not agreeable air, speedily use some of the disinfectants recommended.

II. *Look to the Kitchen.*—Let all sinks be kept sweet by scrubbing—by hot water poured down each day, or by use of disinfectants if needed. If outside there is an opening to the air, so that the kitchen sink is not the chief air outlet to a cesspool or sewer, so much the better. Be careful that all slops or offal from the kitchen or laundry work is soon conveyed away, or disinfected at once, and not made to become a part of any heap or mass of impure matter. Cleanness cannot come out of uncleanness. Such things rapidly vitiate air, and discomfort, sickness or death result. Dirty water of any kind is even worse than dry filth. Secure cleanliness if you would secure health.

III. *Have the Dwelling and Sleeping Rooms well aired each day.*—Closed closets, unshaken bed clothing, windows open and curtains down, will not secure rooms fit to live in, or sleep in. *Flush* the room with air and let this, with sweeping and dusting, remove the organic particles which otherwise constantly accumulate and cause foulness. Chamber slops and wash water are very innocent if cared for within six hours, but soon after decompose, and in sickness or very hot weather, sometimes sooner. If there are water closets or stationary wash basins in your house, be sure

that they are not the foul air inlets to outside cesspools or sewers. Have good traps, good outside ventilation, good caution as to smells and use disinfectants for temporary purposes until you can remedy radical defects. Look to unoccupied rooms and the attic so that all may be dried and well aired, and that you may secure as much coolness and ventilation above you as possible, and not have an unventilated hot air chamber near the roof.

IV. *Know as far as you can that your Water and Ice Supply is Pure.*—Use no water from wells where surface soil is foul or where organic matter can reach, or from cisterns exposed to foul air, as water will absorb foulness. If the water has any odor while heating in a glass tube, or if it becomes turbid or emits odor on being shaken after being kept a day in a long glass bottle, half full and corked, at once suspect it. If you must use it, have it boiled, and when cool, air it by pouring from one pitcher to another, and use it thus until you can be satisfied as to the purity.—See in full our First Annual Report, pages 83-4.

V. *See that the Food Supplied for your Family is in proper condition before cooking, and that it is prepared in a wholesome way.*

VI. *Look to the Out Door Part of your Home and see that it is kept in Proper Order—that no waste water or decomposing matters are thrown upon it.*

If there is a cesspool it must not smell where it is disconnected with the house or has access to the air. If it does, it must be disinfected until radical change can be made. If there is an ordinary out door privy have free access of air to it, and exclusion of all slop or rain water from it. If there is odor from it use odorless disinfectants until it is corrected. If too foul for use cover it over with "calx powder," and have under the seats some receptacle, such as the patent pail, or a half barrel or tub, which can be frequently removed and alternately replaced by another. A privy built above ground, with water-tight receptacle, by the use of dry earth, powdered wood charcoal, dry sifted ashes and occasional copperas water, is easily kept neat and clean, if cleansed each spring and fall.

Country homes need inspection and circumspection. Their sanitary care is often greatly neglected by nice people.

VII. *Insist that your town, if you live in one, have thorough sanitary inspection.* Where persons are housed closely to each other there cannot but be evils from which the community has a right to be protected, and yet from which each one cannot protect himself. There will be householders who, from thoughtlessness, ignorance or poverty, do not secure for themselves or for others the needed sanitary conditions. Charity, the public welfare, and the necessary incidents of city life require regulated and definite provisions against all those nuisances which imperil the life and health of the populace.

Insist upon systematic prevention, instead of waiting for that loss which disease always involves when it is artificial or when we are compelled to meet an epidemic hurriedly.

If your authorities do not act, move by voluntary associations, which shall exhibit the facts and so compel action.

There is no waste so great as that of preventible disease, which disables not only the sufferers, but puts a tax on labor, capital and life much more direful than a well directed expenditure to prevent it. Epidemics are to be dreaded, but our greatest losses are from a chronic death and sickness rate which has a permanent base of supply in prevalent unsanitary conditions, not prevented, not remedied as they should be and can be. Public health is common wealth. Can you not do something to reduce the tax levy which forced diseases impose upon the citizens of your city, township and State? To the degree that sickness or invalidism is unnecessary, it means hard times and ill-content. Every motive of comfort and interest requires that we plan to prevent all those ailments which are within the range and duty of our control.

DISINFECTANTS, AND HOW TO USE THEM.

Drafts of air for all floating foulness;

Dry rubbing for all easily detached foulness;

Wiping and water scrubbing for all attached foulness in most cases admit of no effective substitution.

Submersion in boiling water is applicable to the cleansing of all garments, utensils, &c., admitting of such a method; and dry boiling heat or freezing cold will also neutralize infective particles.

To disinfect a room, ship or building so needing disinfection that its contents and surfaces cannot be easily dealt with singly: Close the room or building, its windows, doors and chimneys so as to exclude the outer air as far as possible. Vacate the house. Break roll sulphur in small pieces, place it in each room on an iron plate or metallic dish, and set this on a pair of tongs or other cross bar over an iron pot in which there is water, or over a large box of sand, so as to avoid danger of fire from small particles of burning sulphur. Light it by a few hot coals or some alcohol poured around the sulphur and lighted. Then leave and shut the door after you. A pound and a half of sulphur is sufficient for 1,000 cubic feet of space. The sulphur will convert all the oxygen of the air into sulphurous acid, and all organic particles are likely to be changed. Keep closed six hours after the burning has ceased, and then air well four hours before occupying. Clothing and bedding needing disinfection may be hung on lines and left in the room. Most furniture is not permanently injured, but needs dry wiping and then washing off afterward.

CHLORIDE OF LIME.

A valuable disinfectant, chiefly because it contains from thirty to thirty-five per cent. of chloride, which is liberated under proper methods of use. If purchased for cities, it should be tested as to the amount. It is not overrated as a disinfectant if only its quality is known and its mode of use is judicious.

It needs slight moistening, frequent stirring, and sometimes the addition of an acid, as vinegar or common spirits of salt. The test of its efficiency is that the odor of it be kept constantly perceptible.

CHLORINATED SODA.

Usually known as Labarraque's solution, is a convenient liquid preparation valuable for use in saucers in the sick room or in utensils. Its odor should be perceptible to strangers entering. Directions are given on the bottle.

LIME—PLASTER—CHARCOAL—DRY EARTH—SIFTED ASHES.

All these have value, chiefly to be tested by the rapidity with which they correct odors. Fresh slaked lime should be scattered

in all places of foul odor. It or charcoal or plaster may be scattered over heaps emitting foul odors. Calx powder is made by pounding one bushel of dry fresh charcoal and two bushels of stone lime and mixing them, and is of great practical use.

All these substances absorb foul gases and dry up moisture, and so help to retard decomposition, or else absorb its results. Where lump charcoal is used it may be refitted for use by reheating it.

Quick lime and ground plaster should not be used where they may be washed into pipes and form lime soap or obstruct by hardening.

THE METALLIC DISINFECTANTS.

Sulphate of iron (copperas or green vitriol), two pounds to a gallon of water, to be sprinkled freely in drains, cess pools, privy closets, soiled vessels or on heaps of decaying matter, which cannot be removed at once. One-half of the strength will do where it is to stand in contact with surfaces or in spittoons, water closets, house-vessels or vaults.

One-half pound of sulphate of iron (green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sulphate of copper (blue vitriol), or one ounce of chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water—any one of these is available for neutralizing discharges or for sinks, used in quantities sufficient to cover the bulk they are intended to disinfect.

Soiled garments may be put to soak in a half pound of sulphate of zinc (white vitriol), to three gallons of water. It will not stain or discolor most fabrics. One ounce of chloride of lead dissolved in a pint of hot water and then a pailful of water added into which a handful of common salt has been thrown, serves a similar purpose. Also a half ounce of permanganate of potash to a gallon of water.

For washing, soiled garments should be put in boiling water, unless the character of the fabric forbids it. Powdered borax one quarter of a pound to a gallon of water, is a good cleanser of clothing. Soiled hair, brushes, etc., are cleansed by it. Chloride of zinc, one quarter of a pound to a gallon of water, does not stain or discolor fabrics.

Parkes recommends two ounces of chloride of lime, or one ounce of sulphate of zinc, or one-half of a fluid ounce of chloride of zinc, to be added to each gallon of the boiling water in which the garments are thrown. On clothing that cannot be washed and does not need to be burned, after thorough shaking and airing the sulphate of zinc or chloride of zinc solution may be sprinkled.

For general disinfection the following compound is available and valuable, and far better than most of the patented articles offered:

Sulphate of iron (copperas), forty pounds.
Sulphate of lime (gypsum or plaster), fifty pounds.
Sulphate of zinc (white vitriol), seven pounds.
Powdered charcoal, two pounds. (If common charcoal, six pounds.)

Mix well and scatter dry or wet it in small quantities and make into balls ready for use. Where liquid is needed, stir in water in the proportion of a pound of the powder or ball to a gallon of water, and sprinkle where needed.

Carbolic Acid is valuable as an out-door disinfectant, to be added to the sulphate of iron solution or used separately. Because of its own odor we cannot well test its effect in correcting other smells. We would test specimens or use only Squibb's Liquid, No. 1, because sure of its strength to be diluted by adding from fifty to one hundred parts of water, according to the mode of its employment. It is seldom required if the other articles named are properly used. Carbolic acid and chloride of lime must not be used together.

Remember that we do not know that any chemical disinfectants destroy the germs of a disease.

They only neutralize or suspend the action of those artificial disease producers or fertilizers which the bad administration of cities or householders, or interference with natural laws or neglect of cleanliness has provided. We are to rely on these palliatives or correctives only while we are preparing for radical methods of prevention.

N. B.—The only reason why the death rate of your city or your township is over 15 to the 1000, or why the sickness and

invalid rate is a large multiple of this, is because you are the victims of nuisances which admit of abatement.

PRESENT WHOLESALE PRICES OF DISINFECTANTS.

Sulphate of Iron (copperas, Green Vitriol), 1½ cents per pound.

Sulphate of Copper (Blue Vitriol), 6 cents per pound.

Sulphate of Zinc (White Vitriol), 4½ cents.

Chloride of Lime (in bulk), 2 cents per pound; in packages 6 cents.

Sulphur Roll, 2½ cents per pound.

Carbolic Acid (No. 1 Squibbs), 30 cents per pound.

Zinc and Carbolic Acid, disinfectant of N. Y. Board of Health 40 cents per gallon.

Permanganate Crystals, \$1.10 per pound.

50 per cent. solution Chloride of Zinc, 25 cents per pound.

Solution of Chlorinated Soda (Labarraque's), 10 cents a pound.

METEOROLOGY AS AN AID TO THE PHYSICIAN.

BY PROF. C. F. BRACKETT.

There can be no doubt as to the value of a system of knowledge which should enable us to forecast the weather for a considerable time. The gain to those pursuing agriculture and other industries on land would be incalculable, while the safety of the mariner would practically be measured by his intelligence and care.

The very maintenance of life itself is in the nature of a contest, to which the ever-changing processes of nature, which constitute what we call climate on the one hand, and the more circumscribed, but not less complex, activities of the organism on the other, are parties. The successful issue of such a contest must turn on the skill with which it is conducted. It may be readily admitted that there is a vast amount of experience in the race which has not been formulated in language—which, indeed, no words could embody—common alike to men and animals, which enables a goodly number to win; and yet, it must be confessed that the failure of the vast hosts that fall out by the way, is a subject for very serious study.

Life having to do with surroundings whose elements are, in general, earth, water and air, it must be greatly to our advantage to be able, from the past and present, to infer the future. And as the value of such ability is to the mariner greater, when exposed to greater dangers from scantiness of food or fuel, so to the invalid it increases in importance when the necessity of extreme care and economy are upon him in respect to health.

The physician, as his guide, should be able to offer him all the aid attainable in anticipating and accommodating himself to the external conditions as they may arise, as well as to prescribe proper diet and medicines. In short, no treatment can be rational and judicious which ignores climate and climatic

changes. No doubt the great father of medicine wrote more wisely than even he knew when he said, "Whoever wishes to investigate medicine properly should proceed thus: In the first place to consider the seasons of the year and what effect each of them produces. * * * Then the winds, the hot and the cold, especially, such as are common to all countries; and then such as are peculiar to each locality." Then, after speaking of water and surface features, he goes on to say, "From these things he must proceed to investigate everything else. For if one knows all these things well, or, at least, most of them, he cannot miss knowing, when he comes into a strange city, either the diseases peculiar to the place, or the particular nature of common diseases, * * * and, if it should be thought that these things belong rather to meteorology, it will be admitted, on second thoughts, that astronomy (used for meteorology) conduces not a little, but a very great deal, indeed, to medicine."

If such views prevailed in the days of Hippocrates, they are with reason even more important now, when the real significance of physical phenomena may be ascertained with far greater certainty than was possible in his time.

If it be the proper business of the physician to conduct his fellow-man in the ways of health, as well as to bring him back when once he has lost them, he, surely, must not be wandering in doubt himself. He must know man not merely as a machine, but must rightly apprehend the relations existing between all that goes to make up man and his surroundings. He can be content with nothing less if he would vindicate his claim to his somewhat exalted title.

In respect to soils and waters the attainment of such knowledge is not so inherently difficult, for they may be taken, and, by proper analysis, be made to disclose their sources and their injurious elements, and so they may be avoided, while it still remains true that "the wind bloweth where it listeth."

It is the object of this paper to point out some of the difficulties pertaining to the study of meteorology, as well as some of the results already attained, having specially in view the bearing of the whole on the proper work of the medical practitioner.

Meteorology properly embraces the study of atmospheric phenomena resulting in connection with the physical properties and configurations of the earth in what we call climate and weather.

The atmosphere presents a pretty uniform mixture of elementary and compound gases and vapors, whose proportions are, on the whole, very constant, and are known with considerable accuracy. Many careful analyses have shown that nitrogen constitutes about 79.2 and oxygen about 20.8 parts of its volume. In addition, other constituents are vapor of water in variable proportions—carbonic dioxide, ammonia, ozone, compounds of nitrogen and oxygen—organic matters due to decomposition, traces of volatile matters derived from many solid substances.

It may, perhaps, aid us in our task if we imagine the atmosphere free from storms and winds, so as to be quite at rest, so far as can be observed by its mechanical effects, and at the same time the earth to present no irregularities of surface. There would still remain the weight of the atmosphere, to which every being on the earth must be subject. If the air were of uniform density throughout, its height would be about five miles. If it were compressed so as to be as dense as water, its height would be about thirty-three feet. If it were further compressed, till its density equalled that of mercury, it would be only about thirty inches. We should best realize the weight of the atmosphere, perhaps, by computing that of an ocean of mercury enclosing the earth, thirty inches in depth.

Under the conditions supposed there would be no respite from the steady, unvarying pressure which we may well believe would speedily bring all life, as we now know it, to an end. But suppose it otherwise, and that life could exist and prosper, would it be true that the air would be completely inactive?

The dynamical theory of gases now doubtless satisfactorily established, affirms that every individual molecule of gas is in a state of most violent and unceasing activity, the mean velocity of the molecule being in the case of oxygen, about one-quarter of a mile in a second; that of nitrogen being somewhat greater. In consequence of this activity, it is clear that we might expect great uniformity of mixture in the atmosphere, even if the mass of it were apparently at rest.

Let, now, the earth's surface assume its present configuration. Plainly some variety in respect to pressure might be secured by choice of residence, those in the valleys having the greater, and those on the heights the less.

The practitioner, in such a world, would, no doubt, wisely send his patient dwelling in the lowlands, suffering from pulmonary insufficiency, up among the mountains, and so apply his knowledge of the laws of fluid pressure to effect a cure.

Under the conditions supposed it is clear that our chief reliance for an unvitiated atmosphere must be on the diffusive action of its constituent gases, resulting from their great activities. Slow oxidation, no doubt, would proceed as now, only much more slowly. In short, we should have on a grand scale the same conditions as prevail at present wherever the air is restricted in its circulation, whether from natural or artificial causes, at least so far as the question of purification is concerned.

Let us now consider some of the causes, external to the earth, which are continually acting so as to render the state of things just supposed, impossible, by setting up movements of most tremendous energy and extent. The principal of these is the sun, our great source of heat and light.

If we have recourse to our former suppositions, imagining the earth free from all irregularities of surface, it might, perhaps, seem possible, from what we know of the laws governing the motions of solids and fluids, to calculate, from data which observation might secure, the principal phenomena which would present, day by day, and thus we might be able to predict those changes in the weather which it so much concerns us to know, provided we might assume the sun to be constant in his action.

But we know that his action is not constant, hence, before we could go on with the solution of our problem, we must investigate the laws of solar activity. We may consider as known all those changes of our earth's position, with respect to the sun which astronomy has pointed out and made familiar. Something, too, is known respecting periods of maximum and minimum activity of the solar surface, but a vast deal remains yet unknown, and we shall require the continued and regular employment of every appliance that can qualitatively detect or quantitatively measure the intensity not only of activities which are now known to exist, but also of those which further inquiry is sure to disclose. The camera has but just commenced its important work, it would seem, for new processes in photography are just coming forward of sensitiveness heretofore un-

imagined, while it is still true that the older and well-known methods have never been worked to any extent proportionate to their capabilities. The spectroscope, the heliometer, the magnet and the telescope even have much more to say than they have uttered thus far, while new and undreamed-of instruments will be needed in the immediate future to prosecute inquiries already proposed.

But even if we had catalogued and measured the solar activities in all their varying intensities, there would still remain the grand integrals of stellar influences which we might not neglect, though placed so far remote.

Suppose all these studies completed. We should thus know the agents which, acting in conjunction with terrestrial conditions, produce those effects which constitute the climates we would know and the weather we would foresee.

Let us now enumerate some of the factors entering into the problem which result from the configuration of the earth's surface. These are the complex continental and oceanic outlines, the interspersions of islands in the seas and of lakes in the lands; the disposing of mountain chains to interrupt or change the direction of wind and to condense the moisture they bear; the courses of the valleys determining those of the rivers; similar features of the ocean bed determining the extent and direction of ocean currents; the character of the soil in respect to radiation and absorption of heat; the nature and extent of vegetation, etc.

Now, after fixing the exact boundaries and relations of all these features, we might suppose ourselves ready to proceed; but we should find that, meantime, the whole had been undergoing changes such as vitiate our record, even supposing that its original complexity did not defy our utmost resources of expression.

If it were otherwise, and we had at last come to the final effort of deducing the future from the present and past, we should have now no problem in statics, but, instead, an exceedingly difficult one in dynamics. We must study a tremendous engine in action, in which the regular cycles of our theoretical engines are absent, or at least not readily apparent. From every stroke there results a new condition, making it difficult to say what the next shall be. It would seem, in view of what has now been

presented, that the time for the deductive treatment of weather problems has not yet arrived.

Let us now see how the case stands, viewed from another point:

All the world knows that in spite of the discouraging picture above presented, weather-charts and storm-warnings, often of surprising accuracy, are sent out from governmental centres at home and abroad, and are in daily use in arranging plans for business or pleasure by thousands.

The telegraph, as a means of rapidly collecting facts respecting atmospheric conditions from widely distant points, has rendered this possible. A country of great extent like ours is evidently favorable to success in such an undertaking, yet we are very far from having realized all that is possible.

The discussion of data daily collected and the comparison of the results with the subsequent history of storms have overthrown many views that were formerly believed to be too obvious to admit of doubt, and have established some generalizations that were recently in doubt.

On the whole, however, there is progress which we may expect to be more rapid in the future, since now hardly a civilized people exists that does not recognize the immense importance of such studies and contribute to further them by an active co-operation.

When once the whole earth is encircled by telegraph lines by which observers stationed at important points all about it, shall report the facts they observe at the same physical instant, it will, perhaps, be easy to say not merely twenty-four hours in advance, but several days, what and how violent changes in the weather may next be expected.

Such results would approach very closely to a solution of our problem; but the process employed, let it be noted, is entirely different from that which we at first supposed to be employed.

It must still remain true, after all is done that may be to forecast the weather, that only general laws which govern movements of great extent can be detected.

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 in

any way contribute to the end in view. Instrumental observations carefully and continuously made, may, in connection with the daily bulletins issued by the Signal Service, lead to provisions that shall seldom fail to be of substantial accuracy. But here let us insist that to be of real value, observations *must* be made in a continuous manner almost from hour to hour, whether we record the changes apparent in our instruments, or those going on the effects of which are visible in the clouds.

Respecting the proper choice of instruments and installing them in their places, it is not needful that anything here be said, since whatever is done should be so done as to conform to the uniform practice of those having the direction of an extensive service in charge, in order to uniformity of results under like conditions.

No one will wisely reject, without examination, the weather wisdom professed by those who lay no claim to scientific training, but whose acute observation and native shrewdness have enabled them to put their results into short pithy sayings, often apparently absurd, but still frequently verified. "In summer the showers follow the rivers," may serve for an example. The explanation is not far to seek. Many maxims of a similar character may be gathered in every region that has been long inhabited, and it is a curious and profitable study to unravel the reasons for many of them, as well as to show the unreliable character of others. It would be found that the unobserving stranger, who migrates to a new locality, brings the opinions respecting the weather, as well as respecting everything else, that prevailed in his former home, but which may not be at all applicable in the now changed conditions; hence, a vast amount of nonsense is everywhere to be found.

It would be quite superfluous to point out in detail the bearing of accurate weather provisions on the public health, for the advantages of such knowledge is so obvious that practitioners and patients alike have long desired it.

Indeed, the whole catalogue of means at the disposal of the physician may be arranged under the heads of *circumfusa*, *ingesta* and *medicamenta*, of which the last is by far of least importance. It would not always be the part of wisdom for an invalid to journey far and endure the consequent fatigue when he failed to take proper advantage of the climate at home. This

can be more certainly done, the more completely the character of the climate is studied.

The physician, then, should study the climate and the weather of the place in which he is to practice his art, as completely and as persistently as he studies the cases of his patients. Indeed they are not to be separated, for a sudden change that a day may bring, not unfrequently decides a case by closing it against all further inquiry.

If the attention of physicians could be drawn to this subject in such a manner that they should not only make it a matter of careful and constant study, but as a fraternity of learned men, should insist that a good knowledge of it should be required of all who seek admission to their ranks, we should have reason to hope for most excellent results in the immediate future. A careful training in the principles of chemistry is considered essential to the discipline and preparation of a physician, and rightly, but it must be admitted that such a knowledge of physics as shall enable him to observe properly the changes going on in the atmosphere, and to conduct researches likely to enable him to turn them to good account, is not less important.

Let all who would possess themselves of even the knowledge that is now to be secured, dismiss every hope that it is to be found by any such course of inquiry as that which we have shown, must, in the nature of the case, present insuperable difficulties. The only hopeful method is that which puts under contribution facts collected from the widest areas as well as those of merely local importance—and judiciously applies the best methods of discussion and interpretation.

Fortunately, there are now many helps to which one may refer with confidence.

PRINCETON, December, 1879.

LETTER

PRESENTED TO THE LEGISLATIVE COMMISSION ON THE GOVERNMENT OF
TOWNS BY THE STATE BOARD OF HEALTH.

On behalf of the State Board of Health, by your kind invitation we beg to present to the honorable Commission on the Government of Towns a few suggestions as to the sanitary administration of municipalities, and how far this should come under the regulation of general or State law.

We do not at present need to discuss in extenso the importance of recognizing sanitary enactments as a vital and integral requisite for each State. You will recall that even the common law of Blackstone's period speaks of the "fourth species of offences more especially affecting the commonwealth, as such as are against the public health of the nation." "A concern," says he, "of the highest importance, for the preservation of which there are in many counties special magistrates or curators appointed."

While every county of the State is subject to some insanitary influences which need surveillance and abatement, experience has shown that it is in cities especially that we are apt to find that aggregation of evils which largely tells upon the health and life of the population. Statistics carefully tabulated have fully justified the statement of the Registrar-General of England that "human life is shorter by almost one-half in cities than in the country, so that with much truth great cities have been called the graves of mankind." This is really but a way of illustrating that disease and death in practical experience are largely artificial. In a general and casual knowledge of sickness and death, without comparative statements, we are not made aware how much the conditions of life are affected by this aggregation.

The death rate per thousand of living people fluctuates from thirteen to forty, fifty or sixty per one thousand in different places, the fluctuations being very largely chargeable to the local, the domestic, and the associate conditions of population. Large numbers of comparisons, extended through many years, have shown how uniformly the larger rates attach to cities, and especially to those in which there is no effective sanitary oversight.

Similar tabulations have also shown conclusively how in most cities a higher death rate than in the country is uniformly maintained, without the agency of special epidemics, and how this can be uniformly reduced by the intervention of sanitary enactment and enforcement.

In the thirty-eighth annual report (1875) of the vital statistics of England and Wales, may be found tables showing the annual rate of mortality per one thousand in town and country districts in the twenty-nine previous years. The contrast is most significant as to the tendency of cities to multiply disease far beyond the natural average. In the thirty-seventh report comparisons are made of thirteen districts as showing what sanitary administration can accomplish for massed populations. The result is thousands of saved lives, which it is also to be remembered represents still more advantage in the saved health and diminished sickness for the living which such figures always indicate.

It were well if statesmen and civilians would come more fully to realize the dependency of effective citizenship and State development upon a provident care of the public health. It is deceptive to talk of our *material resources* and forget that there is no resource so powerful or the case of which is so urgent as that of population. The time too has come when we need to deal more with the causes of enfeeblement, degradation and loss, and not so much confine our Legislation to compensation for consequences.

As dwellers in cities are so much more largely exposed to insanitary conditions New Jersey has especial need for wise foresight. Not only does modern civilization incline to mass the population in cities, but the peculiar relations of our State to adjacent cities and to tide water will ever incline our people to aggregation in great centres. Our fifty cities already represent in a very small comparative area the majority of our citizens. They must be studied as to the conditions of progress.

Protection from avoidable causes of sickness and death means provision for prosperity as much as do care and direction of our industries.

The rapid growth of towns, the influx of immigration, the insanitary condition always incident to the arrival of those of varied nationalities into close vicinage, the introduction of machinery and the consequent increase of close in-door labor in so many departments of industry, the modern system of in-dwelling conveniences, and various other potent and confirmed artificialities, compel us to guard more than did our fathers, against associate evils, and to remedy consequences already cumulative and apparent.

Sanitary provision as a law of compensation is so far demanded, that, *if not* made, a lowering of natural vigor, a larger aggregate of sickness and untimely death are the inevitable results.

Modern sanitary knowledge has become so much more definite and exact, both as a science and an administrative art, that it does not hesitate to point out evils with precision, and to indicate confirmed methods of limitation or abatement. Students of the conditions of physical life and those who are now, by thousands, engaged in the active practical application of sanitary knowledge, are constantly deploring how far short are the actual means used of the methods approved and available. Life, health and the welfare of population are within the reach and the duty of our control, if only the art of oversight is applied within the limits which strictly belong to the material interests of such a social compact as the State is.

The sanitarian runs no risk of discomfiture, if he takes his stand within the closest limits of social science and political economy, and pleads for legal jurisdiction solely on such grounds as pertain to the resources of the State and the social welfare of its citizens. Deliverances from the civic burdens and penalties of sickness, shortened life, and from the entailments of poverty, asylums and prisons are largely within such an estimate.

By a fundamental and organic law such an interest as this falls under legislative and judicial advisement to a degree which commends itself in theory, but yet which in practice has thus far been very inadequate.

In England the most definite early modern movement for sanitary jurisdiction was a direct outcome of social and economical interests. The report of "The Commission on the health of Towns," led to the bill of Lord Morpeth "for improving the health of towns in England," which became a law in 1848. When it was found that in some cities of England the death-rate was continuously over twice as great as in some country localities, and that large towns varied among themselves from twenty-one per thousand to thirty-eight per thousand, it was regarded as not only a local or town interest, but a national interest to look after the causes of such sustained variations in the health condition of localities. Ever since it has been found profitable by the English Government, as it has been by the French, the Swiss, the Swedish and the German, to follow up this method of public care until no department of national concern rests on a surer basis or meets with a more public approval than that of the health service. It is from such considerations that we desire to urge upon this Commission, for the government of towns the interest as one so vital to the whole State as in some leading outlines needing defined State provision. In the conferment of chartered rights, the State should see to it that the welfare of her great municipalities is not compromised and that city governments shall not imperil the welfare of our citizens.

As a result of a close analysis of English statistics and of towns as compared with the country the English report says: "The juxtaposition of the figures in the tables suggests the melancholy reflection that more than seven millions of people inhabiting the metropolis, and all the cities and great centres of industry, are 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 churchyards, the houses, emit poisons. To every ten natural deaths, four violent deaths i. e. deaths from these poisonous exhalations are superadded." The same kinds of ratio are still occurring, and are to be guarded against by the State in its authorizations of massed communities with vested privileges. We might almost rely upon the admission which this view has received abroad, and quote in detail the uniform and progressive interest which has been manifested, as shown by the degree to which

local legislation has itself sought or approved of general enactments.

But as in our system of government more is left to local authorities than is usual in those of a more consolidated character, we need to determine whether this belongs to the large class of interests which, not less than in other nationalities, should be conceded to belong to the State government.

Even here we may at first urge the large example of Massachusetts and Michigan in their general health enactments, and still more the recent act of the National Government, in which after a debate neither partisan nor sectional, a large majority from different constituencies has been commanded in favor of the recognition of public health, as in prominent respects so much a national concern as not to be left to local jurisdiction, even of States alone. It is thus authenticated as a constitutional principle that the interests of public health are so imminent and vital that the general government must, by general act, see to it that it either exercise its national jurisdiction or require that the same shall be exercised by local authorities.

When we come to deal with the still more intimate and common interests of the citizens of one State, it is still more apparent that closer vicinage and harmony of interests require that the public health should be carefully secured by general enactment in all those regards in which the danger of jeopardy to the bodily and social welfare of our people, is greater than any assumed risk which might arise from hypothetical infringement upon the prerogative of towns by the exercise of the higher authority of the State.

Questions of health and physical welfare are in many points allied to those of education. General and regulative laws must be enacted by the State while the enforcement and the extension to details may rightly be left to each city.

Unless there are some such general enactments, it has been a uniform experience that strange neglects occur. While some corporations are informed and faithful, others, by their laxity, involve not only their own municipality, but their neighbors, in the results of their indifference or ignorance. Where peril from such neglect is so universal and so aggressive in its results to the State, and where from the fact of a want of co-ordination of action in the whole, there is necessary defect in the action of

a part, it behooves the State to exercise its regulative and co-ordinating power. These interests are so vital to all citizens that they cannot be left to smaller communities alone. They are too far-reaching to be disposed of as if they were merely local matters.

The State, in the formation of a municipality, accords to it not a few special privileges, and confines to it large rights of local jurisdiction. In such bestowal of powers it is not too much for the State to reserve to itself the right to secure for its own citizens such over-sight of the health and life as is the equal right of all, or the care of which, in some definite form, must at least be enforced upon the local authorities.

We may not leave such a universal social interest any more than we may leave the principle of education or of law, to be entirely subject to the enactment or oversight of local powers. Often where it is unwise for general law or State authority itself to undertake the administration, it is wise to designate what is due to be enforced by local authorities in a common interest, and to see to it that local power is dispensed in accord therewith.

With these views as thus presented, we beg now to designate particulars in which our Board would respectfully suggest to your honorable commission that there is need on the part of the State of general health requisition for towns.

1. We submit that every incorporation should be required to have a Board of Health, which shall make a written report each year, or as much oftener as any city may direct, and that copies of the annual report shall be sent to the State Board of Health. The interests of each city and of the whole State are so related that no just estimate of localities, of their defects and of the relative healthfulness and peculiar local causes of disease can be fully made unless there is a comparison of one part with another. While the whole area is important, this comparison naturally begins with cities as representing our most exposed population. The State, by its Board of Health, seeks to bring together series of facts and to make such deductions as can only be made by comparisons, and such as have been found greatly to aid local administration. A Board of Health, therefore, not merely nominal, but one which, by its reports, shall show what is being done to protect the health of the citizens of New Jersey needs accurate statements from all our cities, and such

uniformity as to general health regulations as are requisite to the welfare of the whole State.

2. We submit that all cities of over ten thousand inhabitants should by law be provided with one or more sanitary inspectors. The experience of all English cities, and especially of cities of our own country, has shown that the evils of close city life are such as to need that kind of watchfulness afforded by inspection as a system. When this is left to a police force it is recognized as a duty entirely different from that for which a police force is created, and it comes in as so incidental and special as never to be well reached in large cities by this plan. Sanitary inspection is of itself a distinct service. It requires some special knowledge of proper health conditions, a careful inquiry into departures therefrom, and a knowledge of the most efficient methods of relief and executive ability in the carrying out of details. We have known of cases in which one or more efficient inspectors of this character have been able most economically and efficiently to accomplish more for the health of our citizens than a whole police force. The State should see to it that our larger cities be more uniform in this kind of supervision.

3. It should be made the duty of the Common Council of each city through its Health Board, Health Physician, City Clerks, Assessors or Inspectors to have definite oversight of vital statistics; to inquire into neglects, and thus actively to aid in such measures as shall secure accurate returns. So important is a correctness in a general census conceived to be that our National Government and our State authority alike secure this as a part of their jurisdiction of the citizen. In no item is it so important as in that which relates to the social conditions, increase and decrease by death and sickness of the number and origin of the population.

It is now recognized that accurate returns of such statistics are indispensable to a full and accurate study of those preventable diseases which are now known to occasion over one-third of all deaths, and to add so enormously to popular invalidism. The average city father cannot be expected, amid so many other duties, to turn his attention to so special a study. But its importance having been authenticated by this State, as it now is by all advanced governments, it behooves that the State see to it that municipalities secure an accurate return, which, in time,

will aid them in comparing wards or localities within their own limits, and so help both State and city in conserving the general health.

4. We respectfully submit that some general law should define more closely what are the vested rights of cities, as well, indeed, as country districts, as to the definition of nuisances and their abatement, and how far the decisions of Boards of Health may be acted upon as final.

In many cases the action of appeal is such that the delay perpetuates a nuisance and renders it impossible, if such appeals are permitted to stay proceedings, for a Board of Health to act as it needs to do for the service of the citizen. Sanitary codes have now so far gained authority that it is no longer doubted that Boards of Health may be safely delegated full jurisdiction to the extent of abatement, being afterward, if need be, held responsible for their acts. Difficulties constantly arise as to the rights of such boards, unless they are, in part, defined in city charters or by general enactment. After the decisions of the last three years in the abattoir question in Boston, and in that of the Board of Health of New York City, it is quite in the power of general legislation so to enact, as greatly to simplify the method of relief, so as not to jeopardize the ultimate right of contestants, and yet so also as not to involve the life-right or right to life of those who are being injured while the rule is suspended. We beg leave respectfully to refer your Commission to the Massachusetts decision in the abattoir case and to the decision in the New York City case.

It is not the desire of our Board to claim anything that could at all be construed into an infringement upon the corporate jurisdiction of cities.

Neither is it our desire to condone anything in which cities, if left to themselves, are likely, by oversight or by want of co-ordinate action, to jeopardize our whole civil and constitutional and health rights to a degree much more perilous than any exercise of general jurisdiction in matters so intimately pertaining to the welfare of all.

So definite has our knowledge become of the care of population as a great national resource and a great public economy, of the avoidable impairments to which it is subjected, and of the need of co-ordinate care of our cities, especially in those health matters,

which involve a common interest, we cannot but insist that general law should, at least, require local law, and should see to it that in important particulars local authorities are brought into such relations with State authorities as to secure information to the State of the condition of its cities, and co-operation in such matters as need both local jurisdiction and general tabulation and report.

We therefore beg of your Honorable Commission that you either prepare some form of law which in your high legal and official judgment shall secure such results, or that in your report you give to the views which our Board is thus permitted to present to you, the sanction of your distinguished approval.

In some slight legislation which the State Board of Health will have occasion to ask the coming winter, it would be the view of our Board to introduce a section requiring local Boards of Health, defining their powers, requiring an annual report to the State Board of Health, and requiring them to make it obligatory to inquire each year into any neglects of vital returns. Beyond this do we not believe it wise at present to go. While up to this point specification is needed, yet the actual exercise of power must be left to local authorities—with perhaps right of appeal if they choose in certain matters to the State Board of Health. In few of our cities we do now find sufficient power. There is also an absence of intelligent conviction on the part of the officers and of the people as to the necessity of exercising it, and a want of close and exact knowledge as to sanitary matters on the part of leading citizens. Law so far as really necessary is desirable, and when only a little in advance of popular sentiment is often educational.

Harm is done both by the absence of adequate authority and by enactments, which if not burdensome to the more enlightened sanitary communities, would be so to many, because too far in advance of public opinion, and if enforced react to the permanent discredit of a most important social interest. While this should not lead us to hesitate in asking what is really needed, it does lead the State Board to canvass with great care its own individual suggestions and those of others, and to seek a wise singling out and specification of what is now essential and

expedient rather than an attempt to prepare a complete sanitary code for our cities, which however broad in its enactments and penalties, would practically add too much to the dead-letter literature of our statutes.

September, 1879.

Signed, E. M. HUNT, M. D.,
C. F. BRACKETT, Ph. D.,
E. A. OSBORNE, C. E.,
Committee of State Board of Health.

UNDERTAKERS AS GUARDIANS OF THE PUBLIC HEALTH.

AND SUGGESTIONS TO THEM IN THE HYGIENIC MANAGEMENT OF BURIALS.

BY EZRA M. HUNT.

Next to the physician, no class of our citizens is so uniformly brought in contact with the localities of fatal diseases as are undertakers. When an epidemic is raging they must be most on duty. In the more common cases of prevalent and mortal disease, they are consulted in all the details of management. So important has this office been considered in some countries and States, that a license or registry is required. A want of knowledge on their part will prolong the risks of the sick room, may endanger themselves and their families and make them the common carriers of contagion to communities. It is of great importance not only that they know the proper conduct of a funeral in its convenient or artistic service, but that they be so intelligent as to methods of cleanliness and disinfection as by their appliances and advice to aid in diminishing the risk to public health often accruing from local disease. In a somewhat extended correspondence for the last two years, we have found many of them intelligent or inquisitive as to the new facilities for safety afforded by recent methods. Many, however, pursue their vocation, without any acquaintance with their art save the hearsay methods which they have casually adopted. Every occupation is ennobled, when, besides its mere formal duties it avails itself of opportunities for establishing its claims as an art. This is a ministry, not only of respect for the dead, but of comfort and preservation for the living. That expressive Anglo-Saxon word "undertaker," ought not only to mean one who takes people under ground, but one who undertakes to do something in the interests of those that remain.

We beg to impress all undertakers with the opportunity they have to benefit society in the interests of public health and to ask of them that they magnify their office in using it as an occasion of enforcing the strictest rules of cleanliness and disinfection. We greet them as almoners of the public health, and ask their co-operation in efforts to prevent the spread and fatality of disease.

Their sanitary relation and jurisdiction includes such cleansing, preservation and direction as to the dead body as shall make it least hazardous to the public health, and such dealing with the clothing, furniture and household where the death has occurred, as shall do most to prevent contagion or to diminish that less specific befoulment of the air which also is unfavorable to ealth.

The Jewish mode of sanitation, as revealed in Scripture and as illustrated in profane history, is well worthy of note as an ensample. Immediately after death the body was well washed, generally with a strong solution of native carbonate of soda called nitre. It was then well anointed all over with some fragrant oil. Most of the essential oils have disinfectant properties. In some diseases, as scarlet fever, for instance, oil serves a valuable purpose in preventing particles from the skin from floating in the atmosphere. Oil or vasaline can be used still with advantage. "The corpse was wrapped in linen, wound around the limbs separately, for the better effect of the embalming ingredients and the more perfectly to saturate the flesh." The Talmud describes the custom as a wrapping around of the separate limbs and a loose sheet over the whole. The use of ointment and spices seems to have been universal, although the kind and value of the spices varied with the rank or ability of the family. The spices were dry and finely powdered and sprinkled within the bandages, or wet and mingled with oils or resins. Myrrh, aloes, etc., were used in connection with more odorous substances, in order to combine astringent and preservative effects. It was not merely a substitution of odors, but an active disinfection. King Asa was laid in a bed of spices. In the embalming of our Saviour we are told that a hundred pounds of spices were given by Nicodemus. When a death occurred in the house, "according to their custom great quantities were burned to perfume the chamber, and especially to pay universal respect."

In the Egyptian method for embalming, the body was anointed repeatedly with oil of cedar, myrrh, cinnamon, and was then put into a solution of the nitre or native carbonate of soda for about forty days, "by which process it was preserved from decay, retaining at the same time a life-like appearance." It was afterward taken out, wrapped up in long linen bandages dipped in myrrh, and then closed with gum.

The common people of Egypt were embalmed by means of bitumen, with which the corpse and its envelopes were smeared. Sepulchres have been opened in which thousands of bodies have thus been preserved in robes without coffins.

The Jews while not so elaborate in embalming for continuous preservation, yet in preparation for the burial carried out these methods to the full extent necessary for cleanliness and disinfection. The washing and anointing, the use of spices, and the bandaging of the body in linen seem to have been always used, although on account of ceremonial uncleanness and the heat of the climate, early burial or entombment was practiced. No corpse thus carefully cleansed, anointed, spiced and bandaged could possibly be a source of contagion. We do not wonder that the body thus prepared needed no coffin for the bier, but could be carried to the grave as much an emblem of purity as the white linen which enfolded it. In our modern plans we have more complicated but not more cleanly methods. We allude to this as illustrating the simple way of dealing with the dead body in a hot climate so to make it innocuous to the living.

We live in a period when very much is said about the communicability of disease and the methods of preventing it. Many instances are on record like that of 1878, in the yellow fever of Grenada, and the one as to diphtheria, occurring the same year in Monmouth county, in both of which it is alledged that the epidemic spread through the medium of the corpse. Boards of Health are issuing mandates as to non-attendance at funerals and non-exposure of the body in case of communicable disease. The Brooklyn Board of Health directs the burial of every child who has died of any infective disease within twenty-four hours, unless special permission is given to the contrary, and further that "the funeral of such person is to be strictly private, no other vehicle than a hearse being allowed." Chicago has had orders of similar rigidity. We regret the necessity of any law

which limits the law of affection to this degree, or that so repels expression of sympathy in the time of bereavement. We are of those who believe it far more important to teach and insist upon rigid method of preparation for the dead body. It is within the range of present knowledge and of known skill for undertakers to deprive the corpse of any infective power, and, as a rule, to render it so safe that no such order needs to be promulgated. There are often reasons why garments or the furniture of the same room may at first hazard contagion, or why a funeral in the same building, instead of from an uninhabited assembly-room, might expose to some virulent contagion. But of all the things connected with the disease, the corpse, properly prepared, is the least likely to communicate a disease to those present at the burial if only properly cared for.

We proceed to outline the method of management by which to insure protection:

After death early attention must be given to any inward parts from which offensive discharges might escape. A small rubber hand-syringe or spray atomizer easily washes out the most accessible cavities, such as the mouth, nostrils, ears, with any of the disinfectants we have named. All openings from any internal organ or cavity should be neatly plugged. When, as from the bowels, much discharge might occur, an egg-shaped plug should be carefully adjusted. For this purpose a small wad of cotton or oakum may be saturated with the copperas or chloride solutions, or chloride of zinc, named in the article on Disinfection, or with tar or the sticky portion of turpentine.

Better still, carbolized paper or cotton can now be had at small expense and used dry. This is suitable where we must place some absorbent in the cavity of the mouth, inside of the teeth, or in the nose or ears.

WASHING OF THE BODY.

All garments that have been upon the body during the sickness should be removed, not to be replaced, and the body be laid for washing on a table or cot covered with paper or linen. The body should then be thoroughly wiped and cleansed all over with soda borax, in the proportion of a teacupful dissolved in a quart of water or the chloride of zinc solution. (See article

on disinfectants.) If soap is used it should be Castile or carbolized soap, the greases of which do not decompose so rapidly as those of laundry and scented soaps. Anointing with Vasaline is also good.

As the face and head are more especially exposed these need the careful cleansing and washing, and use of absorbents heretofore referred to. Where the hair is long it is desirable that it be partly removed, but if this is objected to, it also can easily and safely be thoroughly washed with the zinc solution. The ancient head-dress or cap easily concealed any change of the hair and would still be in taste if fashionable. It is always necessary that very careful attention be paid to the proper cleansing of the hair; in case of any unusual odor of any infectious disease the chlorinated soda or Labarraque's solution, or the chloride of zinc solution noted in the article on disinfectants, or a chlorine wash made by dissolving one quarter of a pound of chloride of lime in a quart of water may be used instead or in addition. The National Board of Health directs the use of a saturated solution of the chloride of zinc as a wash, and the wrapping of the body in a sheet saturated with it. Dry powdered borax sprinkled over the surface after the washing and wiping is an excellent cleanser. Sawdust well moistened with the chloride of zinc is also recommended to be placed in the coffin. Any sore or abrasion or wound should be cleansed when possible, and be freely covered with copperas wash, powdered charcoal, common salt, or any of the cleansing or drying articles above named.

A small bag of sawdust or fine shavings, or cotton or wool, interlaid with salt, borax or charcoal, may properly be closely pinned about the thighs. One good authority recommends that in some cases of delay or transportation the body should be covered with sawdust, to which has been added tar or a pound of ivory black, or other crushed or powdered charcoal, so as to absorb any possible gases, or to prevent escape of any fluid. Persons in attendance upon the sick or those laying them out do not increase their risks by such cleanliness. Indeed those who during sickness, or in caring for bodies after decease, are familiar with methods of cleansing and disinfection are those who themselves escape, besides protecting society.

In exhuming the dead, Blythe directs that all bodies should be covered with tar or saw-dust saturated with carbolic acid.

In the Franco-Prussian war tar was thus freely used. We think the styptic clays so plenty in New Jersey from which so much alum is made, when dry and ground may thus answer a valuable purpose as a cleansing and antiseptic covering.

A brine made of good common salt and a little saltpetre is highly preservative of bodies and is easily used and drained off by a screw opening.

Embalming, as practiced in modern times, seems to have been most successful with the use of a saturated solution of chloride of zinc. Burnett's Fluid, so valued as a disinfectant, is a chloride of zinc solution, although not so strong.

The Souquet, or chloride of zinc method, was tried at Paris in competition with others and so preserved a body that when exposed to the air fourteen months after, it dried without putrefaction. Richardson, in his experiment (1876) injected the saturated chloride of zinc solution into the tracheal artery and repeated it after six hours. The abdomen was emptied of air by a fine puncture and zinc colloid and a gelatinous preparation of zinc thrown in. The Milwaukee law requires that in all contagious diseases there shall be in the bottom of the coffin from four to six inches of saw dust saturated with chloride of zinc solution.

The chloride of zinc solution is now given the preference over all other disinfectants for this purpose. The 50 per cent. solution of Squibb which costs twenty-five cents per pound at wholesale, is sufficiently strong, and may be weakened unless there are some special instructions for active disinfection. As a wash of the body it is the best, as there is no risk of discoloration therefrom. While physicians who prepare and preserve bodies, prefer injection into the arteries, other simpler methods will answer for undertakers. A very small trocar, such as is used for piercing the abdomen in dropsy, can easily be used in the hands of any undertaker. We know of one city undertaker in this State, who, in hot weather, has often found it sufficient to inject from a pint to a quart of the solution by a small pierce into the abdomen which entirely closes itself on the withdrawal of the nozzle of the syringe. It is easy to have the nozzle of the syringe so shaped as to make the puncture by it. Where it is preferred the Fountain syringe may be used, and so the fluid be allowed to flow into any cavity. Since the invention of the

hypodermic syringe, it has been frequently shown how feasible it is to disinfect by merely infusing the zinc solution at various places under the skin.

All these slight punctures as well as those for chest or abdominal injections, can be made without any disfigurement, and are often far more practicable than the ponderous methods now in use. We know of no prominent department of handiwork in which there is more opportunity for improvement.

With these internal methods of preservation by the introduction of fluid into closed cavities, and with the proper cleansing and disinfection of the outer body, the corpse can be preserved for the necessary period previous to the funeral.

When in piercing any internal cavity there is confined gas or foul odor escaping, it is easily absorbed by holding over the tube a small sponge which has been soaked in the chloride of zinc, or other disinfecting solution. Some who have expressed dissatisfaction with present methods, are now using the Egyptian embalming fluid, or other patented articles. There are plans of body preservation now in use in all our medical colleges, which are equally applicable to the preservation of bodies for burial. No doubt the more thorough method is to inject into the arterial system. A large artery in the neck or beneath the collar bone is easily exposed and opened by a very slight incision. A hollow needle is inserted and tied in place; then the chloride of zinc is slowly and not too forcibly injected. Not over three quarts are generally needed.

An intelligent undertaker of this State has informed us that he has always succeeded by filling the abdominal cavity through a small opening, into which he introduces the tube of a Davison's syringe. All external methods of cleansing being also attended to. Each chest cavity is thus easily infused with a few ounces. Even this would only be needed in hot weather, or when the body is to be preserved for transportation, or in case of some epidemic disease. The puncture should be made just below the navel or for the chest, between two of the ribs of the right side.

It speaks little for science or art, that so cumbersome and expensive an apparatus as the ice-box is now our only reliance.

We insist that both the undertaker and those who employ him should come to recognize his care to extend to directing the

preparation of the body for burial, as well as to other arrangements. If fear of disease or carelessness leads him to neglect these matters, he is not less exposed and does not accomplish a high part of his mission. We believe that friends pay as readily for these exact and skillful attentions as for the mere mercantile oversight.

The undertaker needs not only practice, but a technic knowledge of his art. The spray forms of syringes, trocar, sponges, carbolized paper and cotton, bandages, wadding, two or three of the most approved disinfectants, all put up in a case of convenient form, belong as much to his art as does the medical case to the physician.

The last ten years have developed possibilities of care for the dead wholly new and greatly valuable. We believe the time not distant when the occupation will be followed as an exact sanitary art, and become a great adjunct in the checking of contagious diseases. The art of preservation and disinfection is now so complete that if only the undertaker knows the details of proper cleansing and dressing, and keeps himself supplied with the proper appliances of his art, he will not only add to his own skill but make himself a worthy and effective custodian of the public health.

It is greatly important, also, that the care of the undertaker should extend to the surroundings of the fatal sickness.

He should learn how the rooms may be made least likely to convey disease or to deteriorate the air. We have many times attended at funerals where both the coffin and the room that contained it has been closed for some time before. The stifled air thus charged with particles of decay, even in cases of non-malignant disease, has occasioned faintness and discomfort which might have been avoided by a flushing of fresh air and removal of close curtains.

The undertaker should be familiar with the use and value of circulating air, cleanliness and disinfectants, both for the house and the premises, and often more than any one else just at this time is in a position to give advice and direction which will be heeded and obeyed.

We designedly associate an article on disinfectants with this number of our report, and send the report to the undertakers in the State, that they may thus have ready at hand a partial guide

in so important a relation to the public health and common welfare.

COFFINS.

A word needs to be said in reference to the coffins at present in use. The heavy wooden or iron coffins are only defensible in cases where the dead must have long transportation before burial. In usual cases, the body between death and burial, unless kept in a preservative liquid in a coffin, does not need an attempt at exclusion of air, which only means air confined so as to become unpleasant. Proper preparation of the body, free access to air, and a placing of the corpse in the coffin only a short time before burial is the better custom.

We fully agree with the views expressed by Haden, Richardson and others, that the coffin should be nothing more than an easily destructible shroud, in which the mortal remains may be placed until they are deposited in the earth. "The present coffin," says Richardson, "is after the mode of an Egyptian sarcophagus and is probably an imitation of that receptacle. In the *form* of the receptacle there is nothing objectionable, and if the popular taste wills that it shall be maintained, so be it. But the *structure* must be so modified that the instant the body is placed in the earth, it shall either be in direct contact with its surrounding earthy matter, or it shall be separated from it by some simple organic material that is easily and rapidly destroyed." If persons desire their friends preserved after death, let us go to embalment now so simple and expedient, or else let us not long interrupt natural decay, and by an artificial method, substitute a process most loathsome, and wholly destructive of natural methods of decomposition and soil appropriation. A revolting, but true picture has recently been drawn by an eyewitness, of an old grave yard exhumed, as showing how soil was contaminated, water courses befouled, and death itself made more hideous. We have recently lighted upon another description of a yard prepared. It is wonderful how quickly a carbonaceous soil or one of sand-lime and carbonaceous matter mingled, will dispose of remains placed in it free from woody coverings.

The Messrs. Turnbull, of Glasgow, desirous of illustrating the power of charcoal as an absorbent and deodorizer buried a horse in an eight-inch surrounding thereof. In twelve months the whole except the skeleton was absorbed without in the mean time the least trace of decomposing effluvia. Porous and well drained earths have a power quite analagous. In such soils it is stated that complete removal of a human body has taken place in five years, and complete destruction of all but bones and sinews will take place in twenty to thirty weeks. If we mean earth to earth, dust to dust, it is better to let it be accomplished in the time which nature attempts. The earth to earth coffins of the London Metropolis Company, or the wicker coffins now in frequent use in England, have many advantages for crowded populations, and will to some degree interrupt the plan which in our cities "has led us to accumulate in our midst a vast store of human remains in every stage and condition of decay." The Japanese bury in sitting posture, and often after the coffin is in the grave, thrust aside the thin lid and so give a free access to the earth.

While we may not expect any sudden change from confirmed methods, it is well to have attention directed to modifications which may be desirable. The woods at least from which coffins are made might be much lighter. Where preservation is desirable for transportation a proper lining of antiseptics and proper preparation of the body for burial will do far more than an attempt to make air tight by boxes.

The welfare of the living and a guarding against the spread of disease, must not be lost sight of, while all proper respect is shown for our departed ones. Indeed, it is a recent tendency to constrict attendance at funerals within too narrow limits and almost to prohibit tokens of affection, that has in part led us to inquire whether there is not a care and preparation of the dead for burial, such as limits rather than extends disease, and so makes funeral obsequies consistent with assured protection from infections.

We believe the protection of personal and public health is quite in accord with attendance upon the remains of those who are removed from us. But this means a preparing for burial quite different from that now practiced. It means cleansing, anointing, disinfecting, preparation and burial as a distinct,

explicit art; not as a trade which can be taken up at random. It has definite rules which, if carried out, will insure against danger of infection from the dead. It means suggestions to the immediate household as to their own clothing and vicinage, which, with the careless or uninformed, are far more riskful than the person deceased. It means disposal of remains which shall be compatible with the highest interests of the living.

All this adds sacredness and solemnity and token of respect, for the law of purification and cleanliness like the law of carefulness for all human welfare has in it the very essence of respect, honor and affection. The death of the flesh seems to us more like the life of the spirit, when thus it is decently conveyed to the earth so as to closely obey the processes of nature and soon become a part of that vitality which shall remain until the former is restored.

To all undertakers we commend their work as an art, as well as a service, and ask them in it to recognize themselves as capable of conserving some of the most important sanitary interests of society.

SANITARY LEGISLATION.

BY E. S. ATWATER, ATT'Y.

INTRODUCTION.

The necessity for sanitary legislation or legislation to protect the public health, is founded in the ignorance, negligence and selfishness of mankind. In a large community there are a vast number of people who are utterly ignorant of the fact that human life may be prolonged, and the general health and the health of the individual be promoted by following the simplest sanitary precautions. But we may go a step further. There is also a tendency to neglect matters of this nature even where there is some knowledge on the subject. People think there is no hurry about attending to such things, and they let them go until the evil has been done and the seeds of disease are not only planted but growing up. But beyond this is the inherent selfishness, meanness or parsimony, by whatever name it may be called. Sanitary measures cost something. They may even cost the destruction of property to do them properly. The landlord who is reaping large rents from the overcrowded and filthy tenement, has no ear for sanitary improvements. They might in the end make his property more valuable, but he has a sharp eye for his present gains. Hence unless some power is brought to bear from without, some agency that has power to do the thing required, if necessary, in many cases nothing will be done, and, generally, progress will be slow.

The basis or foundation of sanitary legislation is in what is termed the "police power." It is a power often referred to in legal works. Says Mr. Justice Field, of the United States Supreme Court: "That power undoubtedly extends to all regulations affecting the health, good order, morals, peace and safety of society, and is exercised on a great variety of subjects, and in almost numberless ways. All sorts of restrictions and burdens

are imposed under it, and where these are not in conflict with any constitutional prohibitions or fundamental principles, they cannot be successfully assailed in a judicial tribunal."

Says Mr. Justice Miller of same court, referring to police power: "Upon it depends the security of social order, the life and health of the citizen, the comfort of an existence in a thickly populated community, the enjoyment of private and social life, and the beneficial use of property."

Says another Judge: "It extends to the protection of the lives, limbs, health, comfort and quiet of all persons, and the protection of all property within the State, and persons and property, are subjected to all kinds of restraints and burdens in order to secure the general comfort, health and prosperity of the State; of the perfect right of the Legislature to do this no question ever was, or upon acknowledged principles ever can be made, so far as natural persons are concerned."

But while such is the substantial foundation on which sanitary legislation rests, to-wit, that general welfare must be protected, even if it is at the expense of some individuals, yet this very principle shows us that in the nature of things more or less opposition will be developed to the execution of all sanitary laws. It has been claimed, and is now and doubtless will be claimed, that such laws interfere with vested rights, that before a health officer does anything there must be a trial by jury and objections of similar nature. Hence it is obvious that such laws must be framed so as that while they accomplish the end arrived at, they do not interfere with private rights any more than is absolutely necessary.

A municipality has no inherent power to enforce sanitary measures. The powers of municipal corporations are based entirely on legislation, and they must act within the scope of such legislation. If, therefore, no powers to make sanitary regulations have been conferred upon a municipality by the Legislature, it follows that such municipality has no such powers. The public good alone is not a foundation upon which a municipality can act.

SUBJECTS OF SANITARY LEGISLATION.

I now pass to consider some of the subjects which properly come within the scope of sanitary legislation.

1. The gathering and diffusing of information on subjects relating to the public health, including the Department of Vital Statistics. Knowledge must precede action; knowledge as to whether a state of things exists which requires action of a sanitary nature; knowledge from which deductions and generalizations can be made as to the growth and spread of disease, and the causes which produce an unwholesome sanitary condition; knowledge as to the result of measures undertaken to promote the public health; and finally, knowledge as to the best methods to be applied for the promotion of the public health. These generalizations and conclusions, to be of value, must be derived from large observations.

It is impossible to estimate too highly the value of Vital Statistics carefully gathered.

Says an eminent writer: "Considered *physically*, the main object of a correct civil registration of births, deaths and marriages, is to aid in disclosing the causes of disease; considered *legally*, the object is to provide the means of tracing descent and proving personal identity; and considered *politically*, it is to assist the government in arriving at correct conclusions with regard to measures of internal economy, taxation, employment and commerce.

As the world no longer affords one instance of the unanimous agreement of the people of any one country for one form of religion, governments can no longer prudently leave the registration of births, deaths and marriages, solely to the minister of the State Religion, if there be one.

In regard to the matter of diffusing sanitary information, I quote the remark of Dr. Elisha Harris, the eminent and thorough Registrar of Vital Statistics of the Metropolitan Board of Health of New York, as follows: "The task of perpetual cleansing and sanitary renovation by the civil authorities of Boards of Health, though conferring great present benefits, needs to be aided by popular and definite sanitary instruction, else all this present endeavor might prove to be another work of Sisyphus, and the people might forget that they have any personal concern in the efforts of sanitary officers."

In this connection I deem it proper to refer to the very excellent and timely suggestions and directions, issued by the State Board of Health of New Jersey, during the past season.

2. The practice of medicine and the sale of so-called medicines, is a subject that properly comes under the head of sanitary legislation, when it is considered how much harm may be done by unlearned and unskillful practitioners, and the health-destroying compounds which are put forth under the name of medicines, it is evident that there is scope for legislation in this regard.

In this State the law has gone to the extent of providing a competent and educated body of physicians, through the medium of the State Medical Society. It would seem proper to provide for an examination of all who desire to practice medicine, by a competent medical board; that all who engage in the business of compounding medicine, should pass an examination to test their competency, and also to regulate the sale of medicine, so as to protect the public against the nostrums of quacks.

3. Vaccination and other measures preventive of disease. It is not my purpose to argue the importance of vaccination. When we consider the danger to a community of a single case of small pox, not properly isolated, and the peril to which an unvaccinated person is exposed, it is obvious that the authorities should be empowered to provide for thorough vaccination.

4. The regulation of noxious trades and business, including manufactories. Here it would seem at first sight that there might be danger of interfering with private rights, and that legislation relating to such matters might be opposed to fundamental principles in regard to the property and the right of the individual to use his own. There are businesses, such as slaughter houses for instance, which are absolutely necessary and must be carried on, but at the same time there existence in a thickly settled community is fraught with danger. The subject has been thoroughly discussed and the right of the State to enact such laws, has been affirmed by the United States Supreme Court in certain cases which came up from the State of Louisiana and are known as the "slaughter-house cases," reported in volume 16, Wallace's Reports. I deem the matter of sufficient importance to give a brief synopsis of the cases. They grew out of an act of the Legislature of Louisiana, entitled "An Act to Protect the Health of City of New Orleans, to locate the stock landings and slaughter houses and to incorporate 'The Crescent City Live Stock Landing and

Slaughter House Company," which act was approved in March, 1869. This act granted to a corporation created by it, the exclusive right for twenty-five years to have and maintain slaughter houses, landings for cattle and yards for enclosing cattle intended for sale or slaughter within the parishes of Orleans, Jefferson and St. Bernard, in that State, (a territory which it was said contained 1,154 square miles, including the city of New Orleans, and a population of between two and three hundred thousand people), and prohibiting all other persons from building, keeping or having slaughter houses, landings for cattle, and yards for cattle intended for sale or slaughter within those limits, and requiring that all cattle and other animals intended for sale or slaughter in that district should be brought to the yards and slaughter houses of the corporation, and authorizing the corporation to exact certain prescribed fees for the use of its wharves and for each animal landed, and certain prescribed fees for each animal slaughtered. The court held that this grant of exclusive right and privilege, guarded by proper limitations of the prices to be charged, and imposing a duty of providing ample conveniences, with permission to all owners of stock to land, and of all butchers to slaughter at those places, was a police regulation for the health and comfort of the people, (the statute locating them where health and comfort required), within the power of the State legislatures, unaffected by the Constitution of the United States.

I may, in passing remark that this law affected the business of some 1,000 persons, and that individuals and associations of butchers brought suits to prevent its being carried into effect, and that the matter was thoroughly litigated with the result I have stated, thus showing conclusively that there is no fundamental objection to the class of legislation referred to.

5. Providing sufficient means for dealing with nuisances, including their abatement and removal. Of the absolute necessity of vesting in some body power to deal with nuisances which imperil health in thickly settled communities, there can be no question. If the community is to be left to the ordinary machinery of an indictment or other proceedings of that nature it is obvious that the progress in enforcing sanitary regulations will be slow. If, on the other hand, there is an organization whose care is the public health, and whose duty it is to establish

sanitary regulations, and then to enforce them, we may expect systematic and substantial improvement. Of the manner of dealing with such matters, I shall speak hereafter.

6. Efficient sanitary inspection of dwellings and public buildings, particularly schools as to proper ventilation, drainage and other sanitary precautions and disinfecting generally. There can be no question that the health is in danger in a large gathering of people in buildings where the atmosphere becomes fœtid from lack of proper ventilation, and noisome gases are exhaled from defective sewage arrangements. It is a too common occurrence that one after another in a family is stricken down with disease, the causes of which are found to be in the unwholesome sanitary conditions of the dwellings.

7. The regulation of trade in articles of food to the extent of preventing the sale of unwholesome articles is also a proper subject of sanitary legislation. It is a well-known fact that many things manufactured for use as food, are mixed and adulterated with substances which have no nutritive elements, and are in many instances of a deleterious character. Then again, stale meats, fruit and vegetables are often offered in market at low rates. The danger to health in this manner, especially in the warm season, need not be enlarged upon. Then again, there is the danger of diseased meat being put upon the market. Against these things the individual purchaser cannot protect himself always if he would. Hence the necessity for some legislation which will efficiently protect the health of the public in this regard.

8. Quarantine Laws. Such laws come under the jurisdiction of the States. The happy effect of such laws is seen in that while vessels containing persons sick with pestilential and contagious diseases arrive at the port of New York, yet these persons are rigidly kept out of New York City, and such vessels are subjected to thorough fumigation and disinfection. There can be no doubt that it was due to the vigorous enforcement of the quarantine law during the past season that yellow fever was kept out of the great cities at the head of New York Bay. Such measures, no doubt, require the exercise of a great deal of authority on the part of those entrusted with their enforcement but the common sense of mankind concedes their absolute necessity.

Quarantine regulations also relate to the separation of individuals afflicted with contagious diseases and even of whole communities where such diseases are prevalent.

It may be added that there are a variety of other matters, which are proper subjects of sanitary legislation, such as keeping pure the water supply of cities and villages, the prevention of the overcrowding of tenements, proper sewage and the like, but I do not deem it necessary to go further into detail. It is obvious that there is a broad field for wise sanitary legislation.

We come now to consider the jurisdiction within which sanitary powers may be exercised. The subject of the public health is a matter of large importance. It is not limited to any State or municipal boundaries. It is scarcely a year since the public health of the people of this country was imperilled by the ravages of a contagious disease which had become epidemic in some of our large cities. To the coping with the disease in such proportions no State or local health authorities are adequate; concerted action is required. The general government rendered what aid it could under the circumstances, but there was no National Health Board to bring to bear its power in the emergency. So important was this matter felt to be that at the last session of Congress a law was passed establishing a National Board of Health. A United States Senator has said, "At the last session nearly \$1,000,000 was voted to be used to combat sickness in the South, and under powers and discretion such as no act of Congress ever conferred before."

The National Government has also felt called upon to intervene for the protection of the public health by the establishment of National Quarantine law. By a law passed in 1878, United States officials are required to co-operate with State officers in the enforcement of the State Quarantine laws.

By other laws of the United States the Quarantine laws of the States have been recognized.

Much doubt, however, has been expressed as to the power of Congress, under the Constitution, to pass general health laws, and while it would seem for the public good that Congress should possess some power in this direction, it is not within the province of this paper to discuss the constitutional questions that have arisen.

But whatever constitutional objections may exist in regard to sanitary legislation by the general government, no such objections apply to the actions of the State governments, the theory of our system being that the States retain such powers as are not delegated to the general government. As has already been shown, the police power is exercised in a variety of ways. Probably all the States have exercised this power, in some measure, as to matters relating to the public health; but it would seem for the most part to have been done in reference to particular localities and on special subjects, as attention may have been called to them, rather than the enacting of a system of laws pertaining to the subject or a general system of enforcing such regulations. It would seem necessary to any proper regulation of these matters, that there should be some central authority or health board in each State, having some general powers, such as gathering vital statistics and other information, and diffusing the same, and supervising the local health authorities, giving them aid and direction, and setting them in motion, if necessary. In New Jersey a State Board of Health was established by law in 1877. Its powers were limited to gathering information and making reports. In 1878 a law was passed providing for the registration of births, marriages and deaths, and in 1879 a law was passed authorizing the State Board of Health to take action, with a view of setting in motion the local health authorities in the matter of abating nuisances. It will thus be seen that in this State sanitary legislation is making progress in the right direction toward dealing with the problems relating to the public health in a systematic manner.

Some of the Western States have been forward in the matter of sanitary legislation. Minnesota and Michigan have comprehensive health laws.

I present a brief synopsis of the system in Michigan:

SANITARY LEGISLATION IN MICHIGAN.

In the year 1873 the Legislature of the State of Michigan established a State Board of Health, consisting of seven members.

Their duties are summed up in the law as follows: "The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of this State. They

shall especially study the vital statistics of this State, and endeavor to make intelligent and profitable use of the collected records of death and sickness among the people; they shall make sanitary investigations and enquiries respecting the causes of disease, and especially of epidemics, the causes of mortality, and the effects of localities, employments, conditions, ingesta, habits and circumstances as to the health of the people."

The local health authorities are required to report at least once a year to the State Board.

The laws of Michigan also make ample provision for the collection of vital statistics.

In 1846 laws were passed establishing Boards of Health in the towns, villages and cities. The powers given to the Boards in the different orders of municipalities vary somewhat, but would appear to be full and ample. In particular, they provide prompt methods of abating nuisances.

SANITARY LEGISLATION IN MASSACHUSETTS.

In the State of Massachusetts much practical work has been done in sanitary matters which it would be interesting and profitable to consider if time would permit.

A State Board of Health was established in 1869. Its powers at first were principally advisory, and to gather and diffuse information, to make investigations, &c. Subsequently, however, it was clothed with certain executive powers, such as, in certain cases, after hearing, to order parties engaging in trades which are injurious to public health, to desist from the same.

The reports of this Board have been very carefully prepared from year to year and are full of valuable theoretical and practical information as to sanitary matters.

In the general laws of the State, published in 1860, is a chapter, entitled "Of the Public Health and Burials."

Provision is made for local Boards of Health in the towns and cities, and their powers are defined. These Boards are authorized to make regulations for the public health and safety, respecting nuisances, sources of filth and causes of sickness within their limits. They may make orders for the abatement of nuisances after short notice, and may abate the same, if necessary, at the expense of the owner of the property.

They may also assign places for carrying on any trade or employment which is a nuisance or dangerous to the public health, or the exercise of which is attended by noisome and injurious odors and may prohibit the exercise of the same in places not so assigned. The Board may also forbid the exercise of such trades within the limits of the town or any particular locality thereof.

Provision is made for the service of such order of prohibition upon the proper parties, and if the same are not obeyed within twenty-four hours, the Board are to take all necessary measures to prevent the exercise of the offensive trade, and the person refusing to obey becomes liable to fine.

Any person aggrieved by such order may appeal therefrom and shall, within three days after service of the order, apply to the proper court for a jury to try the question, and during the pendency of the appeal, the offensive trade or employment shall not be carried on contrary to the order, and upon any violation of the same, the appeal shall forthwith be dismissed. The verdict of the jury is to be passed on by the court and may either affirm, annul or modify the order appealed from. If the order is affirmed by the verdict, the town shall recover costs against the appellant; if it is annulled, the appellant shall recover costs and damages against the town.

LOCAL HEALTH BOARDS.

It must be obvious, I think, that in order to efficient sanitary work, there must be local authorities having health powers, a body of some sort in each community or municipality, having charge of the measures pertaining to the health of such community or municipality. No State Board of Health can be adequate to the enforcement of the sanitary regulations necessary to the protection of the health of each particular community.

Health Boards should be so constituted as not to have any political or partisan bias, for in matters of this kind, the body having authority to act, should be independent and non-partisan. Hence it would follow that such powers should not be vested in an elective Common Council or other city government. But again, in dealing with matters of public health, knowledge is required. Hence, in a proper Health Board, medical men

should be found. It might not be advisable to make up a Board entirely from the medical profession; but that profession should furnish a large and influential element in any Health Board that would efficiently and intelligently discharge its duties.

Still further, a Board of Health should be a permanent body and not reconstructed each year. The terms of the members should be for long periods, and should not all expire at the same time. In this way the result of experience can be more efficiently applied, and the methods inaugurated can be perfected and carried to completion.

Probably most, if not all the cities of New Jersey, have some provision in their charters for Boards of Health, or authorities of that kind. It will be found however, I think, that the powers given to them are of a general nature, and that no methods are prescribed for dealing with the very important matters that come before such bodies, and in general that their authority is somewhat vague and undefined in its character.

SANITARY LEGISLATION IN ENGLAND.

Some reference to sanitary legislation in England will, I think, prove instructive. The matter has received great attention in that country. Commissioners have been appointed from time to time by act of Parliament to inquire into the subject, and voluminous reports have been made by them. The result has been a body of sanitary legislation of great importance, and practical value, and great good has been accomplished by diminishing the death rate and advancing the conditions of good public health. The ravages of cholera led to the passage in the year 1845 of the Nuisance Removal Act.

In 1848 the Public Health Act was passed by which a general Board of Health was established, at the head of which was a President appointed by the Government. In 1858 the powers of the General Board of Health were given to the Privy Council.

In 1855 other nuisance acts were repealed and a Nuisance Removal and Disease Prevention Act was passed. This act contains some stringent definitions of nuisances. By means of these definitions a variety of causes of disease are brought within the operation of the law.

The local authorities can give notice for the removal of any nuisance, and if this is not attended to, a summons can be issued and offending parties brought before a magistrate. In certain cases also where works are necessary to be done, the local bodies can do the work and charge the person on whose premises the nuisance has existed.

The duties of a medical officer of health and of a sanitary officer are also recognized; and these officers have power given them to inspect premises where they suspect a nuisance to exist. The law provides for inspectors to inspect articles of food exposed for sale, and if found bad to bring offenders before a magistrate. These are only a few of the provisions of the act. I quote the following remarks in regard to the English system:

"The sanitary laws not only extend to more subjects, but they are more stringent, and are enforced by a more discriminating public sentiment and a more vigorous administration than here. All England, for example, is divided into 15,000 sanitary districts, with a sanitary authority in each, and since 1872 there has not been a spot on the surface of England that has not been liable to feel, and, if it needed, which has not felt the direct exertion of such authority. These 15,000 small districts are grouped into twelve larger divisions, and in each of these divisions there is an inspector, who reports directly to the 'Local Government Board,' in London, and over that Board is one of the Secretaries of the State, who is a member of the Cabinet. Connected with the Board is a chief medical officer—now Dr. Simon, perhaps the greatest sanitarian in the world—who has a similar relation to the Privy Council. The system is not a centralized or imperial one, but is such as to devolve the duty and responsibility as to each of the 15,000 districts, mainly upon its own local sanitary authority. But if in any district the death rate or expenditure is too high, those responsible for it are liable to account for it to the Local Government Board.

If local complaints are neglected or nuisances are allowed, one of the twelve inspectors will soon appear in the district and make an investigation.

All accounts of expenditures by each of these 15,000 authorities must be made up in a common form, and they are supervised by the 'Local Government Board.'"

THE METROPOLITAN BOARD OF HEALTH OF NEW YORK.

This Board owes its existence to the necessities of the city of New York, and vicinity. No one will, I think, contend that ample health powers should not be vested in some authority for the protection of the health of that great city—the commercial centre of the country. This Board was established in 1866. Prior to that, health powers had been vested in the Common Council and had been exercised in a very inefficient manner. That Board at its organization consisted of nine members—three of them physicians, one the health officer of the port, one layman, and the other four the four Police Commissioners of New York city. The number has since been reduced, leaving the physicians the predominant element. The district included was the counties of New York, Kings, Westchester, Richmond and a portion of Queens, thus embracing New York City, Brooklyn, Staten Island and adjoining districts. It has since been reduced in extent. Health powers of the largest kind were conferred upon this Board, and the Board proceeded to put them in effect, enacting a health code which deals with a great variety of matters, and involves a great deal of system and energy in giving them proper effect.

In the report for 1867 (the 2d report) we find the following language:

"The Health Department of a great commercial district, which encounters no obstacles and meets with no opposition, may safely be declared unworthy of public confidence, for no sanitary measures, however simple, can be enforced without compelling individuals to yield somewhat of pecuniary interest, or of personal convenience to the general welfare."

The Board did meet with such opposition, and litigation of the most determined character followed. Parties whose alleged rights were interfered with by the Board of Health, organized and sought redress in the courts against the action of the Board, but without success. The results of the litigation are thus stated in the report of the Board for the year 1868, on page 155, by the Hon. Dorman B. Eaton, then counsel of the Board, a gentleman who has given great attention to these matters:

"1. That it was within the constitutional power of the Legislature to create a Board of Health, the members of which

should be nominated by the Governor and confirmed by the Legislature or Senate.

2. That such Board had the power to pass ordinances, reasonable and proper to be observed, for the protection of life and health within the Metropolitan Health District, and that the penalty fixed by law as recoverable against those who should disobey them could be recovered.

3. That the Board had authority to make proper orders for cleansing premises, and for removing causes that made nuisances by endangering the public health, etc., as the law provides, and that such orders could be enforced.

4. That such orders (reasonably made) do not take private property for public use, or impair property or business, in any such sense as gives a right of compensation or of trial by jury.

5. That the courts have no right to ignore the action of the Board whether by ordinance or order, and to enjoin the action of the Board without the record of its action being before the court for review, and that before the action of the Board can be set aside it must be made to appear that it exceeded its discretionary jurisdiction or abused it through recklessness, bad faith, or for other indefensible reason.

6. That the action of the Board, both by order and by ordinance, against slaughtering and cattle driving in densely populated portions of the city of New York, was in all respects legal and proper, and it was sustained by the decision of the Court of Appeals in each of the four cases carried to that court.

Thus it will be seen that while the Board is declared to possess adequate powers for the important purposes for which it was created, it is at the same time subject to that species of judicial supervision which will be a protection against every attempt to exercise unwarranted authority."

The method of dealing with nuisances is thus detailed in the same report, page 158 :

"Since my last report, and especially since the decision of the Court of Appeals, the Board has adopted to a much greater extent than previously, the policy of abating nuisances by means of suits in the courts to recover penalties for violations of the law, or of its order or ordinances. This policy has been found most successful. Owners of real estate, previously in many

cases, neglected the orders of the Board, and allowed it to do the work commanded, while now a suit promptly brought for the recovery of a penalty, stirs such persons to immediate action. The enforcement of the provisions of the "Tenement House Law," so called, is by that law made to depend entirely upon suits for penalties.

The course which has now been adopted as to violations of this law is as follows: When the report of an inspector is received, showing a violation, it is at once laid before the Board, and a direction to commence a suit is obtained. Notice of this fact is then given to the owner or lessee, and he is allowed fifteen days in which to remedy the evil complained of. If more time is needed it is granted on application. If at the end of the time it is found that the evil has not been remedied, an action is at once commenced in one of the District Courts. The judgment is always one hundred dollars, but in practice, the amount taken varies greatly with the circumstances of each case. At first, many suits were discontinued without any judgment, as soon as the law was complied with. Subsequently the rule was made to require the payment of costs, and now the ordinary payment demanded in each case is thirty dollars. This seems enough to enforce obedience to the law, while it is not oppressive.

In at least three quarters of the cases the evils are now remedied without suit. No case is settled unless the remedy is applied. The number of cases under the "Tenement House Law," in which suits have been ordered within the year, is 3,339 in New York, and 417 in Brooklyn. The number actually brought is 979, of these 741 have been disposed of and 185 are now pending."

From the report for 1874-5, it appears that during the period extending from April 1, 1874, to January 1, 1876, 5,218 suits were commenced by direction of the Board for non-compliance with orders of the Board, and for violation of the sanitary code.

The result is thus stated by W. P. Prentice, Esq., Attorney and Counsel of the Board, in his report to the Board of Health:

"In nearly all of these proceedings in behalf of the Board the defendants have called in person or by attorney at this office, and entered into proper stipulations to abate the nuisance complained of or rendered necessary explanations. As far as

practicable a liberal method of adjustment of these actions has been applied, the chief aim having been to secure the removal of the cause of complaint without undue hardship to the responsible party. As a result of this policy the owners of property respect the authority and will of the Board, as expressed in the orders entered from week to week, for the abatement of the various nuisances constantly accruing in this city."

Judge Woodruff, of the New York Court of Appeals, used the following language in regard to this Board:

"The importance of sustaining that Board, in all lawful measures, tending to secure or promote the health of the city, should make us cautious in declaring any curtailment of their authority, except upon clear grounds. On the contrary, powers conferred for so greatly needed and most useful purposes, should receive a liberal construction for the advancement of the ends for which they were bestowed."

THE METHOD OF DEALING WITH NUISANCES.

At the outset it may be remarked that the courts have sustained the rights of individuals to abate a nuisance, as in the case of *Meeker vs. VanRensselaer*, a New York case reported in 15 Wendell, p 397. In this case, the defendant, during the prevalence of the Asiatic Cholera, acting under an ordinance of the city of Albany, tore down a tenement house in the ward in which he resided, that belonged to the plaintiff, which was filled with families of poor people who allowed the house to remain in a filthy condition, which endangered the health of the city, and who neglected to clean the house or to remove therefrom, after notice to do so. The court, in passing upon the question of the defendant's liability, held that he was justified in his act, by the extraordinary emergency, but not as an official of the city, but as a citizen of this city interested in the maintenance of its health, particularly in the ward in which he resided.

Substantially the same doctrine is held in Manhattan county, vs. *VanKeuren*, a case in this State reported in 23 New Jersey equity reports, p 255.

The difficulty with such action is that the party thus taking the law in his own hands takes upon himself the risk that the thing which he attempts to abate may not be a nuisance in the eye

of the law, and of course if he errs in judgment he would be liable.

As has already been intimated, the subject of dealing with nuisances gives rise to questions of great difficulty and delicacy. Can a Board of Health proceed to abate a nuisance if, in their judgment, the public health requires such action? Can a Board of Health adjudge something to be a nuisance and then proceed to remove it, or must action be delayed until a judicial tribunal has passed on the thing complained of, and declares it to be, in the eye of the law, a nuisance? In other words, can the Legislature constitute Boards of Health with such powers and modes of procedure that they can determine the question of nuisance and lawfully proceed to abate a nuisance if they decide that it actually exists?

In any event it may be promised that the Courts will keep such Boards within the powers actually conferred and to the mode of procedure prescribed.

In *Weil vs. Ricord* 9, C. E. Green, page 169, a case arising out of the action of the Board of Health in Newark, in this State, the Court of Chancery restrained that Board from prohibiting certain parties from carrying on the tanning business, but left the Board free to compel these parties to carry on the business, in such a manner, that the same should not be injurious. But in regard to the main question, which is comparatively a new one, and does not appear to have been passed on in many States, so far as I have examined, a different ruling has been made in different States. In New York and Pennsylvania, the action of Health Boards in deciding upon the question of nuisance, has been sustained. In this State, a different view has been held. I refer to the case of the city of Camden vs. *Hutton*, reported in 9 Vroom, page 122 in which the Court of Errors took strong grounds against the decision of Health Boards as to nuisances holding such decisions to be of no force or effect. See, however, important opinions in the Supreme Court on Sanitary Laws and Rights in case of *Marshall vs. City of Trenton*, 6 Vroom, page 284; also, in case *Matter of Drainage along Pequest River*, 10 Vroom, 434; see also case of *Weil vs. Ricord* 9, C. E. Green, 173.

There would seem, however, to be no valid objection to investing Health Boards with powers such I shall name. I offer these suggestions as a plan by which efficient work may be done in the

direction of abating nuisances, in a manner not amenable to objections based on fundamental principles:

1. Boards of Health should have power to enact a sanitary code, declaring what things are or may become nuisances or injurious to the public health, and prescribing penalties for the violation of this code. Probably such code should be revised by the State Board. The Board should have power to sue for these penalties in courts of competent jurisdiction. This plan would appear to have worked well, as shown by the experience of the Metropolitan Board of Health of New York.

2. Boards of Health should at least have power to regulate the manner of carrying on certain noxious trades, and enforcing such regulations.

3. Boards of Health should have power in case of emergencies, where in their judgment the public health may require it after notice to the parties complained of, to declare a nuisance and to restrain parties from maintaining it until such time as a court shall have decided the alleged nuisance not to be one in fact; in other words there should be an appeal to a competent court from such action of the Board of Health and prompt and speedy trials should be afforded. Such is the law in Massachusetts. The action of a Health Board, under this law was sustained in the courts of that State in the case of *Belcher vs. Farran & Allen*, 328.

4. As no one has a right to maintain a nuisance, there can be no objection to permitting a Board of Health to show in court in an action to collect the expenses of abating a nuisance, that their action was justifiable, and that they had actually abated a nuisance.

I apprehend that the cases are not numerous in which the emergency is so great as to require the abatement of a nuisance without allowing time for sufficient notice to be given to the party maintaining the same. If means could be devised by which the question of nuisance could be speedily determined by a judge and jury, then individual rights would be protected and the public welfare promoted. Such methods form an element in the English system.

There is a distinction between regulating the manner of using property and destroying property.

I apprehend that it is competent for a Health Board to make

reasonable regulations in regard to the use of property in a sanitary point of view and to enforce such regulations, while it might not be competent for such a Board to destroy property. For instance, the trade in gunpowder, fire works and other combustibles is a proper subject of regulation in regard to the localities in which it should be carried on, the amount to be kept on storage, &c.

It would seem that a Board acting within the scope of reasonable regulations could enforce the same.

If they went outside of such reasonable regulations they might become liable.

In the presence of epidemic and contagious diseases the promptest action is sometimes required.

Under such circumstances a Board of Health, which took the necessary steps to protect the public health, would run very little risk of legal proceedings. A police officer, who oversteps his duty by arresting an unoffending citizen, renders himself liable for an action for damages for false imprisonment. But it is very rare that an officer who performs his duties intelligently is troubled in this manner. The authorities of a city may remove an obstruction, even a part of a building, which encroaches on a street or sidewalk. If they should go on the grounds of a citizen and remove part of his dwelling, they would render themselves liable.

The same rule would apply to a Board of Health. They must act intelligently and be sure of their position before they proceed. It would seem also that the period of limitation within which actions must be brought against officers acting in public capacity for the public welfare, should be a very short one.

CONCLUSION.

In conclusion I remark that the great benefits arising from the enforcement of wise sanitary regulations are susceptible of demonstration. The records of sanitary work in England show that by the enforcement of sanitary measures the death rate has been largely diminished, not only in the larger and more populous towns and cities, but also in small towns and villages.

Says Dr. Harris: "The greatest necessities and rewards for sanitary care and preventive measures, are more conspicuously witnessed in childhood than in later life. It is now practicable to

point out the local conditions and social circumstances out of which more than twenty-five in every one hundred who die might be saved to riper and more useful years of life, under the influence of improved hygienic conditions."

Sanitary science proceeds on the principle that much of the sickness and disease which affects mankind is preventible, or, in other words, is due to certain conditions which produce them and which are removable. It is the province of wise legislation to enact laws which shall guard against, and as far as possible remove such conditions, and to put into practical effect the lessons which sanitary sciences teaches.

The results of practical sanitary measures are not alone found in the reduction of the death rate. The same causes which tend to reduce the death rate operate in much larger measure to reduce the sick list. In the words of another, "The gain to the common stock of healthy and vigorous life, in a population, is twenty-fold greater than the few added years of worldly comfort and usefulness that are represented by the number of persons at given ages, saved from premature death."

METEOROLOGICAL TABLES.

SUMMARY OF OBSERVATIONS OF W. A. WHITEHEAD, NEWARK, N. J.

FROM JULY 1ST, 1878, TO JULY 1ST, 1879, INCLUSIVE.

Minimum, Maximum and Mean Temperature of each month deduced from full observations of the year ending June 31st, 1879.

| MONTHS. | Date. | Minimum. | Date. | Maximum. | Mean. |
|------------------------|-------|----------|-------|----------|-------|
| 1878. | | | | | |
| July..... | 23 | 60.50 | 3 | 98.25 | 78.25 |
| August..... | 26 | 55.00 | 9 | 90.50 | 73.09 |
| September..... | 28 | 43.75 | 1 | 88.00 | 67.47 |
| October..... | 29 | 35.00 | 2 | 96.75 | 56.41 |
| November..... | 15 | 27.00 | 12 | 58.00 | 42.65 |
| December..... | 25 | 13.50 | 2 | 57.75 | 31.83 |
| 1879. | | | | | |
| January..... | 3 | 2.00 | 25 | 46.75 | 25.69 |
| February..... | 15 | 10.50 | 26 | 49.75 | 27.68 |
| March..... | 1 | 16.50 | 10 | 63.00 | 38.42 |
| April..... | 6 | 24.50 | 30 | 76.25 | 47.96 |
| May..... | 2 | 37.75 | 31 | 86.75 | 63.83 |
| June..... | 7 | 48.00 | 1 | 93.00 | 71.56 |
| Mean average year..... | | | | | 52.07 |

From July 1st to December 1st, 1879.

| MONTHS. | Date. | Minimum. | Date. | Maximum. | Mean. |
|----------------|-------|----------|-------|----------|-------|
| July..... | 20 | 58.00 | 16 | 99.25 | 75.36 |
| August..... | 11 | 54.00 | 2 | 93.00 | 71.75 |
| September..... | 26 | 38.75 | 1 | 86.75 | 62.45 |
| October..... | 26 | 26.50 | 3 | 82.00 | 59.36 |
| November..... | 21 | 17.00 | 12 | 71.00 | 41.76 |
| December..... | — | 11.50 | — | 59.00 | 35.00 |

Minimum Pressure of Barometer Monthly, from two observations daily, during the year ending June 30th, 1879.

| 1878. | |
|-------------------|--------|
| July | 30.029 |
| August | 29.975 |
| September | 30.201 |
| October | 30.059 |
| November | 29.969 |
| December | 30.001 |
| 1879. | |
| January | 30.083 |
| February | 30.109 |
| March | 30.154 |
| April | 29.966 |
| May | 30.128 |
| June | 29.942 |
| Mean average year | 30.055 |

From July 1st, 1879, to December 31st, 1879.

| | |
|-----------|--------|
| July | 30.047 |
| August | 30.134 |
| September | 30.141 |
| October | 30.157 |
| November | 30.145 |
| December | 30.20 |

Number of Inches of Snow and Amount of Rain and Melted Snow falling each Month, from July 1st, 1878, to June 30th, 1879.

| MONTHS. | Inches Snow. | Inches Rain & Melted Snow. |
|-----------|--------------|----------------------------|
| 1878. | | |
| July | | 4.330 |
| August | | 8.060 |
| September | | 22.535 |
| October | | 2.830 |
| November | | 4.570 |
| December | 4.25 | 7.469 |
| 1879. | | |
| January | 17.75 | 2.890 |
| February | 1.01 | 2.530 |
| March | 1.75 | 3.745 |
| April | | 4.700 |
| May | | 2.175 |
| June | | 3.038 |
| Total | 24.76 | 48.932 |

From July 1st to December 31st, 1879.

| MONTHS. | Inches Snow. | Inches Rain & Melted Snow. |
|-----------|--------------|----------------------------|
| July | | 5.030 |
| August | | 9.120 |
| September | | 3.750 |
| October | | 0.320 |
| November | | 1.940 |
| December | | 1.50 |

No. 1—Mean Temperature at Princeton for 1879. From mean of three observations.

| Days. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|--------|----------|-----------|--------|--------|------|-------|-------|---------|------------|----------|-----------|-----------|
| 1 | | | | | | | 64.75 | 76.25 | 72.00 | 65.9 | 29.9 | 28.7 |
| 2 | | | | | | | 73.00 | 78.25 | 76.75 | 66.0 | 35.5 | 37.0 |
| 3 | | | | | | | 77.50 | 81.25 | 71.75 | 68.1 | 29.7 | 44.4 |
| 4 | | | | | | | 77.25 | 74.00 | 72.00 | 56.4 | 24.5 | 48.0 |
| 5 | | | | | | | 64.37 | 78.00 | 76.50 | 61.6 | 26.6 | 38.2 |
| 6 | | | | | | | 68.12 | 77.25 | 65.75 | 61.4 | 32.6 | 50.4 |
| 7 | | | | | | | 68.75 | 70.25 | 70.5 | 60.2 | 35.0 | 43.9 |
| 8 | | | | | | | 72.50 | 73.25 | 61.0 | 62.9 | 44.6 | 41.7 |
| 9 | | | | | | | 73.30 | 61.25 | 58.0 | 69.0 | 50.4 | 38.4 |
| 10 | | | | | | | 73.62 | 65.00 | 57.9 | 65.2 | 51.5 | 51.2 |
| 11 | | | | | | | 78.87 | 72.75 | 57.5 | 61.2 | 46.7 | 45.7 |
| 12 | | | | | | | 71.50 | 70.00 | 57.0 | 61.0 | 60.9 | 29.1 |
| 13 | | | | | | | 79.25 | 73.50 | 61.7 | 64.5 | 53.6 | 25.2 |
| 14 | | | | | | | 75.12 | 74.00 | 54.9 | 55.2 | 57.2 | 37.0 |
| 15 | | | | | | | 80.25 | 70.00 | 56.1 | 63.7 | 61.7 | 36.0 |
| 16 | | | | | | | 80.25 | 65.25 | 58.7 | 67.0 | 42.7 | 25.9 |
| 17 | | | | | | | 74.37 | 71.25 | 57.4 | 66.1 | 40.2 | 33.5 |
| 18 | | | | | | | 70.50 | 64.50 | 58.5 | 67.1 | 38.5 | 21.5 |
| 19 | | | | | | | 69.50 | 68.25 | 58.5 | 49.6 | 28.6 | 26.9 |
| 20 | | | | | | | 67.62 | 67.50 | 55.5 | 43.2 | 23.0 | 32.2 |
| 21 | | | | | | | 76.12 | 70.20 | 54.5 | 50.6 | 16.4 | 14.9 |
| 22 | | | | | | | 78.25 | 74.20 | 53.0 | 59.1 | 23.0 | 23.1 |
| 23 | | | | | | | 75.37 | 73.00 | 59.5 | 58.9 | 35.4 | 29.6 |
| 24 | | | | | | | 73.62 | 71.50 | 54.0 | 38.0 | 27.4 | 33.7 |
| 25 | | | | | | | 72.00 | 63.75 | 42.6 | 30.5 | 33.1 | 20.0 |
| 26 | | | | | | | 69.50 | 62.50 | 46.9 | 36.0 | 30.9 | 9.9 |
| 27 | | | | | | | 75.87 | 61.00 | 48.5 | 41.1 | 37.9 | 18.6 |
| 28 | | | | | | | 78.37 | 65.00 | 55.7 | 42.6 | 52.7 | 28.5 |
| 29 | | | | | | | 76.87 | 68.75 | 56.9 | 46.7 | 35.9 | 36.0 |
| 30 | | | | | | | 73.25 | 70.50 | 62.4 | 46.6 | 23.2 | 32.7 |
| 31 | | | | | | | 76.12 | 70.75 | | 36.2 | | 21.4 |
| Means. | | | | | | | 73.80 | 74.16 | *56.55 | 55.54 | 37.94 | 32.77 |
| Max. | | | | | | | 94.00 | 90.00 | 81.5 | 83.5 | 72.0 | 59.5 |
| Min. | | | | | | | 57.00 | 52.00 | 35.0 | 21.5 | 9.5 | 4.5 |

*Mean of last twenty-four days only. The omitted days were much hotter than the mean. Mean of thirty days, as computed from another record, 59.73.

No. 2—Maximum, Minimum and Mean Temperature, with Self-Recording Thermometers—Station, Princeton, New Jersey.

| DAY OF MONTH. | JULY. | | AUGUST. | | SEPTEMBER | | OCTOBER. | | NOVEMBER. | | DECEMBER. | |
|------------------|-------|------|---------|------|-----------|------|----------|------|-----------|------|-----------|------|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1..... | 83 | 59 | 85 | 68 | 81 | 64 | 71 | 55 | 54 | 29 | 38 | 20 |
| 2..... | 80 | 58 | 86 | 70 | 78 | 62 | 80 | 57 | 49 | 27 | 41 | 22 |
| 3..... | 84 | 64 | 88 | 70 | 83 | 65 | 80 | 60 | 46 | 32 | 48 | 28 |
| 4..... | 89 | 68 | 90 | 70 | 83 | 65 | 81 | 54 | 41 | 23 | 54 | 37 |
| 5..... | 92 | 64 | 90 | 67 | 74 | 65 | 81 | 48 | 40 | 20 | 62 | 32 |
| 6..... | 74 | 57 | 96 | 69 | 81 | 55 | 79 | 47 | 40 | 25 | 46 | 40 |
| 7..... | 79 | 58 | 85 | 70 | 78 | 58 | 80 | 57 | 40 | 30 | 59 | 41 |
| 8..... | 81 | 62 | 75 | 65 | 75 | 65 | 70 | 50 | 48 | 31 | 58 | 42 |
| 9..... | 84 | 65 | 78 | 62 | 81 | 53 | 71 | 56 | 55 | 36 | 58 | 34 |
| 10..... | 85 | 64 | 70 | 54 | 77 | 51 | 81 | 64 | 62 | 47 | 46 | 35 |
| 11..... | 87 | 68 | 74 | 52 | 72 | 52 | 78 | 60 | 70 | 49 | 60 | 41 |
| 12..... | 88 | 67 | 77 | 60 | 70 | 51 | 68 | 60 | 53 | 46 | 63 | 36 |
| 13..... | 87 | 63 | 81 | 72 | 71 | 57 | 70 | 53 | 71 | 50 | 42 | 21 |
| 14..... | 83 | 66 | 80 | 64 | 72 | 53 | 78 | 50 | 67 | 48 | 61 | 22 |
| 15..... | 86 | 65 | 83 | 64 | 74 | 49 | 70 | 52 | 63 | 50 | 45 | 24 |
| 16..... | 93 | 72 | 83 | 63 | 57 | 52 | 76 | 55 | 73 | 47 | 47 | 26 |
| 17..... | 94 | 70 | 82 | 62 | 68 | 50 | 80 | 55 | 64 | 36 | 39 | 26 |
| 18..... | 85 | 60 | 74 | 41 | 71 | 58 | 81 | 59 | 55 | 38 | 41 | 21 |
| 19..... | 83 | 69 | 70 | 58 | 70 | 43 | 80 | 56 | 47 | 29 | 35 | 22 |
| 20..... | 80 | 59 | 75 | 59 | 60 | 59 | 79 | 59 | 41 | 29 | 34 | 30 |
| 21..... | 80 | 57 | 78 | 60 | 60 | 43 | 66 | 37 | 37 | 15 | 38 | 20 |
| 22..... | 83 | 58 | 85 | 64 | 62 | 50 | 68 | 36 | 29 | 14 | 25 | 11 |
| 23..... | 86 | 57 | 83 | 68 | 65 | 52 | 65 | 56 | 35 | 19 | 34 | 20 |
| 24..... | 86 | 67 | 85 | 67 | 71 | 55 | 70 | 40 | 47 | 23 | 38 | 29 |
| 25..... | 83 | 66 | 75 | 64 | 68 | 48 | 55 | 29 | 42 | 25 | 40 | 25 |
| 26..... | 80 | 63 | 72 | 57 | 68 | 50 | 53 | 28 | 46 | 25 | 40 | 7 |
| 27..... | 75 | 62 | 68 | 59 | 68 | 50 | 59 | 35 | 45 | 28 | 48 | 8 |
| 28..... | 83 | 67 | 73 | 53 | 68 | 50 | 54 | 38 | 47 | 28 | 29 | 11 |
| 29..... | 86 | 70 | 78 | 57 | 54 | 49 | 60 | 42 | 60 | 45 | 38 | 25 |
| 30..... | 86 | 79 | 79 | 59 | 80 | 57 | 61 | 43 | 45 | 28 | 42 | 31 |
| 31..... | 81 | 68 | 81 | 64 | | | | | | | 50 | 11 |
| Range..... | 25° | | 56° | | 41° | | 54° | | 60° | | 57° | |
| M'tly means..... | 74°. | | 71° | | 63° | | 60°.5 | | 41°. | | 36°. | |

No. 3—Barometer reduced to 32° F., Princeton, 1879.

| Days. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|--------------|----------|-----------|--------|--------|------|--------|---------|---------|------------|----------|-----------|-----------|
| 1..... | | | | | | | | 29.542 | | 29.962 | 30.083 | 30.136 |
| 2..... | | | | | | | | 29.064 | | 29.969 | 29.932 | 29.952 |
| 3..... | | | | | | | 29.825 | 29.707 | | 29.786 | 29.724 | 29.877 |
| 4..... | | | | | | | 29.660 | 29.651 | | 29.903 | 30.011 | 30.003 |
| 5..... | | | | | | | 30.0920 | 29.612 | | 29.852 | 30.217 | 30.125 |
| 6..... | | | | | | | 30.082 | 29.591 | | 29.990 | 30.014 | 29.642 |
| 7..... | | | | | | | 29.529 | 29.651 | 29.758 | 30.103 | 30.110 | 29.652 |
| 8..... | | | | | | | 29.597 | 29.310 | 29.645 | 29.979 | 30.130 | 29.913 |
| 9..... | | | | | | | 29.551 | 29.694 | 29.823 | 29.825 | 29.983 | 30.189 |
| 10..... | | | | | | | 29.429 | 29.710 | 30.002 | 29.900 | 30.004 | 29.906 |
| 11..... | | | | | | | 29.365 | 29.820 | 30.079 | 30.040 | 29.939 | 29.629 |
| 12..... | | | | | | | 29.400 | 29.950 | 29.965 | 29.944 | 29.605 | 29.991 |
| 13..... | | | | | | | 29.708 | 29.854 | 29.782 | 29.913 | 29.815 | 30.375 |
| 14..... | | | | | | | 29.744 | 29.610 | 29.722 | 29.933 | 29.804 | 29.873 |
| 15..... | | | | | | | 29.716 | 29.775 | 29.901 | 29.874 | 29.434 | 29.500 |
| 16..... | | | | | | | 29.581 | 29.681 | 29.688 | 29.857 | 29.770 | 29.825 |
| 17..... | | | | | | | 29.590 | 29.641 | 29.730 | 29.871 | 30.032 | 29.812 |
| 18..... | | | | | | | 29.307 | 29.586 | 29.905 | 29.726 | 29.652 | 30.120 |
| 19..... | | | | | | | 30.014 | 29.733 | 29.961 | 29.807 | 29.707 | 30.037 |
| 20..... | | | | | | | 30.022 | 30.081 | 30.034 | 30.007 | 29.349 | 29.812 |
| 21..... | | | | | | | | 29.870 | 30.116 | 29.994 | 29.912 | 30.221 |
| 22..... | | | | | | | 29.736 | 29.641 | 29.951 | 29.896 | 30.011 | 29.822 |
| 23..... | | | | | | | 29.546 | 29.522 | 29.837 | 29.697 | 29.727 | 30.162 |
| 24..... | | | | | | | 29.661 | 29.378 | 29.744 | 29.990 | 30.038 | 29.821 |
| 25..... | | | | | | | 29.757 | 29.515 | 30.014 | 30.434 | 29.914 | 29.700 |
| 26..... | | | | | | | 29.669 | 29.609 | 30.150 | 30.424 | 30.201 | 29.956 |
| 27..... | | | | | | | 29.958 | 29.766 | 30.150 | 29.983 | 30.112 | 30.066 |
| 28..... | | | | | | | 29.713 | 29.840 | 30.072 | 29.391 | 29.722 | 29.946 |
| 29..... | | | | | | | 29.715 | 29.777 | 30.074 | 29.421 | 29.700 | 29.732 |
| 30..... | | | | | | | 29.809 | 29.748 | 30.048 | 29.545 | 30.241 | 29.951 |
| 31..... | | | | | | | 29.933 | 29.747 | | 29.879 | | 30.063 |
| Mean..... | | | | | | | | | | | | |
| Highest..... | | | | | | 29.703 | 29.667 | 29.923 | 29.900 | 29.898 | 29.929 | |
| Lowest..... | | | | | | 30.020 | 30.081 | 30.202 | 30.539 | 30.309 | 30.387 | |
| | | | | | | 29.307 | 29.064 | 29.608 | 29.289 | 29.210 | 29.413 | |

*From record of 24 days only.

Summary of Observations by J. Ingram, M. D., at Vineland, N. J.

| YEAR 1878 TO 1879. | TEMPERATURE. | | | MOISTURE. | | | BAROMETER. | | | WINDS FROM JULY 1878 TO JULY 1879. | | | | | | | | | |
|--------------------|--------------|------|-------|-----------|-------------|-------|------------|--------|--------|------------------------------------|------|------|-----|------|-----|------|-----|------|--------|
| | Max. | Min. | Mean. | Hygrom. | Rainy Days. | Rain. | Max. | Min. | Mean. | Range. | N. | N.E. | E. | S.E. | S. | S.W. | W. | N.W. | Total. |
| | July | 98 | 66 | 77.99 | 80 | 9 | 6.42 | 29.989 | 29.488 | 29.786 | .601 | 6 | 13 | 3 | 18 | 7 | 33 | 0 | 13 |
| August | 92 | 57 | 73.16 | 82 | 10 | 8.46 | 30.020 | 29.551 | 29.780 | .469 | 2 | 23 | 2 | 19 | 6 | 27 | 2 | 12 | 93 |
| September | 86 | 42 | 67.98 | 80 | 5 | .69 | 30.294 | 29.520 | 29.985 | .774 | 10 | 21 | 2 | 11 | 6 | 27 | 0 | 13 | 90 |
| October | 78 | 32 | 56.24 | 76 | 7 | 2.18 | 30.135 | 29.016 | 29.887 | 1.119 | 6 | 6 | 1 | 9 | 5 | 28 | 11 | 27 | 93 |
| November | 61 | 23 | 42.96 | 70 | 7 | 2.25 | 30.317 | 28.820 | 29.813 | 1.407 | 4 | 12 | 4 | 8 | 1 | 23 | 9 | 21 | 90 |
| December | 60 | 9 | 31.76 | 67 | 9 | 5.69 | 30.313 | 28.656 | 29.834 | 1.657 | 0 | 2 | 2 | 7 | 1 | 30 | 5 | 46 | 93 |
| January | 63 | 4 | 28.92 | 68 | 6 | 3.75 | 30.303 | 29.285 | 29.903 | 1.078 | 5 | 9 | 1 | 1 | 2 | 33 | 14 | 28 | 93 |
| February | 58 | 7 | 29.55 | 71 | 6 | 2.38 | 30.600 | 29.305 | 29.801 | 1.265 | 5 | 8 | 1 | 7 | 4 | 17 | 8 | 34 | 84 |
| March | 68 | 18 | 41.01 | 82 | 10 | 3.30 | 30.514 | 29.294 | 29.964 | 1.220 | 8 | 4 | 1 | 8 | 8 | 20 | 4 | 31 | 93 |
| April | 83 | 30 | 48.33 | 80 | 9 | 3.47 | 30.238 | 29.296 | 29.758 | .942 | 9 | 4 | 2 | 8 | 8 | 18 | 7 | 33 | 90 |
| May | 92 | 46 | 63.39 | 74 | 4 | .77 | 30.288 | 29.680 | 29.966 | .622 | 6 | 8 | 4 | 15 | 5 | 39 | 0 | 16 | 93 |
| June | 94 | 44 | 73.29 | 78 | 9 | 4.90 | 30.091 | 29.358 | 29.831 | .733 | 5 | 2 | 0 | 10 | 3 | 52 | 2 | 16 | 90 |
| Means | 77.6 | 31.1 | 52.88 | 76 | 7.5 | 44.32 | 30.263 | 29.271 | 29.801 | .992 | 5.5 | 9.3 | 2.6 | 10.0 | 4.7 | 28.6 | 5.1 | 24.1 | |

No. 4.—Meteorological Report for 1879, Trenton, N. J.

Thermometer highest August 3d..... 95°
 Thermometer lowest January 3d..... 4° below 0

Rained on ninety-four days; Snowed twenty-four times; nineteen thunder showers; fourteen fogs; thirty-four frosts; hailed four times.
 *First frost, September 26; first ice, October 29; †first snow, October 24.
 Amount of rain fallen:

| Month | INCHES. |
|-----------|---------|
| January | 2.70 |
| February | 2.30 |
| March | 5.05 |
| April | 5.80 |
| May | 1.50 |
| June | 8.85 |
| July | 4.31 |
| August | 9.23 |
| September | 1.42 |
| October | 0.47 |
| November | 2.13 |
| December | 6.42 |

Amount of snow fallen: 50.18

| Month | INCHES. |
|----------|---------|
| January | 12 |
| February | 10 |
| November | 2 |
| December | 7 |
| Total | 31 |

*Six frosts since.
 †Six times since.

E. R. COOK,
 Observer Chief Signal Service.

VITAL STATISTICS.

United Acts Concerning the Registry and Returns of Births,
Marriages and Deaths as now in force.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That every minister of the gospel, justice of the peace, and other person having authority to solemnize marriages, and the clerk or keeper of the minutes of every religious society in this State, before which any marriage shall be solemnized, shall transmit to the proper officer, as hereinafter designated, a certificate of every particular marriage solemnized before him, within thirty days thereafter, which certificate shall show the name, age, parentage, birthplace, occupation and residence of the parties married, the time and place of the marriage, the condition of each of the parties, whether single or widowed, the name of the clergyman or magistrate officiating, and the names and residences of the witnesses; any clergyman or magistrate neglecting to send such certificate shall be liable to a penalty of ten dollars.

2. *And be it enacted*, That it shall be the duty of the physician, midwife, or other person present at the birth of every child born, and in case there be no physician or midwife present, it shall be the duty of the parent to report in writing to the proper officer within thirty days thereafter the following particulars as far as known: the day of the month and year of the birth, the precise place of residence, the names of both parents, and the maiden name of the mother, the birthplace, residence and occupation of the parents, the sex and color of the child, and its name, if it be named, also the name of the attending physician, under a penalty of thirty dollars; *and it is also provided*, that any assessor of a township at the time of his annual assessment, in case he finds any return of birth not made as herein provided, may fill out the certificate of the same on the usual blank signed

by himself as assessor and made "special return," and said return shall be valid as record of the birth, but shall not excuse the attendant for neglect of return.

3. *And be it enacted*, That no sexton, undertaker or other person shall hereafter bury within this State, or bring into or remove from this State, the body of any deceased person, without having first received a permit from the proper authority of the county, city or township wherein such person may have died, and if so doing, said sexton, undertaker or other person shall be liable to a penalty of fifty dollars; *provided*, that in burying any deceased person who died in any township in this State outside of city limits, or county health board limits, the certificate of any regularly graduated physician of the township wherein the person died, shall be held by the sexton or undertaker as the only necessary burial permit, to be disposed of by him as hereinafter provided.

4. *And be it enacted*, That in case of any person dying within this State, it shall be the duty of the physician who may have attended him during his last illness, to furnish the undertaker, or any member of the family applying therefor, a certificate of the death of said person, which certificate shall show the name, age, sex, color, nativity, occupation, last place of residence, place of death and the cause of death, according to the best of his knowledge, and said certificate shall constitute all the necessary burial permit in any township of the State, outside of city or incorporated or county health board limits, and the undertaker shall, within five days after said burial, send the same, by mail or otherwise, to the assessor of the township in which the deceased died, under a penalty of fifty dollars, as herein provided; *and furthermore it is provided*, that any undertaker residing in an incorporated city or town may present the certificate of death, in case of any burial which he is superintending, to the city clerk or other proper officer of said city, and receive the usual permit as issued by it, on condition that said clerk shall at once transmit said certificate to the assessor of the township in which the person died, and in case there has been no physician in attendance, some member of the family, if there be any present, if not, any one present, shall notify a physician of the death at once, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of

death, grant the township certificate for burial, and, if not satisfied, shall send at once for the county coroner, or county physician, or justice of the peace, who shall take charge of the body and investigate the same, and, if any person present at the death of any person shall refuse or neglect to comply with the requirements of this act, they shall be liable to a penalty of ten dollars, and the physician shall receive one dollar for viewing a dead body and granting a burial certificate, provided said physician has not been in regular attendance on the deceased, if so, no extra charge shall be made by said physician.

5. *And be it enacted*, That in any case where, on account of the absence of the proper officer, or for any other sufficient reason, it may be impossible to obtain from said officer a permit in time for burial, it shall be lawful for any judge of the court of common pleas or any justice of the peace of the county in which the person died, on being satisfied as to the correctness of said certificate, to issue a permit for burial in the following form: "It being impossible to obtain a burial permit from the proper officer on account of (here stating the reason) I hereby grant this special permit for the burial of ——— whose death has been duly certified to me;" the said judge or justice of the peace shall at once copy upon the back of said certificate the permit as granted, and mail the same to the office of the Secretary of State at Trenton, marked on the envelope "Burial Permit;" and the undertaker or other person on the receipt of said special permit, shall pay to the said judge or justice, granting the same, the sum of fifteen cents.

6. *And be it enacted*, That any person who shall knowingly make any false certificate, statement or receipt, relative to any marriage, birth or death, under the action of this law, shall be judged guilty of a misdemeanor, and on conviction shall be punished by fine or imprisonment, or both, at the discretion of the court.

7. *And be it enacted*, That the proper officer to receive the certificates of marriages, births and deaths, and to grant permits for burial, shall, in any incorporated city or borough, be the city clerk or other officer charged with these duties, and in any county having a similar officer appointed by a county board of health now organized, be such person or persons as said incorporated city or county board of health has authorized or may

authorize, and in townships the assessor, but in townships outside of city or incorporate, or county health board limits, the burial certificate given by any regularly graduated physician shall constitute the burial permit as herein provided.

8. *And be it enacted*, That it shall be the duty of all assessors, clerks and other officers to transmit, on or before the 15th day of each calendar month, to the Secretary of State at Trenton, in an envelope or package marked "vital statistics," all the certificates of marriages, births and deaths as above described, received during the preceding month, or at such other intervals or periods as may be designated by the Secretary of State.

9. *And be it enacted*, That it shall be the duty of such assessors, clerks and other officers, to make and keep a complete list, as far as possible, or all coroners, physicians, midwives, undertakers, clergymen and other persons authorized to solemnize marriages, and on or about the first day of May, in each year, to send to each a printed copy of the sections of this act defining their respective duties, and to furnish them, on application, with the proper blanks to make the prescribed returns.

10. *And be it enacted*, That such assessor, clerk or other officer, upon receiving a certificate from the Secretary of State as to the whole number of marriages, births and deaths returned as aforesaid, shall be entitled to receive from the collector of the township or other proper disbursing officer, ten cents for each marriage, birth or death so returned, the receipt for which shall be attached to the said certificate, and no payment shall be made unless such certificate be produced.

11. *And be it enacted*, That the Secretary of State shall appoint, on the nomination of the State Board of Health, of which he is a member, a suitable person, who shall be a practicing physician of at least ten years' standing, who shall receive the returns made in pursuance of this act, examine carefully and prepare, under the direction of the State Board of Health, such tabular statements, results and deductions therefrom as bear upon the population, the causes and sources of disease, and the sources of special progress and deterioration, and make an annual report thereof to the State Board of Health, which report shall be published as a part of the annual report of said Board; it shall also be the duty of the said person to prepare and issue to assessors, clerks and other officers the blank forms of certificates and re-

turns required by this law, and the printed sections of the law required to be distributed to physicians, clergymen, undertakers, and other persons, and he shall accompany the same with such instructions and explanations as may be necessary and useful, and shall do whatever may be required to carry into effect the provisions of this act; the Secretary of State shall, as now authorized, furnish the above and other blank forms that may be required for issue on application or otherwise, but the failure to have received such blanks unless there has been application therefor, shall not be any excuse for the disregard of the law.

12. *And be it enacted*, That at the publication of the report of Vital Statistics, the superintendent thereof shall have caused all returns of marriages, births and deaths for the year to which the report relates to be arranged and alphabetically indexed, keeping each class of marriages, births and deaths distinct and separate, and also the index and returns for each county and for all cities of over five thousand inhabitants within said county; and the same shall be kept on file with the archives of the office of the Secretary of State, and for the clerical service needed the Comptroller is authorized to pay the same amount as is now provided to be paid to county clerks for the same service, payable on the order of the Secretary of State; and in the case of any county now having a county board of health, or of any city of over thirty thousand inhabitants, the clerk of said county or of the city board shall also keep an indexed registry, and shall receive from the proper authorities of said county or city an amount for each name so registered equal to that heretofore allowed for such index and registry.

13. *And be it enacted*, That the person appointed to take charge of the certificates of marriages, births and deaths, and to prepare the report on vital statistics, shall be paid for his services such sum as may be fixed by the State Board of Health; *provided*, that he be paid out of the moneys appropriated for the use of said board; *and provided further*, that the entire amount to be expended by said board shall not exceed two thousand dollars annually, and so much of said amount as the Board of Health may require shall be payable by the Comptroller on account rendered and signed by the president and secretary of the board, and approved by the Governor.

14. *And be it enacted*, That the State Board of Health shall have the same power of enquiry as to vital statistics, and as to other matters relating to public health in all cities and counties of the State having city or county boards of health as they have in other parts of the State; *provided*, that in no case shall the enquiries interfere with the present authority of city or county boards of health, nor shall the State Board of Health exercise any jurisdiction over such city or county boards.

15. *And be it enacted*, That in case any of the persons designated in this law to make or transmit returns shall fail so to do, they shall be liable at suit at common law to the amounts heretofore named, but said suit must be brought by a State, city or township board of health, or township committee in the State, and one-half of the amount recovered shall be paid to the usual disbursing officer of the city or township, and the rest shall belong to the board or committee bringing the action.

Explanations of parts of the Act as to Marriage, Birth and Death Returns.

Copy of sections of the law defining the duties of Clergymen, Coroners, Physicians, Midwives, Undertakers, etc.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That every minister of the gospel, justice of peace, and other person having authority to solemnize marriages, and the clerk or keeper of the minutes of every religious society in this State, before which any marriage shall be solemnized, shall transmit to the proper officer, as hereinafter designated, a certificate of every particular marriage solemnized before him, within thirty days thereafter, which certificate shall show the name, age, parentage, birthplace, occupation and residence of the parties married, the time and place of the marriage, the condition of each of the parties, whether single or widowed, the name of the clergyman or magistrate officiating, and the names and residences of the witnesses; any clergyman or magistrate neglecting to send such certificate shall be liable to a penalty of ten dollars.

Neglect on the part of those solemnizing marriage to report the same, not only incurs the penalty, but often causes great inconveniences in securing evidence as to questions of legal validity. It is the right of each married person to have this recorded evidence, besides the need of these returns in the study of conditions, and of the moral as well as the civic welfare of society. Those in charge of the various religious bodies at their annual, semi-annual or quarterly meetings should not fail to call attention to this duty of monthly report, and to the breach of law and ethics which the oversight involves.

2. *And be it enacted*, That it shall be the duty of the physician, midwife, or other person present at the birth of every child born, and in case there be no physician or midwife present, it shall be the duty of the parent to report in writing to the proper officer, within thirty days thereafter, the following particulars, as far as known: The day of the month and year of the birth, the precise place of residence, the names of both parents, and the maiden name of the mother, the birthplace, residence and occupation of the parents, the sex and color of the child, and its name, if it be named, also the name of the attending physician, under a penalty of thirty dollars, *and it is also provided*, that any assessor of a township at the time of his annual assessment, in case he finds any return of a birth not made as herein provided, may fill out the certificate of the same on the usual blank signed by himself, as assessor, and marked "special return," and said return shall be valid as a record of the birth, but shall not excuse the attendant for neglect of return.

The decisions of the medical profession (see English Registrar General and Privy Council Reports and articles on Vital Statistics, Vols. I. and II., Report of New Jersey State Board of Health, and Transactions of Medical Society of New Jersey, 1878,) authenticate it as a part of our duty to make these reports, besides the obligation which law and the general interests of society imposes. If Physicians will carry a few blanks in the pocket case or the visiting record, there is but little inconvenience. The fact that in townships the assessor is allowed to make special return in neglected cases will not be allowed to take the place of the requirement of return from the attendant, but it is used as the means of informing the Bureau of Vital Statistics of

any cases of neglect of return. Assessors should inform those concerned of the penalty for such neglect.

3. *And be it enacted*, That no sexton, undertaker, or other person shall hereafter bury within this State, or bring into or remove from this State, the body of any deceased person, without having first received a permit from the proper authority of the county, city or township wherein such person may have died, and if so doing, said sexton, undertaker or other person shall be liable to a penalty of fifty dollars; *provided*, that in burying any deceased person who died in any township in this State outside of city limits, or county health board limits, the certificate of any regularly graduated physician of the township wherein the person died, shall be held by the sexton or undertaker as the only necessary burial permit, to be disposed of by him as hereinafter provided.

4. *And be it enacted*, That in case of any person dying within this State, it shall be the duty of the physician who may have attended him during his last illness, to furnish the undertaker or any member of the family applying therefor, a certificate of the death of said person, which certificate shall show the name, age, sex, color, nativity, occupation, last place of residence, place of death, and cause of death according to the best of his knowledge; and said certificate shall constitute all the necessary burial permit in any township of the State, outside of city or incorporated or county health board limits, and the undertaker shall, within five days after said burial, send the same, by mail or otherwise, to the assessor of the township in which the deceased died, under a penalty of fifty dollars, as herein provided; *and furthermore it is provided*, that any undertaker residing in an incorporated city or town may present the certificate of death, in case of any burial which he is superintending, to the city clerk or other proper officer of said city, and receive the usual permit as issued by it, on condition that said clerk shall at once transmit said certificate to the assessor of the township in which the person died, *and in case there has been no physician in attendance*, some member of the family, if there be any present, if not, any one present, shall notify a physician of the death at once, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of death, grant the township certificate for burial, and, if not satisfied, shall send at once for

the county coroner, or county physician, or justice of the peace who shall take charge of the body and investigate the same, and, if any person present at the death of any person shall refuse or neglect to comply with the requirements of this act, they shall be liable to a penalty of ten dollars, and the physician shall receive one dollar for viewing a dead body and granting a burial certificate, provided said physician has not been in regular attendance on the deceased, if so, no extra charge shall be made by said physician.

5. *And be it enacted*, That in any case where, on account of the absence of the proper officer, or for any other sufficient reason, it may be impossible to obtain from said officer a permit in time for burial, it shall be lawful for any judge of the Court of Common Pleas or any justice of the peace of the county in which the person died, on being satisfied as to the correctness of said certificate, to issue a permit for burial in the following form: "It being impossible to obtain a burial permit from the proper officer, on account of (here stating the reason), I hereby grant this special permit for the burial of——, whose death has been duly certified to me;" the said judge or justice of the peace shall at once copy upon the back of said certificate the permit as granted, and mail the same to the office of the Secretary of State at Trenton, marked on the envelope "Burial Permit;" and the undertaker or other person on the receipt of said special permit shall pay to the said judge or justice, granting the same, the sum of fifteen cents.

6. *And be it enacted*, That any person who shall knowingly make any false certificate, statement or receipt, relative to any marriage, birth or death, under the action of this law, shall be judged guilty of a misdemeanor, and on conviction, shall be punished by fine or imprisonment or both, at the discretion of the court.

7. *And be it enacted*, That the proper officer to receive the certificates of marriages, births and deaths, and to grant permits for burial, shall, in any incorporated city or borough be the city clerk or other officer charged with these duties, and in any county having a similar officer appointed by a county board of health now organized, be such person or persons as said incorporated city or county board of health has authorized or may authorize, and in townships the assessor, but in townships out-

side of city or incorporate, or county health board limits, the burial certificate given by any regularly graduated physician shall constitute the burial permit as herein provided.

These sections are so explicit as only to need enforcement rather than explanation. The burial of a person in this State without certificate or permit, or the failure of a person in charge of a burial to return the same according to the city law or according to this law as provided in townships, is so hazardous that it is not likely to occur. There is only need to ask of physicians and others in making out certificates that they be as exact and full as possible in the statement of facts and that the returns of cause of death be such as the Leaflet to Physicians indicates. Such terms as general debility, dropsy, old age, sore throat, etc., are rarely defensible. On the other hand, cholera, typhus and typhoid fever, diphtheria, cerebro-spinal meningitis, should not be attached as names unless the specific character is clear.

In the interests of public health it is often well for the physician to state how prevalent the disease is at that time, if it is at all endemic or epidemic, and to note on the back of any certificate the prevalence of any disease which has been so mild as not to cause death. No physician should report a disease prevalent in his own practice unless he has had at least ten cases during the month.

In case of death, physicians will save undertakers trouble by leaving the certificate at the house of the deceased, or by having it ready at their own offices, so that it may be had when called for in their absence.

When in case of sudden death for which a physician finds he can not give certificate, a coroner or county physician, or a justice of the peace acting as coroner, is called, said officer gives the certificate of death as would the physician in other cases, and signs his official title.

NOTE TO CITY CLERKS AND ASSESSORS.

This copy of the printed sections of the act, etc., may be sent at any time by assessors or city clerks to any persons neglecting their duties under the law, or to any new physicians or ministers, etc., moving within their bounds. None, however, can plead

ignorance of the law from not having received such special reminder. The names of physicians, ministers, undertakers, and all required to make returns, should be kept by each assessor or city clerk in a small book, or we will, on request, furnish blank sheets for them. This Bureau should be notified especially as to changes of physicians and undertakers.

Assessors and city clerks will send on the 15th of each month the certificates up to the 1st of the month, and place on the outside of the envelope, by number and initials, how many are sent, so as to compare accounts. When an Assessor goes out of office he should include in his monthly return all certificates in hand at that time, together with the name and address of his successor. As the time of administering oaths to officers after the March elections varies from the middle of March to April, we close the fiscal year so soon as returns up to April 1st are received. All clerks of incorporated cities may have their receipt for returns twice per year if they prefer.

CIRCULAR TO ASSESSORS, TOWN CLERKS, ETC.

Some important changes in the law as to the Registry of Marriages, Births and Deaths, make it necessary to issue this circular.

I. There has been no change in the law as to the return of Marriages. These are to be made to the assessor or city clerk in the township or city or borough where the marriage took place, and on the forms provided, as they are for permanent preservation. In Hudson county all returns of Vital Statistics are made to the County Board of Health.

II. There has been no change in the law as to return of Births, except that the penalty of non-report is increased to thirty dollars, and the assessor, in his annual assessment, is to fill out a certificate of birth, marked special in any case where over a month has elapsed without report. This return names the attendant, and so shows where there has been neglect, but

does not excuse the attendant for non-report. Still-Births come under the same provision. It is impossible to compute the meaning of the death rate unless studied by the side of the birth rate. The law has been fully sustained, and all are now cautioned against the penalty for neglect.

III. The law as to the modes of giving and obtaining Certificates of Death and Permits of Burial remains the same in cases of death within the corporate limits of any city, town or borough of the State. When the death occurs in any township outside the corporate limits of a city or of a County Board of Health, the Certificate of Death of any regularly graduated physician answers as the Burial Permit; but the undertaker or person in charge of the burial must, under a penalty of fifty dollars, within five days of the date of burial send the same, by mail or otherwise, to the assessor of the township in which the deceased died.

Or if the undertaker himself resides in a city or incorporated town, he may present the certificate of death in *case of any burial* he is superintending to the city clerk or other proper officer of said city, and receive the usual permit as issued by the city clerk, whereupon the clerk at once for him transmits the certificate of death to the assessor of the township in which the deceased died.

IV. Where a person who has died in a township outside of a city is to be buried out of the State, it is best to exchange the Certificate of Death for the usual State or Transit Permit, as we cannot compel other States to accept a Certificate of Death as a permit. It is well for all assessors to have on hand Permits to exchange for Certificates of Death when asked. Adjacent States accept *our* Transit Permit, and Pennsylvania accepts the usual State Permit. The Certificate of Death is never to be given up by the undertakers or persons in charge, to the sexton or keeper of a cemetery but where such have a registry, a copy may be taken, or a certificate marked "Duplicate" be left with the keeper of the cemetery. There may be special requirements of city ordinances where the burial is within the corporate limits of a city.

Cases of disinterment and re-burial should be dealt with as burials, and have in cities a permit, and in townships a Physician's Certificate, giving name and year or month of the decease.

V. Where a body is brought from another State for burial in this State, outside of City or County Board limits, the Burial Certificate is the warrant for burial, but must be transmitted by the undertaker within five days, to the assessor of the township in which the burial takes place, and if brought within city limits, must conform to the regulations for the city. If the undertaker resides out of the State, the law would hold the sexton or other person in the State providing the place for burial as obligated to see that the certificate is duly sent. Where a body is brought into the State without either Death Certificate or its own State Permit, the mode of procedure is the same as where no physician has been in attendance.

VI. Where there has been no physician in attendance, "some member of the family, if there be any present, if not any one present, shall notify a physician of the death, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of death, grant the Certificate, and, if not satisfied, shall send at once for the county coroner, or county physician, or justice of the peace, who shall take charge of the body and investigate the same, and, if any person present at the death of any person shall refuse or neglect to comply with the requirements of this act, they shall be liable to a penalty of ten dollars, and the physician shall receive one dollar for viewing a dead body and granting the Certificate, providing said physician has not been in regular attendance on the deceased; if so, no extra charge shall be made by said physician."

In the case of a body brought from another State without Certificate of Death or Burial Permit, the charge of one dollar for issuing the Certificate is to be paid by the undertaker or person in charge; where the person has died in the State, the physician who views the body and issues the Certificate, or refers the case to the coroner or county physician, is entitled to receive one dollar from the county collector, if he has not received pay from the family or friends of the deceased.

VII. The allowance to those who receive and transmit certificates has been increased to ten cents. This includes the duty of transmitting such death certificates as belong to townships and have been given to city clerks to their respective assessors without remuneration. This increase of allowance is intended to result in a close oversight on the part of assessors and clerks for securing full returns. Success depends as much upon the officers as upon the facility of the law itself. It is not now meant that assessors and city clerks shall be merely receivers, but that they shall each in their way studiously aim that no marriage, birth or death shall occur without return in due form. Neglects reported to the Secretary's office will receive exact attention. It is the well determined policy of the State to make its statistics of reliable value both as records and as pointing out the social condition of the people and the cause of disease and death. The new law has operated encouragingly, but now that its inconvenient points have been adjusted and its force increased, there must be insistence upon exactness in all returns.

As the allowance for returns has been changed, accounts will be made up to date of April 1st. The receipts and orders for payment will be sent as promptly as returns are received in April, and the amount will be due on presentation to the disbursing officer of the cities or townships.

When there is any change of assessor or clerk the outgoing officer should make over all blanks, books of instructions, circulars, etc., on the day that he retires from office, and send us the name and post office address of his successor, whereupon the account due will be made out and sent within the month, instead of waiting until the close of the fiscal year. The new assessor or city clerk should at once inform us by postal how many blanks of each kind the former officer has made over, and how many more of each kind he thinks he needs.

VIII. While care should be taken that blanks be always on hand and are supplied to all, generally as done up in tens, yet clerks and assessors should see that the returns made nearly correspond in number with the blanks given out. In mailing, returns should be folded carefully, as they are kept on file. It is best, as far as possible, to send on the 15th of each month

only those of the previous month, except where an assessor is making his last return. It is also best to mark on the outside of the envelope of each package the number sent, M., B., D. and S. B., showing the divisions of each.

IX. We have now a list of all Clergymen, Physicians, Undertakers, etc., in the State. City clerks and assessors will please report especially medical changes. They should compare their returns at least every three months with their lists to know if there are any omissions of return. When any physician in full practice has made no birth return for three months, the fact should be stated to this office. In April of each year, in accord with section 9 of the law, all lists should be reviewed, and such notices as are needed be sent.

X. Hereafter applications for blanks should be sent by postal, directed "State Vital Statistics," Trenton. The book of instructions, or Leaflets, will be sent to Clergymen, Physicians, Undertakers, etc., on similar application by postal, or through the assessors and city clerks.

CIRCULAR.

TRENTON, N. J., 1878-9.

The enactment of a new State law as to the registry of Marriages, Births and Deaths, affords a good opportunity to secure greater accuracy of returns everywhere, and for cities to enforce their own local requirements in addition. These records have become so important in furnishing information as to the progress of States, the condition of the people, and the needs of sanitary supervision, and so help to guard against careless dealing with the sick or dead, that all countries now insist upon their careful collection and study. It is found that all such laws depend for effective working very much upon the person who, in any city or district, superintends the returns. If he keeps the names of Clergymen, Physicians, etc., and each month examines his returns, he will soon be able to detect any failures of report. With the return made August 15th, 1878, all City Clerks are requested

to send a list of all practising Physicians or Midwives who *live* within the city limits, and all Assessors to furnish a similar list of such in their respective townships, with the post office address of each person. The list should, as far as possible, designate the sect of practice; those of the Old or so-called Allopathic School being marked (A), those of the Eclectic (E), those of the Homœopathic (H), and Midwives (M). We may thus know whether those signing their names to Birth and Death Certificates have somewhere received education or license.

The names and post office address of all *Undertakers* in your city or township are also desired. Returns made to the Secretary of State will be carefully compared, so as to find out any failures of duty, and cases of omissions be recorded for investigation. All Clerks and Assessors are requested to make prompt return on the fifteenth day of each month, and to report any case of Burial without Permit, or any other case of delinquency in their District, to the Secretary of State, Trenton, N. J., or to E. M. Hunt, M. D., as by his direction, having the oversight of State Vital Statistics.

CIRCULAR TO TOWN CLERKS AND ASSESSORS.

TRENTON, October, 1879.

The experience of the Bureau of Vital Statistics has now extended over a sufficient length of time to enable us to judge of the success of present methods, and the cause of variations that may occur in the completion of returns. Incidents connected with the change in the law, the small compensation at first allowed to assessors, and the inconvenience of the first law in rural districts, occasioned some embarrassment. But since the improvement made in the law by the last Legislature, these difficulties have vanished. The aggregate number of Marriage, Birth and Death returns for the year ending July 1st, 1879, is an increase of about 13,000 over the previous year. As we come to compare the fuller returns in the different districts, it is apparent that where assessors are faithful in reminding the tardy, and requiring from all compliance with the law, full returns are secured.

It will always occur that some are negligent in making their reports. It is now the duty of all assessors and town clerks, at least each three months, to closely note those who fail to make returns, or whom they have reason to believe overlook some. When this is done full returns are obtained. In cases of continued dereliction, we have not failed in a single case reported to us to secure the returns. Already good effects are apparent in tracing the causes and localities of disease. It only needs faithfulness on the part of assessors to make this census of vital condition more complete than any other census which is taken. We now ask each assessor and town clerk to be diligent in securing returns, where there is any neglect, and to report to the Secretary of State and Bureau of Vital Statistics any persons who neglect their duty. The law is imperative and the duties explicit.

"Modern sanitary science owes its existence to the registration of deaths, and the localization thereby of unsanitary conditions." Alongside of it we need to study the marriage and birth returns as showing the proportion of material, the circumstances, ages and conditions with which disease is dealing. No city or township can properly guard its population or lessen the avoidable burdens of insalubrity which sicken and destroy its inhabitants without a study of such statistics. In large cities it is indispensable that street by street or other areas of locality be studied and compared. The English reports teem with records of such inquiries, and with the details of methods by which the people have been delivered from some of the most serious embarrassments to health and life. We urge each assessor and town clerk to re-study carefully the directions already given—to secure full reports from each clergyman, physician, etc., and in a thorough, business way to aid us in the perfecting of these returns.

By order of Bureau of Vital Statistics.

CIRCULAR AS TO SANITARY ORGANIZATIONS IN CITIES.

To the Mayor and Common Council of your city:

New Jersey has about fifty incorporated towns and cities, including over 600,000 inhabitants, the entire population of the State being a little over one million. Other towns not incorpo-

rated, such as Vineland, Flemington, Somerville, etc., contain about 50,000. According to the census of 1875 in an area of 70 square miles there are 307,363 inhabitants, or nearly one-third of the people of the State. The geographical position of our State necessitates that masses of people congregate in chosen centres. The relations of tide water also bring the cities in close neighborhood to each other. We cannot thus mass population without certain incidents and associations unfavorable to health and long life. The comparison of the average death rate of city and country, and that of cities among themselves, shows the actual facts as to the perils, and also how far they may be obviated or diminished by sanitary methods. There are no health lessons more valuable than such as are to be learned by the study of those English cities in which sanitary measures have sensibly prolonged the lives and improved the health of the people. Sickness and death are more expensive to towns and more personally depressing than are such expenditures as are really demanded for their prevention, if these are made with intelligent and honest jurisdiction. The greatest expense is generally in undoing what ought never to have been done, or in imperative changes after a locality has been builded upon. Many of our cities are now accumulating evils which wise forethought and a little expense would easily avoid, while afterthought and depressing disease and taxation will create the real burden. If before doing we find out just what needs to be done and how to do it, leaving the *when* as a measure to be decided on with all the facts in view, there is seldom unwise or burdensome expenditure. Cities will be disease resorts until they are made health resorts. The questions for the citizens and for their official representatives, are simply these:

What ought to be the health condition of the town?

What are its natural sources of ill-health?

What are its artificial sources?

How can these be prevented from increasing?

How can real evils be abated?

It is not difficult to obtain important preliminary information. In the inquiry itself good enough is done to pay for the time and trouble, even if we are not able at once to abate recognized evils. The first step toward reform is a sense of its necessity. We have sometimes to pause long, but nothing is lost by the

first step. The State is helping in this direction through the Bureau of Vital Statistics. It is now possible to learn what the actual death rate is, what proportion it bears to the birth rate, and to the population, what ages are most affected, and what local causes show their effects in registry of death and in the prevalence of disease at any one spot. The geology of our State is so defined that it is an easy matter to determine the ground work of our cities. The sources of, and the risks from, impurities are not difficult to discover. What constitutes a healthy dwelling and what are the deviations therefrom to be found in cities or parts of them can be ascertained.

Where children or operatives are assembled for daily work, we should know whether there are avoidable evils risking health or embarrassing labor. The great present need of most of our cities is not expense, but some well devised steady inquiry—a recognition of its importance, and some simple, definite plan of fact-gathering. Every city should have its Health Board of not less than five members. These should not be chosen politically, but with reference to fitness for sanitary inquiry into the causes which favorably or unfavorably affect the public health. The Mayor and City Physician should be, *ex-officio*, members of the Board. Surveyors and City Clerks and School Trustees are often of service with other members. It is not difficult to select in each city those who by judicious examination could give valuable information as to local causes of disease. Some of our cities have no Health Boards at all. In some there are Boards without power.

With expenditures limited within fifty or a hundred dollars, many such Boards could gather facts which all the citizens should know, and which would prevent increase of sickness by precautions, where they could not at once abate nuisances. Here and there a city is doing valuable work. We know a few cities in which voluntary associations have accomplished so much as to have been of great service.

The Health Board of the State has, as one of its duties, to cooperate with all localities in such inquiries.

We respectfully ask that you make of your Health Board something more than a name, if at present it is merely this, and that you place yourselves in such correspondence with us as that there may be mutual aid in securing the welfare of our citizens.

These interests have to do with the material prosperity of your city far more than some imagine. The time has come when intelligent persons, seeking settlement and business, inquire as to the sanitary administration of the place. The City Clerk in his next report of Vital Statistics is requested to send the names of the Mayor and of the Board of Health of the city, and always to send any report made by the Board or any facts as to sanitary conditions.

Any careful series of questions asked by any Boards will receive due attention from the State Board of Health and the Bureau of Vital Statistics. We ask that this matter be brought before your Council at its next meeting and that your Board of Health be so strengthened as to secure effective inquiry.

EZRA M. HUNT,

Secretary of State Board of Health, Medical Supt. of S. V. S.
TRENTON, N. J.

REPORT OF THE MEDICAL SUPERINTENDENT OF STATE VITAL STATISTICS.

Vital Statistics are important because they are the record of the vital conditions of population. They afford the data with which we must be acquainted in order to plan for the future development of the social and material resources of a State. If they present facts not in accord with true progress or a higher civilization, we are thereby led to inquire into causes of failure and to study how, in the future, to abate or control whatever may be found to have interfered with the highest welfare of the whole people. Governments long since found that as preparative to defence in times of war, they must seek an accurate acquaintance with the physical conditions of their subjects. A standing army, selecting the strongest men, and, by military discipline, developing all their physical resources, might seem, in part, to preclude the necessity of special care for the remainder. The European nations have not so thought, and surely a nation depending largely on a citizen soldiery could not so reason.

Modern and Republican statesmanship has taken a higher and broader view in that it has come to estimate the real strength of a people, by the capacity of a nation in peace; by the vigor which it can infuse into trade, commerce and the arts, and by an effort to secure that endurance, of which a sustained industry is the happy token. It affords a base of supply which often prevents the occurrence of war, and, if it comes, gives the best assurance of victory. Social science is now distinctly recognized as an indispensable department of Political Economy. It has no more important division than that which concerns the health and the life of the people. The common health is so much the common wealth as to restore to the two words their former identity of meaning.

It is sufficient for us just now to accept the united verdict of all statisticians in favor of the most accurate registrations of those

events of marriage, birth and death which so concern national as well as individual life.

Our greater need is to study the best methods of securing the returns, and then how to deal with the facts acquired in such a manner as to deduce from them correct conclusions, such as shall indicate avoidable errors on the one hand, and true methods for progress on the other.

It is fortunate that we do not enter upon an untried or experimental field of inquiry. Statistical inquiries conducted by methods such as belong to science and the arts, have been pursued by many governments as parts of their economic administration, and have commanded the devoted attention of many of the ablest minds of the age. Speaking of one class of such records Farr, the statistician says, "The deaths and causes of death are scientific facts which admit of numerical analysis. Science has nothing to offer more inviting than a study of the influence of civilization, occupation, locality, seasons and other physical agencies either in generating disease or producing death, or in improving the public health." After twenty-one years of registry, he says, "We have now before us the results of observations in a certain class of phenomena. They are as valuable as the experimental philosopher could have deduced from his experiments if he had had the power to expose the population to great vicissitudes of heat and cold, of dampness and dryness, to changes incidental to differences in the price of food; to air and water in different degrees of impurity, and to destructive epidemics." "Organized bodies are governed by laws as fixed as those which govern the stars in their courses."

Beneke, the statistician of the German government, has said "mortality statistics are the basis of public as well as private care of health. Every step forward in this direction is a gain to human working-power and welfare." Our American statist, DeBow, generalized the accepted fact when he said: "The experience of all countries preserving such records shows a marked amelioration of society, diminution of disease, and extension of the average period of human life."

As to the method of obtaining the most correct returns on leading points, there is, on the part of those who have used various plans and had the largest experience, a unanimity of

judgment quite in contrast with the varied and speculative suggestions of those who have not studied this subject as they have the details of their own chosen occupation.

First of all it is found that the record of an event is most accurately obtained from the person specially in charge at the time and at a period of time not remote from the occurrence. Punctual and careful men are apt to think that occasional reports in bulk would do, while those who lay chief stress on the fact of a marriage, or birth, or a death, rather than upon vital inquiries connected therewith, do not object to an annual collector whose returns are capable of no satisfactory analysis.

Second, returns are chiefly of value when gathered over large areas and from a large population admitting of comparisons as to city and county, as to locality and climate, as to age and circumstances, and other modifying or governing circumstances. It is only thus that hasty generalizations from an insufficient number of facts are avoided, and errors eliminated, which, in a small comparison would be formidable or unaccountable. The general government now deems it wise to attempt this at its decennial census for the whole country.

When our present law commenced operation, it might be fairly asked whether returns could be secured from the whole State with the same accuracy as from a single county, even though it would be readily granted that if they could the comparisons would eventually be of far greater importance. Experience has fully settled this point. There has been little difficulty in securing the returns. Delays have occurred more in cities that had become accustomed to neglect a local registry law, than in those that never had one, or than in sparse localities.

It will be seen that with all the temporary embarrassment consequent upon any change, and then upon a subsequent modification, the aggregate of returns exceeds by over 13,000 those of the former year.

New Jersey represents a population of little over a million, or about the population of New York City. By the facilities of present postal intercourse we are easily able to bring together monthly returns, and in the end to secure all the advantages afforded by a comparison of all the returns for the whole State at a single centre. This affords a basis for the thorough study of social and vital conditions in every part, which will enable us in the

future not only to compare different counties and districts with each other, but also each city with every other. Our large cities will need to make that closer inquiry which is thus made easy of comparing different streets and parts of its own municipality in order to find the operative causes of variable death rates.

The more difficult question to deal with at present is how to tabulate the statistics which are obtained so as to make them correct inferences.

Some of the most valuable deductions can only be made by comparisons of one year with another. As our former statistics have long been admitted as valueless for any sanitary or disease study we can only rely upon such as shall be soon furnished from year to year.

It is important at the start to settle definitely as to the use to be made of the figures and the kind of analysis which will be instructive.

As the returns of deaths and causes of death can be more informingly dealt with in the start, it is best for the present year chiefly to consider how we are to get indications for sanitary care and advisement from these.

1. The first apparent principle is that the proportion of deaths to the number living is an indication of the prevalent mortality of a people. It is also an approximate indication of the amount of sickness, and of the prevalent stamina of the population. To this general statement there are found to be some collateral limitations which need to be regarded in constructing life tables.

2. We need to deal with large areas and with smaller areas in various localities and of various density of population in order that our generalizations may be more accurate, that our comparisons may be more numerous, that our mode of dealing with variations in special localities may be fully certified. It is partly for this reason that not less than one thousand is usually taken as the unit for statement of death rate.

The aggregate of deaths and the aggregate of the living have fluctuations, which would lead to erroneous generalizations. Errors from this source can, to a very great degree, be avoided by dealing with decades or lesser divisions of age.

3. This leads to the proposition that tables of mortality must present the proportions of the death at each age to the living at

equal age. The careful study of this subject by vital statisticians, both in reference to vital returns and the interests of life assurance has led to the conclusion that "the rate of mortality in decennial periods furnishes the most satisfactory basis for determining the series of facts which will express the probabilities of life. It is also usual to include all the ages under ten in a decennial period, making deaths under five a distinct column in addition.

It is also claimed by many that all deaths under one year should form a separate column, although others have shown that in an aggregate, if included with all under five, they do not disturb the reliable approximation to accuracy.

4. For the same reason it is important to know the number of the living at each of these ages and the number of births, since only thus can we accurately know the amount of material with which disease and death are having to deal. Where birth returns are incomplete, the whole number living under one year of age added to those who have died under that age within the year, enables us to reckon as to the deficiency with an approximation that is safe in dealing with large numbers and extended areas.

5. If we add together the ages of all who die and divide the sum by the number of deaths we get the *mean age at death*. Formerly the health of two populations was supposed to be indicated by the mean life time, and this to be in the proportion of the mean age at death as thus shown. The mean age at death does bear upon the laws of longevity and race-conditions. But in the light of the closer analysis afforded by finding the proportions of death at different ages to corresponding ages of population, and of the whole to the parts, it is evident that this method alone is not reliable.

Another method of securing the mean age at death is approximate. It is illustrated thus: If one hundred thousand persons born at the same moment were followed through life, the number that died in each year of age noted, and the sum of these ages divided by one hundred thousand, the average ages which they lived would be obtained. The mean duration of their lives would be their mean age at death.

If these were a fair sample of the law of life in their country or place of residence, this would give us the mean future life-time of those born at any successive period, or what is called "the

expectation of life." On such a basis life insurance and life annuities can be predicated, and a standard furnished by which to estimate the deviations occasioned by disturbing causes and the methods of their abatement. This idea is practicalized by taking the population living at each age in the middle of a year (thus avoiding some fluctuations which might appertain to adjacent years,) and the deaths in the same year at the same age. We thus obtain the actual mortality both as to number and ages and the proportions, and so come to know the mean duration and expectation of life. At the same we possess ourselves of details of data that help much in the study of the devitalizing burdens of population.

6. Another recognized principal as to vital statistics is that some diseases and deaths at certain ages are far more informatory than others as to artificial and avoidable causes of disease. The so-called zymotic diseases, for instance such as scarlet fever, diphtheria, etc., have, by analysis of facts as to the conditions of their excessive prevalence, established for themselves such indicative value as that Simon has associated them under the name of filth diseases.

The alvine fluxes such as diarrhœa, cholera infantum, etc., and the lung diseases of early childhood are quite informatory as to local surroundings. Thus an analysis of the lives of 100,000 children born in one year, as actually made under the direction of the English Statistical Bureau, showed that 25,799 died within five years. "Closer inquiry showed that prevention depended very much upon the power of parents to supply food and raiment, upon the mother's watchfulness and cleanliness, upon the air they are doomed to respire in imprisoned courts and alleys, or in the fresh open atmosphere of healthy country districts." Similar inquiries in subsequent decennial periods show the effects of school life, of trades, and of the various influences which either establish or undermine physical vigor.

We are thus able to ascertain to what degree life is shortened, under unfavorable conditions, what these conditions are and how they may be vacated.

"These items," says one, "are as indispensable in sanitary inquiries as the barometer or thermometer, or other instruments in physical research. The influence of any external cause or combination of causes can be analyzed, while without this aid

and extended observation and calculation we are liable to be misled at every step by vague opinions, well concocted stories, or interested statements." These are our instruments of precision, without which we have not the data for reckoning by which to determine fluctuation, and so guard against disturbing forces. It is because the State and society can not afford to be ignorant of such social conditions as are subject to ascertainable laws of progress or deterioration that studies like these touch very nearly the polity of any people.

To those who merely view statistics from afar, or are bewildered over masses of figures—as they would be bewildered in a printing office because they have not set type—there is a tendency to conclude that there are so many sources of error that reliable results cannot be obtained or safe deductions made therefrom.

There is no such wilderness as that of unexplored statistics, and no such confusion as that arising from the misplacement or ill-assortment of figures. On the other hand, there is no greater lucidity than that of a problem mathematically demonstrated and certified by the application and experience of competent observers.

It ought to be quite sufficient that the students of vital and social conditions who have based their studies on such methods have established for themselves the fullest recognition and have become thereby indispensable to the nationalities in which they are citizens. The names of Halley, Finlaison, Farr, Graham, Quintelet, Bertillon, Berg, Beneke, Walker, Snow, and many others are not the names of statistical dreamers or visionary experts, but of men whose services their respective governments have gladly commended in the interests of the population.

Additional to this is the fact that the methods they have devised, and the results they have indicated have been made the basis of such economic administrations as have resulted in appreciating the welfare of the people.

Fifty years of actual experience has shown that Joshua Milne was right when he said: "Whether the population is stationary, increasing or decreasing, and whether such changes be produced by procreation, mortality or migration, or by the joint operation of any two or more of these causes, provided that the mode of their operation be uniform, or nearly so, and not by sudden

starts, the law of mortality may be approached near enough for any useful purpose by actual enumeration and the bills of mortality."

The men who have inclined to and pursued the study have not generally been men of diffuse inference, but rather those who rely upon mathematical deductions and subject themselves to the severest tests of experience.

Halley, the inventor of life tables, had as the test of his correctness that he was the first to accurately predict the return of a comet. "He believed in the constancy of the laws of nature and ventured from a knowledge of a part of a curve of a comet to predict the whole." Applying similar methods of study to facts and observations about human life, he conceived the possibility of defining its course and conduct, of studying its variations, and thus brought the science of numbers to bear upon the determination of health, disease and longevity, and so gave an introduction to those numerical methods which are now doing so much in teaching us how to deal with great variations from ascertained health-standards. It is this that led General Graham, the Registrar for England, to say "that much light is being thrown on the physical condition of the respective populations such as suggests many ways of diminishing the suffering and ameliorating the condition of the people, for the longer life of a nation denotes more than it does in an individual; a happier life—a life more exempt from sickness and infirmity—a life of greater energy and industry, of greater experience and wisdom. We can thus read of sickness diminished, deformity banished, life saved—of victories over death and the grave with as much enthusiasm as of victories over armies in the field." "The deaths and the causes of death," said Dr. Farr in his first report, "are scientific facts which admit of numerical analysis. Science has nothing to offer more inviting than the laws of vitality, the variations of these laws in the two sexes at different ages, the influences of occupation, locality, seasons and other physical agencies either in generating disease, inducing death or improving the public health." The tendency to guessing or loose inference on insufficient number of cases is very common.

It is a great thing for any study, whether of physical life or social condition, when it attempts to substitute exactness for

vague conjecture. All the more when the attempt at once reveals laws and shows us the method by which we can eliminate or offset errors. By enumerating the ages of population, the deaths at different periods, by comparison with birth or death registers, by so associating different periods and different localities as to detect imperfect returns, by comparisons of life and death and population tables, and by various applications of expert methods of analyses, and methods of securing closeness of observation and collateral tests of accuracy, this study has come to assume a definiteness which is thoroughly scientific and eminently practical. Imperfections in returns which mislead or confuse a casual observer are duly weighed and allowed for by the systems in use. Like the long-discussed proposition of Farr, as to specific population, or the relation of density to proximity, which has so recently been certified as correct by Dr. Robertson and Prof. Tait, so have other reasonings of the vital statisticians stood the test of accuracy. The calculations of probabilities gives mathematical result.

The causes of disease are drawn with precision, and graphic methods are enabling us to compare and study results, and to test and correct possible errors where they might exist. In such a study there are disturbing factors, which, as being on opposite sides of the equation, balance each other.

No true student of such a science but that recognizes fallacies to be guarded against, and elements of confusion in the initial efforts at registry. But the mariner must not throw his compass overboard because there is a real and sometimes unaccountable fluctuation of the needle. In guiding human life amid its shoals or deep waters, statistics afford us equally valuable and indispensable aids, although it is true they need a close supervision in order that accuracy and completeness may be secured.

Without now entering into all the details of methods by which such a study is conducted, it is in order to say that our registration system was not adopted without close inquiry into the plans of other States as well as of those of foreign governments. It has already commanded the attention of experts in this line of study and practice, and is so commended by those who have examined it as to give great occasion for hopefulness. There are lessons which can only be learned by actual experience and comparisons that can only be made at the

shortest, at quinquennial periods. But in the meanwhile the records will be valuable in all legal aspects, while in some regards we shall be able to study the comparative figures of each year, and of each city and county with great advantage.

We have no reason to apprehend any difficulty in securing reports from each township or city, and in increasing their accuracy and completeness. With those who have thus far had occasion to examine the returns for legal evidence, there is a uniform expression of satisfaction.

Our table of returns is made to reach from July 1st, to July 1st, of each succeeding year. For facility of comparison, it were better to have the report reach from January to January. But because this report must be made by the 1st of November, this is not feasible unless the report should only reach to the preceding January. It has been thought better, therefore to have it embrace a year which reaches to July 1st, and so is easily divisible into half year or quarterly estimates for purposes of comparison. The returns for June of 1878, as thus left out of the tabular classification, are all duly filed and indexed, and are given by counties and cities in a separate part of the report, and not included here in the summary for a year.

Guarding ourselves against arrangements of figures and deductions therefrom, or insufficient data, we shall, this year, need to deal only with a few tables. The tables will show the actual number of Marriages, Births and Deaths, as returned from each township and from each city of over five thousand inhabitants.

As occasionally returns were made by assessors over the line of their townships, which could not always be adjusted until greater familiarity with boundaries was acquired, there will be some slight variations in numbers, but none sufficient to be serious disturbing factors in the general estimate, and none that are not noted upon the original index sheets, as where burials from other States or reburials took place. Various tables as to marriages, showing ages, nativity, percentage to the population, occupation, etc., and similar items as to births, and comparisons with previous years, would not, if now made, be available for any practical purpose. They are on record and indexed so as to be easily consulted. The State has, as yet, made no provision for such full transcription of the returns as is desirable. Of these we at present give only the local numbers and general summary.

The most important table to be made at present is that which, after showing the number of deaths in each statistical district, then shows the principal causes of death and the ages of the decedents. Thus we are enabled at once to study the influence of local causes of disease, and to compare one locality and one part of the population with another at marked periods of age. While for some purposes it is advisable to study population in quinquennial or decennial periods for the purpose of this comparison, we have taken the ages used for this purpose by the highest European authority, and the same selection of diseases, with the addition of two or three incident to our national and State locality.

It is hoped that ere long we will be able to deal thus with each disease at shorter periods of life, and with it to associate a closer study of occupation, circumstances and modes of life. Already some of the data of these tables are prepared. The tabulation will be made to such a degree as the State Board of Health, under provisions of the State may direct.

In dealing with the death returns, we have the satisfaction of knowing that we are able to give with great accuracy the actual death rate of each locality, with ages and other vital facts.

While the statement of causes of death depend much upon the diagnostic accuracy of the attendant in charge, and there is some just criticism as to the competency of some who furnish certificates, yet for the leading diseases the record is quite accurate.

It would be better too if the birth returns were as full in proportion to the actual number as the death returns, since this gives the relation between death and birth rates, and the amount of susceptible material furnished for disease or for insanitary impression. These will be more fully secured each year, while the record of all deaths before 5 years of age and calculations, established as to the usual proportion of birth rates to population will enable us to secure comparisons approaching to accuracy.

COMMENTS ON RETURNS.

The twenty-one counties of the State by the census of 1875 contain 1,020,584 inhabitants.

The deaths as appears from the tabulation from July 1st, 1878, to July 1st, 1879, numbered 20,440. This is a death rate of 20.02 per 1000 for the whole State. Of these the large proportion of 7,919 were under five years of age, and of this number 4,452 under one year of age.

The still births are excluded from this summary. Of the remainder of the 20,440, 1,905 died at the ages from childhood to manhood, or from five to under twenty years of age; 5,930 from twenty to sixty years, or in the active working period of life; 4,337 beyond the age of sixty, and 349 at age unknown or not stated.

The returns or index sheets give all the ages so that they may be divided into quinquennial periods, but they are here published nearly as in the quarterly Glasgow summary. The published tables show the proportions for each county and township of the State for all cities over 5,000 inhabitants.

There are twenty-one incorporated cities of the State containing over 5,000 inhabitants, and these as required by law are indexed separately.

Out of the 1,020,584 inhabitants of the State these cities contain 486,541. Besides these many of the townships have their chief population in cities. Out of the 20,440 deaths in the State 11,208 have occurred in these cities.

The area of the whole State is 7,576.68 square miles.

The area of all the twenty-one cities is not yet available.

A study of other cities as related to area shows the great tendency of population to cluster and mass so that parts of some of these towns are so dense as some larger cities. A close examination of a few of these larger cities will show them so small and favorably situated as to be entitled to have only a county death-rate. So on the other hand outside of these cities there are found crowded villages, or ill-situated or ill-managed localities which have a city death-rate, and so make the average of the township large. In one or two instances the county death-rate is made large by this fact. That of Atlantic county is too large because of a defect in census and large temporary population. A careful and systematic comparison of these conditions will well repay medical practitioners, or those who may be studying the vital conditions of population in special localities.

The death rate of each county is given, as also the death rate of each city so that all these may be compared. The death rate of townships is not carried out, because that is easily done as any one may desire, and as the calculated death rate of small or sparse populations for a single year does not convey a proper estimate of real healthfulness. It is true also that in the case of counties and of cities, while the aggregate death rate is informative or indicative, it needs also to be carefully compared and all modifying circumstances duly weighed. Thus the general death rate of Hudson county, outside of its cities of over five thousand inhabitants, is made to appear larger, because of the comparatively small population outside of these cities, and because as suburbs, or by reason of special localities and exposures, there are small areas which show a very high comparative death rate. Again the death rate of Jersey City, in comparison with Hoboken, is really higher than the figures would indicate, since the city boundary extends to the Hackensack, and includes what is in part a county area. All these points, however, can, in time, be estimated. The great work for cities, and also for larger towns and for some other special localities in counties, is, after knowing the general estimate to take measures to examine sections and parts and find out just where the chief diseases and preventible causes of disease are to be found. Vital facts as to sex, nationality, etc., are fully on record, but, as yet, not sufficient for correct inferences.

DISEASES.

The principal causes of disease have been singled out and tabulated, as found in the report. These include what are known as zymotic diseases, many of which are owing to local or preventible causes. It is also true of most of the other diseases that appear in this list of the principal causes of disease that they largely depend upon foul air, poor food, poor water supply, undue moisture, or other causes that admit of abatement or control. Out of the 20,440 deaths in the twenty-one counties 15,797 are embraced within these principal causes. The rest are scattered among accidents and less prevalent causes of disease. In the estimate no disease of any child under one month of age is included, since these are so often loosely stated or connected

with earlier malnutrition that they would swell the report of infantile diseases beyond their real significance. Of the 15,797 deaths from these principal causes 8,738 occurred in the twenty-one cities of the State, of over 5,000 inhabitants. The total population of these cities is 486,541, that of the rest of the State being 534,043. The tables are of great interest as showing the principal causes of disease, a death-rate of 17.95 for these principal causes in the twenty-one cities, and of 13.21 outside of these. The study and comparisons of such tables help to correct impressions as to the prevalence of disease or epidemics in certain localities. Often these impressions are derived from a few cases, or from one or two sudden deaths, or several in two or three families, or from the inaccurate methods of some physicians in speaking of this or that disease as prevailing.

SMALL-POX.

No case of small pox is reported in the State. New York city, with about the same population reported only two cases the last year, both of which occurred from a non-resident. It must be admitted that epidemics have a kind of periodicity. It is claimed by many that this results from the fact that at the time of a severe epidemic many have it or die, and as in the case of small pox great numbers are vaccinated, and so protected. Thus the material for the disease diminishes, and what remains is so separated and cases so isolated that the disease can not reach the proportion of an epidemic. This is true, although it is also probably true that infection may have their "epizootic" waves which reach us only occasionally. It is the conjunction of meteorological and local conditions that causes the epidemic. The former we must study but can not always control. The latter it is believed we can. If so we as effectually prevent result as if we had charge of both of the necessary factors. Even as to the former we may sometimes define the conditions and so protect themselves from them.

DIPHTHERIA AND CROUP.

The number of deaths from diphtheria and croup (1,100) may well excite attention. It is not like consumption, a hereditary

disease, or one dependent upon a variety of causes, but in its invasion is believed to be owing to specific infection from without. With many the cause of membranous croup and "membranous" diphtheria is regarded as identical. They are now so nearly allied in the nomenclature of the profession as not to be separable in returns. The persuasion is gaining ground that the causes of inception are often local, and that we must seek and shall secure prevention of its causes.

SCARLET FEVER.

Scarlet fever with its 627 deaths is still a dreaded scourge of childhood. It is now the topic of much hopeful inquiry. Recent facts look to a possible spontaneous origin of the disease under some flagrant circumstances.

Like diphtheria it needs to be watched in its places of greatest prevalence, and the conditions and circumstances of its outbreak carefully noted. When derived by imported contagion it can often be greatly limited in its virulence and extension. The jurisdiction to be exercised over schools in their relation to the prevalence of contagious diseases is a subject pressing upon us for consideration. It will require very definite declaration of the laws and circumstances of contagion or exposure on the part of physicians, and clear judgment from our educators. The time has come in sanitary science when opinions will not do. The grounds of opinions must be given, in order that these may be reviewed.

BOWEL AFFECTIONS.

The large number of deaths from diarrhoeal diseases, and especially as associated with the large prevalent death rate under five years of age, points very decidedly to local causes of disease which must be abated. Cities hereby show their great accumulations of evil. When in some country places, as along the sea shore, death rate is high, it is in part traceable to those brought thither for good air, too late to recuperate. Although we have not the data for separating accurately the deaths among temporary residents, we think that the death-rate of Atlantic county from this cause, registers higher per thousand than it otherwise would.

CONSUMPTION.

Consumption demands much careful study with reference to surroundings, localities and occupations. In some trades like those of hatting, glass-blowing, etc., it is always noticeable how often occupation is the cause of death. We refrain from tabulations which seem indicated, because not willing to reason from too few cases or insufficient data. But it is evident that many of our industries need studying in their bearings upon health, and in order to provide such protection from dust, heat, chemical fumes or ill-ventilated enclosures as will save skilled workmen from the incubus of diminished vitality, and the State from the loss of valuable lives. It will be possible ere long to show how certain diseases depend upon definite ascertained conditions, as plainly as the relations of cause and effect is shown in the other physical sciences. It will yet become one of those vital facts which will compel the notice of all rulers of the people, since the welfare of population must be provided for. Such legislation always proves more regulative than punitive, and benefits the whole people by preventing avoidable sources of depopulation and enfeeblement. Demoralization and degradation are often best provided against by attention to the household, school and workshop—protections to which every inhabitant is entitled.

REVIEW.

A review of the deaths and causes of deaths for the entire State, either shows that the past year was one of exceptional good health, or else that the State ranks very high in its capacity for health. A list of all of our smaller cities, and death rates calculated for the usual country areas, where there is a well-settled but scattered population, give us indications as to health, which are highly encouraging. It is highly probable that a death rate of not over 15 per thousand, could be secured by the application of well understood laws of hygiene, with the prospect of still further amelioration. How healthy cities may become is not yet determined. It has been shown in England and Scotland that with some special advantages which cities

enjoy of methodizing sanitary care, it is quite possible to bring down the rate of parts of cities to the rural average.

In our own State the contrast between rural and city districts is as marked as in some of the most neglected parts of our country. It is not too much to say that the imperfect sanitation of some of our most populous cities, and the meagre attention given to any thorough sanitary work, has greatly excited the surprise of sanitarians outside of the State, who have studied these and other similar areas. Hudson and Essex counties, especially, stand in need of a very exact and well-planned study of conditions which now are showing themselves by excessive death-rates, and an enfeeblement of population. The same is true of several cities.

The time has come for the careful study of the statistics of localities and careful consideration of the local care of population as to health. It is a question of prosperity and of progress for individuals and for the State. The State, by a well-devised system, now offers a helping hand. It now behooves that each city and district for itself should see to it that it seeks evidence rather than promiscuous opinions as to healthfulness or insalubrity, and that on the same careful and exact methods it finds what ought to be done, and how and when it should be done.

All that pursue such a course will find that economy and home interests, as well as philanthropy, require a well-planned and well-executed oversight of localities and population in a common cause and for the common welfare.

NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY
TOWNSHIPS.

Atlantic County.

| | M. | B. | D. |
|--------------------------|-----|-----|-----|
| Absecon..... | 8 | 20 | 13 |
| Atlantic City..... | 19 | 62 | 64 |
| Buena Vista..... | 0 | 19 | 4 |
| Egg Harbor City..... | 19 | 39 | 36 |
| Egg Harbor Township..... | 32 | 63 | 54 |
| Galloway..... | 12 | 50 | 41 |
| Hamilton..... | 10 | 41 | 40 |
| Hammonton..... | 9 | 28 | 21 |
| Mullica..... | 2 | 14 | 7 |
| Weymouth..... | 0 | 16 | 22 |
| | 111 | 352 | 302 |

Bergen County.

| | M. | B. | D. |
|--------------------|-----|-----|-----|
| Engleswood..... | 23 | 51 | 62 |
| Franklin..... | 15 | 21 | 35 |
| Harrington..... | 17 | 35 | 34 |
| Hohokus..... | 31 | 55 | 64 |
| Lodi..... | 18 | 57 | 80 |
| Midland..... | 3 | 19 | 31 |
| New Barbadoes..... | 33 | 141 | 102 |
| Palisade..... | 16 | 31 | 37 |
| Ridgefield..... | 7 | 36 | 49 |
| Ridgewood..... | 2 | 30 | 20 |
| Saddle River..... | 3 | 8 | 25 |
| Union..... | 11 | 77 | 45 |
| Washington..... | 14 | 67 | 52 |
| | 193 | 628 | 636 |

Burlington County.

| | M. | B. | D. |
|------------------------|-----|-------|-----|
| Bass River..... | 4 | 33 | 8 |
| Beverly City..... | 8 | 37 | |
| Beverly..... | 4 | 21 | 68 |
| Bordentown..... | 47 | 133 | 86 |
| Burlington..... | 65 | 145 | 154 |
| Chester..... | 22 | 44 | 50 |
| Chesterfield..... | 8 | 27 | 19 |
| Cinnaminson..... | 14 | 61 | 66 |
| Evesham..... | 3 | 41 | 25 |
| Florence..... | 5 | 35 | 24 |
| Little Egg Harbor..... | 19 | 46 | 31 |
| Lumberton..... | 5 | 32 | 23 |
| Mansfield..... | 5 | 38 | 24 |
| Medford..... | 15 | 31 | 43 |
| Mt. Laurel..... | 0 | 25 | 26 |
| New Hanover..... | 21 | 53 | 41 |
| Northampton..... | 69 | 85 | 96 |
| Pemberton..... | 18 | 100 | 79 |
| Randolph..... | 0 | 9 | 11 |
| Shamong..... | 5 | 21 | 15 |
| Southampton..... | 21 | 47 | 32 |
| Springfield..... | 5 | 20 | 25 |
| Washington..... | 3 | 11 | 6 |
| Westhampton..... | 0 | 30 | 19 |
| Willingboro..... | 5 | 23 | 10 |
| Woodland..... | 2 | 7 | 8 |
| | 373 | 1,155 | 989 |

Camden County.

| | M. | B. | D. |
|----------------------|-----|-------|-------|
| Camden..... | 341 | 888 | 673 |
| Centre..... | 3 | 42 | 30 |
| Delaware..... | 0 | 28 | 33 |
| Gloucester..... | 14 | 78 | 66 |
| Gloucester City..... | 28 | 125 | 72 |
| Haddon..... | 22 | 71 | 47 |
| Stockton..... | 11 | 26 | 72 |
| Waterford..... | 17 | 50 | 38 |
| Winslow..... | 9 | 40 | 28 |
| | 445 | 1,348 | 1,059 |

Cape May County.

| | M. | B. | D. |
|--------------------|----|-----|-----|
| Cape May City..... | | | |
| Dennis..... | 5 | 41 | 5 |
| Lower..... | 29 | 43 | 18 |
| Middle..... | 28 | 43 | 37 |
| Upper..... | 17 | 48 | 42 |
| | 16 | 21 | 18 |
| | 95 | 195 | 120 |

Cumberland County.

| | M. | B. | D. |
|--------------------|-----|-----|-----|
| Bridgeton..... | | | |
| Commercial..... | 82 | 219 | 133 |
| Deerfield..... | 10 | 26 | 7 |
| Downe..... | 6 | 35 | 25 |
| Fairfield..... | 13 | 26 | 23 |
| Greenwich..... | 20 | 72 | 87 |
| Hopewell..... | 13 | 19 | 23 |
| Landis..... | 13 | 31 | 28 |
| Maurice River..... | 51 | 85 | 119 |
| Millville..... | 12 | 78 | 34 |
| Stoe Creek..... | 62 | 218 | 137 |
| | 0 | 18 | 12 |
| | 282 | 827 | 638 |

Essex County.

| | M. | B. | D. |
|-------------------|-------|-------|-------|
| Belleville..... | | | |
| Bloomfield..... | 11 | 59 | 57 |
| Caldwell..... | 38 | 120 | 110 |
| Clinton..... | 11 | 72 | 50 |
| East Orange..... | 19 | 39 | 30 |
| Franklin..... | 37 | 167 | 126 |
| Livingston..... | 10 | 20 | 29 |
| Millburn..... | 6 | 5 | 17 |
| Montclair..... | 9 | 40 | 33 |
| Newark..... | 35 | 96 | 71 |
| Orange..... | 1,022 | 3,567 | 3,116 |
| South Orange..... | 90 | 435 | 215 |
| West Orange..... | 26 | 83 | 54 |
| | 9 | 39 | 39 |
| | 1,323 | 4,742 | 3,947 |

Gloucester County.

| | M. | B. | D. |
|--------------------|-----|-----|-----|
| Clayton..... | 28 | 56 | 17 |
| Deptford..... | 1 | 32 | 35 |
| Franklin..... | 17 | 79 | 24 |
| Greenwich..... | 17 | 56 | 40 |
| Glassboro..... | 18 | 86 | 40 |
| Harrison..... | 15 | 56 | 47 |
| Logan..... | 5 | 29 | 26 |
| Mantua..... | 11 | 42 | 27 |
| Monroe..... | 9 | 30 | 38 |
| Washington..... | 14 | 10 | 22 |
| West Deptford..... | 2 | 38 | 25 |
| Woodbury..... | 29 | 56 | 52 |
| Woolwich..... | 9 | 43 | 38 |
| | 175 | 613 | 431 |

Hudson County.

| | M. | B. | D. |
|--------------------|-----|-------|-------|
| Bayonne..... | 15 | 140 | 156 |
| Guttenberg..... | 6 | 11 | 32 |
| Harrison..... | 9 | 102 | 104 |
| Hoboken..... | 221 | 795 | 669 |
| Jersey City..... | 576 | 1,532 | 2,517 |
| Kearney..... | 5 | 43 | 26 |
| North Bergen..... | 11 | 60 | 183 |
| Town of Union..... | 34 | 140 | 137 |
| Union..... | 3 | 30 | 32 |
| Weehawken..... | 1 | 16 | 6 |
| West Hoboken..... | 19 | 104 | 95 |
| | 900 | 2,973 | 3,957 |

Hunterdon County.

| | M. | B. | D. |
|----------------------|-----|-----|-----|
| Alexandria..... | 16 | 50 | 32 |
| Bethlehem..... | 15 | 38 | 26 |
| Clinton..... | 9 | 45 | 12 |
| Delaware..... | 35 | 74 | 41 |
| East Amwell..... | 15 | 58 | 20 |
| Franklin..... | 14 | 23 | 17 |
| Frenchtown..... | 8 | 44 | 12 |
| High Bridge..... | 18 | 46 | 31 |
| Holland..... | 2 | 13 | 9 |
| Kingwood..... | 4 | 20 | 14 |
| Lambertville..... | 51 | 100 | 82 |
| Lebanon..... | 23 | 59 | 31 |
| Raritan..... | 32 | 59 | 50 |
| Readington..... | 23 | 75 | 63 |
| Tewksbury..... | 11 | 43 | 35 |
| Town of Clinton..... | 4 | 23 | 29 |
| Union..... | 1 | 14 | 9 |
| West Amwell..... | 4 | 16 | 14 |
| | 285 | 800 | 527 |

Mercer County.

| | M. | B. | D. |
|-------------------|-----|-------|-------|
| Chambersburg..... | 30 | 114 | 92 |
| East Windsor..... | 14 | 33 | 36 |
| Ewing..... | 6 | 13 | 22 |
| Hamilton..... | 19 | 57 | 52 |
| Hopewell..... | 35 | 112 | 56 |
| Lawrence..... | 9 | 51 | 62 |
| Princeton..... | 33 | 97 | 92 |
| Trenton..... | 264 | 596 | 653 |
| Washington..... | 5 | 18 | 16 |
| West Windsor..... | 8 | 22 | 28 |
| | 423 | 1,113 | 1,109 |

Middlesex County.

| | M. | B. | D. |
|----------------------|-----|-----|-----|
| Cranbury..... | 20 | 19 | 44 |
| East Brunswick..... | 22 | 87 | 47 |
| Madison..... | 0 | 9 | 19 |
| Monroe..... | 12 | 38 | 43 |
| New Brunswick..... | 107 | 428 | 55 |
| North Brunswick..... | 10 | 28 | 15 |
| Perth Amboy..... | 13 | 77 | 75 |
| Piscataway..... | 14 | 63 | 77 |
| Raritan..... | 11 | 46 | 53 |
| Sayreville..... | 3 | 6 | 5 |
| South Amboy..... | 9 | 52 | 61 |
| South Brunswick..... | 21 | 60 | 81 |
| Woodbridge..... | 10 | 53 | 63 |
| | 252 | 966 | 817 |

Monmouth County.

| | M. | B. | D. |
|---------------------|-----|-------|-----|
| Atlantic..... | 5 | 22 | 17 |
| Eatontown..... | 20 | 44 | 33 |
| Freehold..... | 85 | 99 | 86 |
| Holmdel..... | 5 | 19 | 28 |
| Howell..... | 28 | 74 | 58 |
| Manalapan..... | 15 | 53 | 52 |
| Marlboro..... | 4 | 28 | 17 |
| Matawan..... | 20 | 66 | 69 |
| Middletown..... | 16 | 86 | 86 |
| Millstone..... | 32 | 39 | 39 |
| Neptune..... | 8 | 32 | 33 |
| Ocean..... | 49 | 222 | 179 |
| Raritan..... | 39 | 94 | 68 |
| Shrewsbury..... | 51 | 167 | 147 |
| Upper Freehold..... | 18 | 35 | 43 |
| Wall..... | 29 | 100 | 32 |
| | 374 | 1,180 | 926 |

Morris County.

| | M. | B. | D. |
|------------------|-----|-----|-----|
| Boonton..... | 24 | 50 | 53 |
| Chatham..... | 26 | 60 | 58 |
| Chester..... | 9 | 37 | 25 |
| Hanover..... | 10 | 60 | 104 |
| Jefferson..... | 12 | 18 | 31 |
| Mendham..... | 14 | 44 | 22 |
| Montville..... | 3 | 11 | 21 |
| Morris..... | 41 | 127 | 114 |
| Mount Olive..... | 12 | 45 | 25 |
| Passaic..... | 7 | 23 | 23 |
| Pequannock..... | 12 | 43 | 33 |
| Randolph..... | 40 | 140 | 119 |
| Rockaway..... | 29 | 178 | 130 |
| Roxbury..... | 10 | 49 | 49 |
| Washington..... | 13 | 58 | 22 |
| | 262 | 943 | 829 |

Ocean County.

| | M. | B. | D. |
|-----------------|----|-----|-----|
| Berkeley..... | 2 | 24 | 11 |
| Brick..... | 14 | 64 | 56 |
| Dover..... | 21 | 57 | 40 |
| Eagleswood..... | 1 | 9 | 6 |
| Jackson..... | 5 | 30 | 17 |
| Lacey..... | 6 | 19 | 16 |
| Manchester..... | 4 | 11 | 7 |
| Ocean..... | 5 | 2 | 9 |
| Plumsted..... | 13 | 58 | 17 |
| Stafford..... | 7 | 22 | 28 |
| Union..... | 6 | 22 | 10 |
| | 84 | 318 | 217 |

Passaic County.

| | M. | B. | D. |
|-------------------|-----|-------|-------|
| Aquackanonk..... | 2 | 22 | 31 |
| Little Falls..... | 10 | 15 | 16 |
| Manchester..... | 2 | 1 | 14 |
| Passaic..... | 43 | 204 | 124 |
| Paterston..... | 347 | 1,318 | 994 |
| Pompton..... | 20 | 42 | 50 |
| Wayne..... | 0 | 14 | 32 |
| West Milford..... | 16 | 47 | 36 |
| | 440 | 1,563 | 1,287 |

Salem County.

| | M. | B. | D. |
|---------------------------|-----|-----|-----|
| Elsinboro..... | 1 | 4 | 8 |
| Lower Alloways Creek..... | 6 | 22 | 13 |
| Lower Penn's Neck..... | 24 | 24 | 30 |
| Mannington..... | 0 | 47 | 37 |
| Pikesgrove..... | 29 | 91 | 69 |
| Pittsgrove..... | 1 | 61 | 15 |
| Quinton..... | 11 | 30 | 12 |
| Salem..... | 63 | 89 | 113 |
| Upper Alloways Creek..... | 19 | 38 | 30 |
| Upper Penn's Neck..... | 31 | 75 | 54 |
| Upper Pittsgrove..... | 2 | 37 | 22 |
| | 187 | 518 | 392 |

Somerset County.

| | M. | B. | D. |
|-----------------------|-----|-----|-----|
| Bedminster..... | 13 | 34 | 39 |
| Bernards..... | 19 | 62 | 39 |
| Branchburg..... | 3 | 13 | 17 |
| Bridgewater..... | 62 | 174 | 127 |
| Franklin..... | 16 | 44 | 65 |
| Hillsborough..... | 22 | 55 | 46 |
| Montgomery..... | 17 | 41 | 34 |
| North Plainfield..... | 2 | 78 | 45 |
| Warren..... | 5 | 6 | 17 |
| | 159 | 507 | 429 |

Sussex County.

| | M. | B. | D. |
|-----------------|-----|-----|-----|
| Andover..... | 11 | 21 | 19 |
| Byram..... | 12 | 15 | 16 |
| Frankford..... | 12 | 27 | 19 |
| Greene..... | 3 | 12 | 14 |
| Hardyston..... | 16 | 42 | 34 |
| Hampton..... | 4 | 11 | 10 |
| Lafayette..... | 6 | 10 | 22 |
| Montague..... | 3 | 24 | 9 |
| Newton..... | 29 | 40 | 38 |
| Sandyton..... | 14 | 21 | 19 |
| Sparta..... | 7 | 34 | 26 |
| Stillwater..... | 14 | 32 | 31 |
| Vernon..... | 15 | 6 | 11 |
| Vernon..... | 10 | 13 | 17 |
| Walpack..... | 13 | 49 | 55 |
| Wantage..... | | | |
| | 169 | 355 | 330 |

Union County.

| | M. | B. | D. |
|---------------------|-----|-------|-----|
| Clark..... | 0 | 1 | 2 |
| Cranford..... | 2 | 13 | 12 |
| Elizabeth..... | 108 | 747 | 472 |
| Fanwood..... | 1 | 16 | 15 |
| Linden..... | 0 | 17 | 28 |
| New Providence..... | 19 | 188 | 130 |
| Plainfield..... | 58 | 105 | 169 |
| Rahway..... | 8 | 24 | 19 |
| Springfield..... | 10 | 33 | 15 |
| Summit..... | 2 | 33 | 35 |
| Union..... | 10 | 44 | 40 |
| Westfield..... | | | |
| | 283 | 1,258 | 966 |

Warren County.

| | M. | B. | D. |
|-------------------------|------------|------------|------------|
| Allamuchy..... | 10 | 9 | 14 |
| Belvidere..... | 17 | 46 | 21 |
| Blairstown..... | 12 | 22 | 21 |
| Franklin..... | 20 | 24 | 17 |
| Frelinghuysen..... | 11 | 18 | 11 |
| Greenwich..... | 9 | 53 | 43 |
| Hackettstown..... | 29 | 39 | 41 |
| Hardwick..... | 1 | 12 | 4 |
| Harmony..... | 8 | 45 | 21 |
| Hope..... | 14 | 22 | 17 |
| Independence..... | 13 | 22 | 17 |
| Knowlton..... | 5 | 31 | 14 |
| Lapatcong..... | 3 | 30 | 13 |
| Mansfield..... | 5 | 40 | 34 |
| Oxford..... | 29 | 35 | 40 |
| Pahaquarry..... | 1 | 9 | 5 |
| Phillipsburg..... | 51 | 123 | 121 |
| Town of Washington..... | 37 | 58 | 38 |
| Washington..... | 6 | 21 | 30 |
| Total..... | 181 | 702 | 371 |

Totals of Marriages, Births and Deaths for all the counties.

| COUNTIES. | M. | B. | D. |
|-------------------|--------------|---------------|---------------|
| Atlantic..... | 111 | 352 | 202 |
| Bergen..... | 193 | 623 | 276 |
| Burlington..... | 373 | 1,155 | 282 |
| Camden..... | 445 | 1,348 | 1,059 |
| Cape May..... | 95 | 195 | 130 |
| Cumberland..... | 282 | 827 | 372 |
| Essex..... | 1,323 | 4,742 | 3,947 |
| Gloucester..... | 175 | 613 | 431 |
| Hudson..... | 900 | 2,973 | 3,567 |
| Hunterdon..... | 285 | 800 | 277 |
| Mercer..... | 423 | 1,113 | 1,101 |
| Middlesex..... | 252 | 906 | 257 |
| Monmouth..... | 374 | 1,180 | 923 |
| Morris..... | 262 | 943 | 222 |
| Ocean..... | 84 | 318 | 217 |
| Passaic..... | 440 | 1,563 | 1,217 |
| Salem..... | 187 | 518 | 222 |
| Somerset..... | 159 | 507 | 222 |
| Sussex..... | 169 | 555 | 220 |
| Union..... | 283 | 1,258 | 222 |
| Warren..... | 181 | 732 | 222 |
| Total..... | 7,096 | 23,116 | 20,440 |

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, 1879.

| COUNTIES OF NEW JERSEY. | DEATHS AT ALL AGES. | | | | | | Population, census of 1870. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | Total deaths from these diseases. | | | | | | | |
|-------------------------|---------------------|---------------|-----------------|------------------|--------------|------------|-----------------------------|----------------------|----------------------------|-----------------------|-----------------|----------------|-----------|-----------------|---------------------|---------------------|--------------|----------------------|---|------------------------------------|-----------------------------------|-------------------|----------------------------------|--------------|---------------------------|-----------|-------------------|---------------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Undeined. | | | Total. | Remittent fever, etc. | Typhoid fever.† | Scarlet fever. | Measles. | Whooping cough. | Croup & Diphtheria. | Diarrheal diseases. | Consumption. | Acute Lung Diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | | Primary diseases. | Adult brain and spinal diseases. | Erysipelas. | Digestive and Intestinal. | Cancer. | Acute Rheumatism. | Fuereprial. |
| Atlantic..... | 67 | 77 | 22 | 67 | 66 | 3 | 302 | 15,138 | 10.94 | 30 | 6 | 26 | 3 | 4 | 35 | 44 | 36 | 10 | 14 | 15 | 15 | 15 | 15 | 15 | 1 | 6 | 2 | |
| Bergen..... | 124 | 112 | 55 | 187 | 150 | 8 | 636 | 35,516 | 17.80 | 5 | 25 | 23 | 0 | 10 | 10 | 40 | 87 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 1 | 6 | 2 | |
| Burlington..... | 207 | 136 | 81 | 257 | 201 | 17 | 989 | 50,155 | 19.68 | 5 | 20 | 34 | 4 | 21 | 77 | 120 | 187 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 1 | 6 | 2 | |
| Camden..... | 192 | 206 | 121 | 315 | 212 | 14 | 1,059 | 52,994 | 19.68 | 5 | 20 | 34 | 4 | 21 | 77 | 120 | 187 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 1 | 6 | 2 | |
| Cape May..... | 108 | 117 | 60 | 122 | 79 | 3 | 329 | 8,190 | 14.65 | 1 | 4 | 1 | 1 | 2 | 51 | 55 | 52 | 14 | 14 | 14 | 14 | 14 | 14 | 1 | 6 | 2 | | |
| Cumberland..... | 108 | 117 | 60 | 122 | 79 | 3 | 329 | 8,190 | 14.65 | 1 | 4 | 1 | 1 | 2 | 51 | 55 | 52 | 14 | 14 | 14 | 14 | 14 | 14 | 1 | 6 | 2 | | |
| Essex..... | 888 | 695 | 406 | 1,294 | 696 | 23 | 3,911 | 17,730 | 17.89 | 14 | 38 | 37 | 69 | 12 | 123 | 253 | 321 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 | 6 | 2 | |
| Gloucester..... | 81 | 37 | 114 | 124 | 124 | 6 | 431 | 24,482 | 17.60 | 10 | 17 | 1 | 1 | 7 | 12 | 43 | 44 | 10 | 10 | 10 | 10 | 10 | 10 | 1 | 6 | 2 | | |
| Hudson..... | 1,010 | 877 | 352 | 1,199 | 456 | 61 | 3,957 | 163,900 | 24.27 | 32 | 36 | 13 | 8 | 15 | 12 | 43 | 44 | 10 | 10 | 10 | 10 | 10 | 10 | 1 | 6 | 2 | | |
| Hunterdon..... | 71 | 52 | 47 | 124 | 204 | 29 | 627 | 37,473 | 14.06 | 0 | 1 | 1 | 1 | 8 | 16 | 113 | 128 | 14 | 14 | 14 | 14 | 14 | 14 | 1 | 6 | 2 | | |
| Mercer..... | 222 | 114 | 100 | 302 | 259 | 52 | 1,109 | 49,884 | 22.23 | 15 | 22 | 26 | 8 | 24 | 28 | 88 | 122 | 13 | 13 | 13 | 13 | 13 | 13 | 1 | 6 | 2 | | |
| Middlesex..... | 186 | 127 | 87 | 248 | 180 | 9 | 837 | 48,313 | 17.32 | 15 | 22 | 26 | 8 | 24 | 28 | 88 | 122 | 13 | 13 | 13 | 13 | 13 | 13 | 1 | 6 | 2 | | |
| Monmouth..... | 136 | 136 | 78 | 220 | 225 | 25 | 626 | 48,900 | 19.69 | 8 | 8 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 1 | 6 | 2 | | |
| Morris..... | 152 | 136 | 78 | 220 | 225 | 25 | 626 | 48,900 | 19.69 | 8 | 8 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 1 | 6 | 2 | | |
| Ocean..... | 30 | 38 | 10 | 76 | 52 | 1 | 157 | 5,775 | 23.63 | 6 | 6 | 6 | 6 | 6 | 16 | 17 | 18 | 10 | 10 | 10 | 10 | 10 | 10 | 1 | 6 | 2 | | |
| Passaic..... | 262 | 206 | 115 | 418 | 277 | 0 | 1,547 | 59,775 | 23.63 | 21 | 14 | 6 | 6 | 6 | 16 | 17 | 18 | 10 | 10 | 10 | 10 | 10 | 10 | 1 | 6 | 2 | | |
| Salem..... | 87 | 43 | 39 | 103 | 105 | 15 | 392 | 22,701 | 17.20 | 6 | 6 | 6 | 6 | 6 | 16 | 17 | 18 | 10 | 10 | 10 | 10 | 10 | 10 | 1 | 6 | 2 | | |
| Somerset..... | 65 | 65 | 42 | 164 | 154 | 9 | 330 | 27,453 | 15.62 | 3 | 3 | 3 | 3 | 3 | 4 | 31 | 31 | 10 | 10 | 10 | 10 | 10 | 10 | 1 | 6 | 2 | | |
| Sussex..... | 265 | 209 | 28 | 494 | 330 | 5 | 906 | 24,010 | 13.74 | 5 | 10 | 11 | 1 | 5 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 1 | 6 | 2 | | |
| Union..... | 245 | 156 | 84 | 268 | 244 | 9 | 906 | 51,758 | 18.66 | 22 | 10 | 12 | 4 | 7 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 1 | 6 | 2 | | |
| Warren..... | 120 | 37 | 40 | 143 | 140 | 7 | 525 | 37,389 | 13.96 | 10 | 12 | 4 | 7 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 1 | 6 | 2 | | |
| Total..... | 4,452 | 13,467 | 1,905 | 6,930 | 4,937 | 349 | 20,440 | 1020,584 | 200.03 | 208 | 324 | 627 | 77 | 277 | 1,100 | 1,849 | 2,788 | 2,169 | 1,047 | 972 | 568 | 1314 | 137 | 1,041 | 378 | 76 | 194 | 15,797 |

*Death rate too high by reason of defects in the census of county. †Small Pox omitted because no deaths occur therefrom.
 ‡Death rate, exclusive of cities of over 5000 inhabitants from these diseases, 13.21 per thousand.

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, 1879.

| COUNTY OF CAMDEN. Population, 52,994. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | |
|---|---------------------|--------------|-----------------|------------------|-------------|------------|-----------------------------|----------------------|----------------------------|-----------------------|----------------|----------------|----------|-----------------|-----------------------|----------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|------------------------------------|---------|-------------------|------------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Undefined. | | | Total. | Remittent fever, etc. | Typhoid fever. | Scarlet fever. | Measles. | Whooping cough. | Croup and Diphtheria. | Diarrhoeal diseases. | Consumption. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Erysipelas. | Digestive and intestinal diseases. | Cancer. | Acute Rheumatism. | Puerperal. |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Camden City*..... | 101 | 144 | 91 | 206 | 125 | 6 | 673 | 4 | 16 | 26 | 15 | 62 | 77 | 120 | 76 | 71 | 35 | 20 | 36 | 1 | 31 | 10 | 2 | 4 | | | |
| Cape May..... | 3 | 5 | 1 | 8 | 5 | 2 | 20 | 1 | 1 | 2 | 1 | 3 | 5 | 6 | 2 | 6 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | | | |
| Dennis..... | 3 | 4 | 2 | 11 | 11 | 3 | 33 | 1 | 1 | 2 | 1 | 3 | 4 | 4 | 1 | 4 | 2 | 1 | 4 | 1 | 4 | 1 | 1 | 1 | | | |
| Lower..... | 9 | 7 | 4 | 26 | 27 | 7 | 80 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Middle..... | 10 | 8 | 4 | 26 | 27 | 3 | 79 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Upper..... | 2 | 2 | 1 | 7 | 7 | 2 | 19 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Death rate per 1000 for county exclusive of cities*..... | | | | | | | 47 | | | | | | | | | | | | | | | | | | | | |
| Stockton..... | 12 | 23 | 2 | 20 | 13 | 1 | 72 | 2 | 2 | 106 | 3 | 5 | 8 | 14 | 5 | 9 | 4 | 2 | 4 | 1 | 5 | 1 | 1 | 1 | | | |
| Waterford..... | 13 | 6 | 3 | 7 | 10 | 8 | 38 | 1 | 1 | 1 | 2 | 2 | 1 | 6 | 4 | 4 | 2 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Weymouth..... | 7 | 10 | 2 | 1 | 8 | 1 | 28 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 5 | 2 | 4 | 2 | 4 | 1 | 1 | 1 | 1 | 1 | | | |
| Death rate per 1000 for county exclusive of cities*..... | | | | | | | 28 | | | | | | | | | | | | | | | | | | | | |
| | 192 | 205 | 121 | 315 | 212 | 14 | 1,069 | 5 | 20 | 34 | 21 | 77 | 120 | 187 | 116 | 103 | 54 | 25 | 71 | 4 | 58 | 17 | 4 | 9 | | | |

*See Register of cities and low rate of Gloucester City.

†See Stockton.

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, 1879.

| COUNTY OF CAPE MAY. Population, 8,190. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | |
|--|---------------------|--------------|-----------------|------------------|-------------|------------|-----------------------------|----------------------|----------------------------|-----------------------|----------------|----------------|----------|-----------------|-----------------------|----------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|------------------------------------|---------|-------------------|------------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Undefined. | | | Total. | Remittent fever, etc. | Typhoid fever. | Scarlet fever. | Measles. | Whooping cough. | Croup and Diphtheria. | Diarrhoeal diseases. | Consumption. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Erysipelas. | Digestive and intestinal diseases. | Cancer. | Acute Rheumatism. | Puerperal. |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cape May City..... | 1 | 3 | 4 | 18 | 1 | 1 | 28 | 1 | 2 | 2 | 2 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Dennis..... | 3 | 7 | 4 | 18 | 1 | 1 | 37 | 1 | 1 | 1 | 2 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Lower..... | 9 | 7 | 4 | 18 | 1 | 1 | 42 | 1 | 1 | 1 | 2 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Middle..... | 10 | 8 | 4 | 18 | 1 | 1 | 42 | 1 | 1 | 1 | 2 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Upper..... | 2 | 2 | 1 | 12 | 1 | 1 | 18 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Death rate per 1000 for county..... | | | | | | | 14.65 | | | | | | | | | | | | | | | | | | | | |
| | 25 | 21 | 10 | 22 | 39 | 3 | 120 | 5 | 20 | 34 | 2 | 8 | 10 | 12 | 13 | 13 | 3 | 3 | 11 | 1 | 14 | 2 | 1 | 1 | | | |

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

| COUNTY OF CUMBERLAND. Population 35,311. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | |
|---|---------------------|--------------|-----------------|------------------|-------------|-----------------------------|----------------------|----------------------------|--------|-----------------------|----------------|----------------|----------|-----------------|---------------------|---------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|------------------------------------|---------|-------------------|------------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | | | Undefined. | Total. | Remittent fever, etc. | Typhoid fever. | Scarlet fever. | Measles. | Whooping cough. | Croup & 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. |
| Bridgeton..... | 26 | 31 | 10 | 30 | 30 | 6 | 133 | 7,955 | | 5 | 11 | | 1 | 10 | 15 | 21 | 19 | 3 | 10 | 1 | 7 | 1 | 1 | 8 | 4 | | |
| Commercial..... | 2 | 6 | 1 | 4 | 1 | 1 | 7 | 2,152 | | | | | | | | | | | | | | | | | | | |
| Dover..... | 5 | 2 | 2 | 7 | 5 | 1 | 25 | 1,470 | | | | | | | | | | | | | | | | | | | |
| Fairfield..... | 6 | 2 | 1 | 4 | 2 | 2 | 23 | 1,560 | | | | | | | | | | | | | | | | | | | |
| Greenwich..... | 14 | 16 | 10 | 22 | 17 | 8 | 87 | 3,310 | | 1 | 3 | 6 | 15 | 6 | 8 | 8 | 5 | 5 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | | |
| Hopewell..... | 3 | 1 | 1 | 6 | 13 | 1 | 23 | 1,173 | | | | | | | | | | | | | | | | | | | |
| Landis..... | 6 | 10 | 16 | 34 | 44 | 5 | 128 | 1,715 | | 1 | 1 | 1 | 1 | 1 | 4 | 7 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 2 | | |
| Maurice River..... | 6 | 10 | 16 | 34 | 44 | 5 | 128 | 1,715 | | 2 | 4 | 1 | 7 | 6 | 21 | 15 | 10 | 1 | 1 | 6 | 0 | 1 | 2 | 5 | 2 | | |
| Millville..... | 7 | 1 | 1 | 3 | 13 | 33 | 34 | 2,632 | | 2 | 10 | | 1 | 14 | 18 | 14 | 12 | 1 | 2 | 6 | 1 | 1 | 6 | 5 | | | |
| Stee Creek..... | 31 | 35 | 1 | 5 | 1 | | 137 | 7,775 | | | | | | | | | | | | | | | | | | | |
| Death rate per 1000 for county..... | | | | | | | 12 | 17.50 | | | | | | | | | | | | | | | | | | | |
| Death rate per 1000 for county exclusive of cities..... | | | | | | | 12 | 17.39 | | | | | | | | | | | | | | | | | | | |
| Total | 109 | 117 | 62 | 167 | 150 | 23 | 628 | 35,311 | | 1 | 14 | 33 | 1 | 2 | 51 | 53 | 92 | 70 | 47 | 33 | 17 | 41 | 5 | 39 | 15 | 8 | 3 |

*See Register of cities.

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, 1879.

| COUNTY OF ESSEX. Population, 168,812. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | | |
|--|---------------------|--------------|-----------------|------------------|-------------|-----------------------------|----------------------|----------------------------|--------|-----------------------|----------------|----------------|----------|-----------------|-----------------------|---------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|------------------------------------|---------|-------------------|------------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | | | Undefined. | Total. | Remittent fever, etc. | Typhoid fever. | 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. |
| Belleville..... | 14 | 10 | 2 | 13 | 18 | | 57 | 2,785 | | 3 | 1 | | 2 | | | | | | | | | | | | | | |
| Belmont..... | 17 | 15 | 18 | 26 | 34 | | 106 | 2,825 | | 4 | 5 | | 2 | 15 | 3 | 3 | 7 | 5 | 1 | 8 | 0 | 6 | 2 | 1 | | | |
| Clinton..... | 8 | 5 | 5 | 9 | 23 | | 50 | 2,897 | | 3 | 2 | | 2 | 2 | 3 | 4 | 6 | 14 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | | |
| East Orange..... | 26 | 20 | 9 | 39 | 32 | | 136 | 6,497 | | 2 | 2 | 1 | 1 | 1 | 4 | 6 | 13 | 14 | 15 | 3 | 3 | 2 | 2 | 4 | 1 | | |
| Franklin..... | 9 | 1 | 3 | 12 | 7 | | 29 | 1,556 | | 4 | 2 | | | 10 | 4 | 5 | 2 | 4 | 5 | 2 | 2 | 2 | 1 | 1 | | | |
| Livingston..... | 6 | 1 | 1 | 3 | 12 | | 17 | 1,200 | | 2 | 2 | | | 4 | 2 | 4 | 4 | 5 | 2 | 1 | 2 | 2 | 2 | 4 | 1 | | |
| Millburn..... | 3 | 3 | 8 | 15 | 15 | | 33 | 1,541 | | 4 | 3 | 4 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | | | |
| Montclair..... | 19 | 8 | 5 | 18 | 19 | | 71 | 4,034 | | 4 | 3 | 4 | 1 | 3 | 8 | 5 | 7 | 7 | 2 | 0 | 1 | 1 | 3 | 1 | | | |
| Newark..... | 757 | 569 | 327 | 936 | 469 | | 3,116 | 123,310 | | 60 | 65 | 120 | 23 | 44 | 242 | 448 | 308 | 328 | 432 | 82 | 15 | 0 | 18 | 11 | 97 | 9 | 34 |
| Orange..... | 57 | 40 | 16 | 70 | 29 | | 15 | 10,815 | | 1 | 3 | 1 | 4 | 5 | 5 | 12 | 33 | 37 | 32 | 8 | 3 | 2 | 2 | 2 | 1 | | |
| West Orange..... | 15 | 6 | 2 | 18 | 13 | | 55 | 2,432 | | 2 | 1 | 1 | 2 | 2 | 4 | 2 | 4 | 3 | 4 | 4 | 1 | 3 | 2 | 2 | 1 | | |
| Death rate per 1000 for county..... | | | | | | | 39 | 25.35 | | | | | | | | | | | | | | | | | | | |
| Death rate per 1000 for county exclusive of cities..... | | | | | | | 39 | 25.35 | | | | | | | | | | | | | | | | | | | |
| Total | 838 | 605 | 400 | 1,224 | 666 | 24 | 3,947 | 168,812 | | 85 | 76 | 145 | 37 | 60 | 233 | 295 | 554 | 413 | 414 | 193 | 104 | 220 | 33 | 144 | 75 | 13 | 26 |

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, 1879.

Table for Hunterdon County showing deaths at all ages and principal causes of death. Columns include age groups (Under one to Over sixty), population (37,473), and various diseases like Typhoid fever, Measles, and Consumption.

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, 1879.

Table for Mercer County showing deaths at all ages and principal causes of death. Columns include age groups (Under one to Over sixty), population (49,884), and various diseases like Typhoid fever, Measles, and Consumption.

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, 1879.

| COUNTY OF MIDDLESEX. Population, 49,313. 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 1876. | Death rate per 1000. | Remittent fever, etc. | Typhoid fever. | Scarlet fever. | Measles. | Whooping cough. | Croup & Diphtheria. | Diarrhoeal diseases. | Consumption. | Acute lung dis- eases. | Brain and nervous diseases of children and circulation. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Erysipelas. | Digestive and intes- tinal diseases. | Cancer. | Acute Rheumatism. | Puerperal. |
| | 6 | 8 | 5 | 14 | 16 | 44 | 1,651 | | | | | | | | | | | | | | | | | | | | |
| Cranbury..... | 1 | 1 | 1 | 3 | 5 | 14 | 44 | 1,651 | 15 | 23 | 26 | 1 | 24 | 28 | 88 | 110 | 96 | 63 | 44 | 30 | 46 | 5 | 51 | 14 | 6 | | |
| East Brunswick..... | 10 | 8 | 3 | 18 | 6 | 18 | 47 | 2,944 | | | | | | | | | | | | | | | | | | | |
| Madison..... | 4 | 3 | 3 | 8 | 3 | 6 | 19 | 1,697 | | | | | | | | | | | | | | | | | | | |
| Monroe..... | 8 | 8 | 5 | 12 | 0 | 6 | 32 | 2,480 | | | | | | | | | | | | | | | | | | | |
| New Brunswick..... | 74 | 51 | 37 | 100 | 63 | 329 | 16,980 | | | | | | | | | | | | | | | | | | | | |
| North Brunswick..... | 4 | 4 | 1 | 5 | 4 | 77 | 3,770 | | | | | | | | | | | | | | | | | | | | |
| North Amboy..... | 17 | 15 | 9 | 20 | 14 | 77 | 2,802 | | | | | | | | | | | | | | | | | | | | |
| Raritan..... | 8 | 4 | 3 | 10 | 12 | 38 | 43 | 3,047 | | | | | | | | | | | | | | | | | | | |
| Sayreville..... | 10 | 2 | 3 | 12 | 13 | 5 | 5 | 5 | | | | | | | | | | | | | | | | | | | |
| South Amboy..... | 11 | 1 | 1 | 3 | 3 | 7 | 72 | 5,193 | | | | | | | | | | | | | | | | | | | |
| South Brunswick..... | 14 | 5 | 22 | 10 | 3 | 4 | 46 | 2,899 | | | | | | | | | | | | | | | | | | | |
| Woodbridge..... | 14 | 3 | 12 | 12 | 12 | 46 | 46 | 2,699 | | | | | | | | | | | | | | | | | | | |
| Death rate per 1000 for county, exclusive of cities..... | 14 | 7 | 10 | 19 | 12 | 2 | 64 | 3,706 | | | | | | | | | | | | | | | | | | | |
| | 186 | 127 | 87 | 248 | 180 | 9 | 837 | 48,313 | 15 | 23 | 26 | 1 | 24 | 28 | 88 | 110 | 96 | 63 | 44 | 30 | 46 | 5 | 51 | 14 | 6 | | |

Return of Deaths from all Causes, and certain specified Diseases in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

| COUNTY OF MONMOUTH. Population, 48,500. 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 1876. | Death rate per 1000. | Remittent fever, etc. | Typhoid fever. | Scarlet fever. | Measles. | Whooping cough. | Croup & Diphtheria. | Diarrhoeal diseases. | Consumption. | Acute lung dis- eases. | Brain and nervous diseases of child'n. and circulation. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Erysipelas. | Digestive and intes- tinal diseases. | Cancer. | Acute Rheumatism. | Puerperal. |
| | 1 | 10 | 5 | 12 | 7 | 53 | 17,683 | | | | | | | | | | | | | | | | | | | | |
| Atlantic..... | 1 | 1 | 1 | 3 | 11 | 17 | 53 | 17,683 | 8 | 8 | 15 | 1 | 31 | 50 | 83 | 132 | 113 | 65 | 80 | 39 | 46 | 4 | 53 | 16 | 6 | 7 | |
| Eatontown..... | 10 | 6 | 6 | 23 | 7 | 66 | 3,774 | 3,774 | | | | | | | | | | | | | | | | | | | |
| Freehold..... | 3 | 3 | 2 | 9 | 10 | 23 | 388 | 3,300 | | | | | | | | | | | | | | | | | | | |
| Hammel..... | 10 | 3 | 3 | 10 | 13 | 28 | 2,094 | 2,094 | | | | | | | | | | | | | | | | | | | |
| Marlboro..... | 5 | 3 | 2 | 4 | 11 | 17 | 2,274 | 2,274 | | | | | | | | | | | | | | | | | | | |
| Matawan..... | 2 | 4 | 6 | 25 | 12 | 69 | 2,876 | 2,876 | | | | | | | | | | | | | | | | | | | |
| Middletown..... | 11 | 12 | 6 | 27 | 18 | 80 | 4,517 | 4,517 | | | | | | | | | | | | | | | | | | | |
| Millsboro..... | 17 | 9 | 9 | 27 | 12 | 82 | 2,091 | 2,091 | | | | | | | | | | | | | | | | | | | |
| Neptune..... | 5 | 2 | 3 | 7 | 12 | 22 | 610 | 6,100 | | | | | | | | | | | | | | | | | | | |
| Pecon..... | 3 | 2 | 3 | 7 | 8 | 11 | 6 | 10 | | | | | | | | | | | | | | | | | | | |
| Shrewsbury..... | 10 | 20 | 35 | 28 | 5 | 470 | 6,100 | 6,100 | | | | | | | | | | | | | | | | | | | |
| Upper Freehold..... | 34 | 26 | 15 | 37 | 17 | 68 | 3,664 | 3,664 | | | | | | | | | | | | | | | | | | | |
| Wall..... | 9 | 6 | 3 | 11 | 11 | 47 | 6,300 | 6,300 | | | | | | | | | | | | | | | | | | | |
| Death rate per 1000 for county..... | 6 | 7 | 4 | 13 | 8 | 32 | 2,615 | 19,008 | 8 | 8 | 15 | 1 | 31 | 50 | 83 | 132 | 113 | 65 | 80 | 39 | 46 | 4 | 53 | 16 | 7 | | |
| | 226 | 136 | 88 | 226 | 225 | 25 | 926 | 48,500 | 15 | 23 | 26 | 1 | 31 | 50 | 83 | 132 | 113 | 65 | 80 | 39 | 46 | 4 | 53 | 16 | 7 | | |

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

Table with columns: COUNTY OF MORRIS, Population, 49,019; DEATHS AT ALL AGES; PRINCIPAL CAUSES OF DEATH; Death rate per 1000. Rows include various divisions like Boonton, Chatham, Chester, Hanover, etc.

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, 1879.

Table with columns: COUNTY OF OCEAN, Population, 13,707; DEATHS AT ALL AGES; PRINCIPAL CAUSES OF DEATH; Death rate per 1000. Rows include divisions like Berkeley, Brick, Dover, etc.

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, 1879.

| COUNTY OF PASSAIC. Population, 53,775. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | |
|--|---------------------|--------------|-----------------|------------------|-------------|------------|-----------------------------|----------------------|----------------------------|----------------------------|----------------|----------------|----------|-----------------|-----------------------|----------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|------------------------------------|---------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Undefined. | | | Total. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | |
| | | | | | | | | | | Remittent fever, etc. | Typhoid fever. | Scarlet fever. | Measles. | Whooping cough. | Croup and Diphtheria. | Diarrhoeal diseases. | Consumption. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Erysipelas. | Digestive and Intestinal diseases. | Cancer. |
| Aquackonk..... | 1 | 2 | 6 | 8 | 21 | 1,631 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| Little Falls..... | 1 | 1 | 1 | 1 | 16 | 1,457 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| Manchester..... | 1 | 1 | 1 | 1 | 14 | 1,544 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| Passaic..... | 1 | 1 | 1 | 1 | 24 | 1,833 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| Pittsgrove..... | 1 | 1 | 1 | 1 | 15 | 1,315 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| Pompton..... | 1 | 1 | 1 | 1 | 15 | 1,315 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| Wayne..... | 1 | 1 | 1 | 1 | 15 | 1,315 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| West Milford..... | 1 | 1 | 1 | 1 | 15 | 1,315 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |
| Death rate per 1000 for county, exclusive of cities | 292 | 206 | 115 | 418 | 277 | 9,1287 | 19.58 | 24 | 6 | 40 | 6 | 9 | 60 | 137 | 186 | 137 | 106 | 74 | 32 | 88 | 8 | 78 | 23 | 7 | 22 |

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, 1879.

| COUNTY OF SALEM. Population, 22,701. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | |
|--|---------------------|--------------|-----------------|------------------|-------------|------------|-----------------------------|----------------------|----------------------------|----------------------------|----------------|----------------|----------|-----------------|-----------------------|----------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|------------------------------------|---------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Undefined. | | | Total. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | |
| | | | | | | | | | | Remittent fever, etc. | Typhoid fever. | Scarlet fever. | Measles. | Whooping cough. | Croup and Diphtheria. | Diarrhoeal diseases. | Consumption. | Acute lung diseases. | Brain and nervous diseases of children. | Diseases of heart and circulation. | Urinary diseases. | Adult brain and spinal diseases. | Erysipelas. | Digestive and Intestinal diseases. | Cancer. |
| Elsinboro..... | 1 | 1 | 1 | 1 | 8 | 635 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Lower Alloways Creek..... | 1 | 1 | 1 | 1 | 13 | 1,396 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Lower Penn's Neck..... | 1 | 1 | 1 | 1 | 30 | 1,265 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Mannington..... | 1 | 1 | 1 | 1 | 27 | 1,690 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Pittsgrove..... | 1 | 1 | 1 | 1 | 69 | 3,276 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Pompton..... | 1 | 1 | 1 | 1 | 15 | 1,694 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Salton..... | 1 | 1 | 1 | 1 | 12 | 1,146 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Upper Alloways Creek..... | 1 | 1 | 1 | 1 | 11 | 4,819 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Upper Penn's Neck..... | 1 | 1 | 1 | 1 | 34 | 4,439 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Upper Pittsgrove..... | 1 | 1 | 1 | 1 | 22 | 2,652 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |
| Death rate per 1000 for county | 87 | 48 | 39 | 106 | 166 | 392 | 17.36 | 6 | 14 | 0 | 1 | 2 | 14 | 41 | 71 | 36 | 15 | 17 | 6 | 23 | 5 | 27 | 7 | 3 | 3 |

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

| COUNTY OF SOMERSET. Population, 27,453. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | |
|--|---------------------|--------------|-----------------|------------------|-------------|-------------|-----------------------------|----------------------|----------------------------|-----------------------|----------------|----------------|----------|-----------------|-----------------------|---------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|-----------------------------------|---------|-------------------|------------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Undeclared. | | | Total. | Remittent fever, etc. | Typhoid fever. | 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 or intestinal diseases. | Cancer. | Acute Rheumatism. | Puerperal. |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bedminster..... | 5 | 2 | 1 | 3 | 8 | 17 | 46 | 1 | 1 | 1 | 2 | 1 | 1 | 8 | 4 | 4 | 10 | 3 | 2 | 3 | 3 | 1 | 1 | 1 | 3 | | |
| Bernards..... | 8 | 2 | 7 | 7 | 14 | 2 | 39 | 1 | 1 | 1 | 1 | 1 | 4 | 1 | 4 | 4 | 3 | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 1 | | |
| Branchburg..... | 3 | 2 | 10 | 10 | 1 | 1 | 39 | 1 | 1 | 1 | 1 | 1 | 4 | 2 | 4 | 10 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 1 | | |
| Bridge water..... | 16 | 24 | 15 | 87 | 34 | 1 | 127 | 1 | 1 | 1 | 1 | 1 | 23 | 5 | 16 | 7 | 2 | 7 | 12 | 7 | 12 | 9 | 3 | 3 | 3 | | |
| Franklin..... | 13 | 9 | 8 | 16 | 17 | 2 | 65 | 1 | 1 | 1 | 1 | 1 | 8 | 7 | 4 | 7 | 4 | 4 | 4 | 7 | 6 | 2 | 2 | 2 | 2 | | |
| Hillsborough..... | 5 | 4 | 1 | 6 | 29 | 1 | 46 | 1 | 1 | 1 | 1 | 1 | 8 | 7 | 4 | 5 | 3 | 5 | 4 | 6 | 6 | 4 | 4 | 1 | 1 | | |
| Morris..... | 5 | 4 | 1 | 8 | 19 | 1 | 34 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 10 | 5 | 3 | 2 | 1 | 3 | 3 | 4 | 1 | 1 | 1 | | |
| Morris and Orange..... | 5 | 2 | 7 | 13 | 13 | 1 | 49 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 6 | 4 | 1 | 1 | 1 | 3 | 3 | 4 | 1 | 1 | 1 | | |
| North Plainfield..... | 3 | 2 | 1 | 3 | 8 | 1 | 17 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Death rate per 1000 for county..... | 65 | 55 | 42 | 104 | 154 | 9 | 429 | 3 | 5 | 3 | 1 | 1 | 42 | 31 | 53 | 46 | 20 | 23 | 18 | 52 | 30 | 10 | 10 | 1 | 3 | | |

Return of Deaths from all Causes and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

| COUNTY OF SUSSEX. Population, 24,010. Statistical Divisions. | DEATHS AT ALL AGES. | | | | | | Population, census of 1875. | Death rate per 1000. | PRINCIPAL CAUSES OF DEATH. | | | | | | | | | | | | | | | | | | |
|--|---------------------|--------------|-----------------|------------------|-------------|-------------|-----------------------------|----------------------|----------------------------|-----------------------|----------------|----------------|----------|-----------------|-----------------------|---------------------|--------------|----------------------|---|------------------------------------|-------------------|----------------------------------|-------------|------------------------------------|---------|-------------------|------------|
| | Under one. | One to five. | Five to twenty. | Twenty to sixty. | Over sixty. | Undeclared. | | | Total. | Remittent fever, etc. | Typhoid fever. | 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. |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Andover..... | 2 | 2 | 2 | 4 | 6 | 2 | 18 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Byram..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Frankford..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Greene..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Hamorton..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Lawrenceville..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Lawrenceville..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Montague..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Newtown..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Sandyton..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Sparta..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Walton..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Walton..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Wantage..... | 1 | 1 | 1 | 3 | 3 | 1 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Death rate per 1000 for county..... | 60 | 29 | 28 | 98 | 110 | 5 | 380 | 5 | 10 | 11 | 5 | 8 | 17 | 54 | 40 | 18 | 23 | 13 | 26 | 2 | 20 | 9 | 2 | 5 | | | |

Return of Deaths from all Causes, and certain specified Diseases, in the Statistical Divisions of the State of New Jersey, for the year ending July 1st, 1879.

Table with columns: COUNTY OF UNION, Statistical Divisions, DEATHS AT ALL AGES (Under one to Over sixty), Population, Death rate per 1000, PRINCIPAL CAUSES OF DEATH (Typhoid fever, Measles, Whooping cough, etc.), and Puerperal, Acute Rheumatism, Cancer, Digestive and Intestinal diseases.

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, 1879.

Table with columns: COUNTY OF WARREN, Statistical Divisions, DEATHS AT ALL AGES (Under one to Over sixty), Population, Death rate per 1000, PRINCIPAL CAUSES OF DEATH (Typhoid fever, Measles, Whooping cough, etc.), and Puerperal, Acute Rheumatism, Cancer, Digestive and Intestinal diseases.

CIRCULAR OF THE NEW JERSEY STATE BOARD OF HEALTH AS
TO SANITARY APPLIANCES.

In the practical application of Sanitary science, it has become necessary to use very many appliances, both for convenience and to guard against evils incident to household or city life. These have become far more numerous and useful than is generally known. To afford the citizens of this State a better opportunity for becoming acquainted with their merits, both by personal examination and by the opinions of experts, we have conferred with officers of the State Fair of New Jersey, and, as a State Board of Health, shall aid in an exhibition of sanitary appliances therewith. This Fair is held each year, only a few miles from New York City, and near 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 opportunities for familiarizing the people with valuable improvements. It opens yearly about the middle of September.

Specimens may be sent either as competing for premiums or on exhibit. Any articles sent from abroad may be consigned to our care, through Morris's Express, 50 Broadway, New York, or through other agents. Every article exhibited should bear a descriptive label, containing detailed information respecting its construction, its use, and the retail price and place at which it can be obtained. There is no charge for space. The small cost of conveying goods to and from the exhibit must be borne by the exhibitors themselves. The articles must bear the names of the owner or the agency exhibiting it. Articles sent for exhibit in our care should be directed "New Jersey State Fair, Waverly. Care of New Jersey State Board of Health."

The State Board of Health has commenced at Trenton, the capital of the State, a museum of sanitary appliances, to which any owner or manufacturer may present the articles exhibited as the property of the State, for permanent examination and exhibit. Or they will by us be directed to the persons or agents with whom they are to be left.

By order of the New Jersey State Board of Health.

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

Trenton, N. J., July 7, 1879.

Letters of inquiry may be addressed to E. A. Osborn, C. E., Middletown, N. J., or to State Board of Health, Trenton, N. J.

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ADDENDA.

The headline on page 27 should read "Government of Towns," instead of "Government of Forces."