SECOND ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF MAINE,

For the Fiscal Year Ending December 31, 1886.

AUGUSTA:
SPRAGUE & SON, PRINTERS TO THE STATE.
1887.

MAINE STATE BOARD OF HEALTH.

OFFICE OF THE SECRETARY,
Augusta, Maine, April 4, 1887.

To His Excellency, Jos. R. Bodwell, Governor, and the Honorable Executive Council:

GENTLEMEN :—I have the honor of submitting to you the Second Annual Report of the State Board of Health of Maine.

Very respectfully,

A. G. YOUNG, M. D.,

Secretary.

CONTENTS.

"The great question of the day is not this operation or that, not ovariotomy or lithotomy, or hip-joint amputation, which have reflected so much glory upon American medicine—but preventive medicine, the hygiene of our persons, our dwellings, our streets—in a word, our surroundings, whatever or wherever they may be, whether in city, town, hamlet, or country; and the establishment of efficient town and State boards of health, through whose agency we shall be more able to prevent the origin and fatal effects of what are known as the zymotic or preventable diseases, which carry so much woe and sorrow into our families, and often sweep like hurricanes over the earth, destroying millions of human lives in an incredibly short time. The day has arrived when the people must be aroused to a deeper and more earnest sense of the people's welfare, and suitable measures adopted for the protection, as well as for the better development of their physical, moral and intellectual powers. This is the great problem of the day; the question which you, as representatives of the rising generation of physicians, should urge, in season and out of season, upon the attention of your fellow-citizens, the question which above and beyond all others should engage your most serious thoughts and elicit your most earnest co-operation. When this great object shall be attained, when man shall be able to prevent disease, and to reach with little or no suffering his three-score years and ten, so graphically described by the Psalmist, then, and not till then, will the world be a paradise."

PROF. S. D. GROSS.

INTRODUCTORY.

The State Board of Health of Maine has been organized less than two years. In this, the second year of its work, it has had to cope with no great epidemic nor with the near danger of one. Reports from the various parts of the State show that the general health of the Commonwealth has probably been somewhat better than that of the average year. This fact, that we are not threatened with immediate danger from any imported epidemic, would argue in the minds of some that there is no present need of sanitary work or of sanitary organizations, State or local. But to briefly finish the sanitary chronicle for the year it must be said that there have been somewhat frequent outbreaks of our indigenous infectious diseases; and it is exactly from these well-known maladies that our mortality lists are often swelled to too large proportions. Thus we read in the local records of diphtheria as it has prevailed in the State for the past twenty-five years or more that "the epidemic of 1860 was a fearful one. It swept off whole families of children and even depopulated school districts;" that "over one hundred deaths occurred in the small town of Lee in six months;" that in 1862, one physician treated eight hundred cases of diphtheria and says he has probably treated three thousand in all; that in 1878 in a small school district a family of five children were attacked with diphtheria and four died, and that the neighbors representing eight families assisted in nursing these children and carried the disease to their families in every instance except one; that on account of this disease in 1886, in a small village, eight families were thrown into mourning within a few weeks.

If possibly cholera and small-pox in this State or in this country can be said to slay their thousands they are outdone in destructive prowess, as was Saul by David, in that the every-day diseases slay their tens of thousands. And this goes on under the protest of those who know how unnecessary much of this is. To know that a given disease is a contagious disease is to know that it is a preventable disease. This fact should be clearly appreciated by the people and ought to shape their actions in reference to guarding against the danger of these diseases.

Many years ago Lord Palmerston gave the following rather startling answer to his Scotch petitioners who were asking for a day of fasting and prayer to protect them from the pestilence: "Go home, and see that your towns and cities are freed from those causes and sources of contagion which, if allowed to remain, will breed pestilence and be fruitful in death in spite of all the prayers of a united but inactive people!" This good advice was probably given in no irreligious spirit, but in accordance with sound sense and an understanding of the main requirements in the case. It was given too, knowing that the word "epidemic" has lost or is fast losing the original signification which it had by virtue of its derivation, and does not mean a disease which has come down from above or from the atmosphere upon the people, but is now usually used as referring to one which, with infectious qualities, has escaped from the premises or locality in which it first appeared and has spread upon the community or to other communities, almost always by means of the hundreds of ways which social intercourse and traffic make possible. To aid us in doing our duty in this direction we should clearly comprehend that the epidemic may be compared to the fire which swept away our town of Eastport and which like all fires was a small flame at first which a bucket of water might have extinguished. The epidemic grows in the same way from small beginnings which in many cases might have been confined to the primary cases if a little intelligent care had been taken to destroy the contagion and not let it develop its tendency to wander. The Utopia of the hopeful sanitarian is a place where the people will demand that every spark of the contagion of the dangerous infectious diseases be treated as promptly and as effectually as are the beginnings of conflagrations in our cities that have the best organized fire departments.

Is this practicable, or only visionary?

Dr. Budd of Bristol, England, who died a few years ago, after a large and extended experience as a physician and hygienist, was able to say of scarlatina that "For a period of nearly twenty years, during which I have been employed in a very wide field, I have never known the disease to spread in a single instance beyond the sick-room, and in a very few instances within it." The rules which he laid down to accomplish so favorable a result with a disease so infectious were few and simple, but imperative. They were essentially the same as those which are now generally employed by local authorities in all parts of the world and by means of which they meet with an amount of success commensurate with the wisdom of the laws, the efficiency of the local officers, and the intelligent co-operation of the people at large. For instance, as regards the success of the local health officers in Michigan in restricting outbreaks of diphtheria, the following is quoted from the last report of the Secretary of the State Board of Health of Michigan.

"Fifteen health officers, who reported on the special final report blank that patients had been isolated and that houses had been disinfected, reported that the outbreaks had been limited to one case. Nineteen others reported on the final report blank that the success of measures taken to restrict the spread of the disease had been 'good;' four stated that they had met with 'perfect' success; eight reported that they had been 'successful' in restricting the spread of the disease. Measures taken to restrict the spread of diphtheria in other cases were reported to have met with the following success: 'So far complete,' 'all that could be desired,' 'remarkably effective,' 'excellent,' 'confined to one family;' 'restricted to one house,' 'confining the spread of the disease to the two cases named,' 'that no new cases have come down with the disease although there were others in the house all through,' 'no new cases appeared after I was notified.'"

In a late communication on the practicability of restricting diphtheria and the success which has followed efforts in his State, Dr. Baker, the Secretary of the same Board, says:

"In the 102 outbreaks where isolation or disinfection or both were neglected, the average *cases* per outbreak were a little over 16, and the average *deaths* were 3.23; while in the 116 outbreaks in which isolation and disinfection were both enforced, the average *cases* per outbreak were 2.86 and the average *deaths* were .66; indicating a saving of over 13 cases and 2.57 deaths per outbreak, or 1,545 cases and 298 deaths during the year, by isolation and disinfection in the 116 outbreaks, compared with those in which little or nothing was done."

Testimony of this kind might be adduced in abundance. It assures us that the measure of success which we shall attain in the restriction of the contagious diseases will be limited only by the inadequacy of the means and methods which we may bring to bear upon them. It should also be a forcible reminder that, with us, the great desideratum is a thorough sanitary organization, branches of which shall extend into every city. village and township to promptly take cognizance of cases of the dangerous contagious diseases, and as far as is possible by approved methods to stand ready to aid the afflicted household and to guard the public from unnecessary dangers. This "consummation devoutly to be wished" seems at the time of writing this to be in a fair way of a speedy fulfilment. When it is an established fact the good results which will surely but gradually follow will be appreciated by the general public, and the confidence in the good old State of Maine will rise both in the mind of her own children and in that of the outside world.

SECRETARY'S REPORT.

As Secretary and Executive Officer of the Board, I have the honor to present the following, my second annual report, for the year ending Dec. 31, 1886. It will include only such parts of the proceedings at the meetings of the Board and of its work, and of the work of the Secretary, as may be thought to be of interest to the general public, or of use in teaching and impressing certain things which ought to be learned.

During the year, no change, either in the membership or in the officers of the Board has been made. At the annual meeting held in March, Dr. Frederic H. Gerrish was re-elected President. Dr J. O. Webster, whose term of membership expired January 31, 1886, was re-appointed by the Governor to fill the vacancy thus occasioned.

The names and addresses of the members of the Board, with the dates at which their terms of office will expire, are as follows:

E. C. Jordan, C. E., Portland, term expires January 31, 1887.

O. A. Horr, M. D., Lewiston, term expires January 31, 1888.

Hon. Stephen J. Young, Brunswick, term expires January 31, 1889.

Hon. Lewis Barker, Bangor, term expires January 31, 1890.

Frederick H. Gerrish, M. D., Portland, term expires January 31, 1891.

J. O. Webster, M. D., Augusta, term expires January 31, 1892.

One member, the Hon. Stephen J. Young, is now in Germany, whither he went in the autumn for a somewhat prolonged stay. Another member, Dr. O. A. Horr, has recently returned from Europe after an absence of six months.

Meetings of the Board have been held as follows:

The annual meeting on March 29, 1886; the second quarterly meeting June 29, 1886; the third quarterly meeting September 27, 1886; an adjourned meeting October 25, 1886; an adjourned meeting November 29. 1886; the last quarterly meeting December 27, 1886.

At the annual meeting in March the following committees were appointed for the ensuing year:

On Finance—The Hon. Lewis Barker. Hon. S. J. Young, and the Secretary.

On Disposal of Excreta—F. H. Gerrish, M. D.

On Ventilation—O. A. Horr, M. D.

On Summer Resorts—Hon. S. J. Young.

On Sewerage and Drainage—E. C. Jordan, C. E.

On Water and Water Pollution—J. O. Webster. M. D.

On School Houses and School Hygiene—A. G. Young, M. D.

SANITARY LEGISLATION.

From the very first the Board could not fail to be aware of the defective condition of our existing public health laws and to feel the need of improvement in them. In seeking to guard the State against the danger of the importation of small-pox, which so strongly threatened it during our first year's work, the very unsatisfactory condition of our sanitary legislation, as compared with that of some of the other States, was painfully felt. and no less has the need of better, more modern laws been felt for the prevention of those diseases which prevail, whether it is an epidemic year or not, in some parts of our State, the year in and the year out.

The law establishing the State Board of Health provides that it shall make "such suggestions as to legislative action as they may deem necessary." That we might do this part of our duty in such a way as would be for the best interests of the State, a careful and extended study has been made of the public health laws of the other states and of other countries, and of the working of those laws, particularly of those of the English-speaking peoples. As the result of this examination and of several meetings of the Board which were devoted almost wholly to this single topic, the draft of a bill entitled, "An Act to establish Local Boards of Health and to protect the People of this State from Contagious Diseases," is presented further on in this report. It embodies the views of the Board in regard to what is needed by the State in those directions in which there seems to be the most urgent need of amendment and reform, to wit, in the direction of providing for a more effective local sanitary government by establishing local boards of health, specifying their powers and duties, and providing for the control of contagious diseases. That the reasons why these suggestions for legislation are made may be understood, and that the need of the proposed changes may be appreciated, the remarks on the next few following pages are submitted.

Hitherto, until within comparatively recent years, most of the health laws of the world have been made in the face of some great impending danger. The fear of the approaching pestilence has more frequently been the inspiration of the sanitary law-maker. In the reign of James I., one hundred years before the last terrible sweep of the plague, and the London holocaust which, so it seemed, there and then forever put an end to its ravages, we may find a sample of such sanitary legislation.

> "If any infected person, as aforesaid, so commanded to keep house, shall contrary to such commandment willfully and contemptuously go abroad, and shall converse in company, having any infectious sore upon him uncured, that then such person and persons shall be taken, deemed and adjudged as a felon and to suffer the pains of death, as in case of felony.
>
> — *Anno primo Jacobi Regis.*"

The short act of which this is the most important part, was almost all of the sanitary legislation which was done in the British Parliament for three or four centuries. It sought to guard the well from the danger of infection by immuring the unfortunate victim of the plague within the walls of the abode whose emanations had largely to do with the production of the disease. The scores of details which go to make up the whole of healthy living, and whose neglect are the chief factors in the causation of disease, or at least of those infectious and epidemic diseases whose unusual prevalence has constituted the historic plagues, were wholly ignored in those early times, a matter of no surprise when we recollect the almost entire absence of knowledge which then prevailed respecting the causes of diseases.

Later, but not far from the time when the plague ceased to ravage the English coasts, another pestilence, small-pox, arose, or rather was imported, and its presence is recorded in a few, but in only a very few parliamentary acts. For centuries these two pestilential diseases dominated the scanty sanitary legislation which was enacted, and even long after the one had become a disease of the past, and the means of effectually controlling the other had been placed in our hands so that the town which suffered severely from it could only be said to be expiating its sin of neglect, the dread and the remembrance of these two plagues still shaped our laws. In the legislative bodies of the early American Colonies there were passed some health laws which, considering the date of their enactment and the undeveloped condition of sanitary science in those times, are a credit to our early legislators. These early colonial laws formed the basis of the health laws of most of the States, and as such many of them may now be found on our statutes almost unchanged. Of these ancient health laws it may be said that some of the sections of them are still of the highest worth, while other sections might perhaps keep their place on account of historic associations, but hardly for any useful purposes which they now serve.

In the legislatures of many of the States, particularly in those which were the first to establish State boards of health, there have, within the last ten or fifteen years, been passed many new enactments relating to health matters. These new laws are generally far more useful than the older laws, for the reason that they are founded on a careful consideration of the present wants of sanitation and in the light of a hygienic knowledge which has been carried forward to a much more advanced stage. In our own State, however, health legislation, in those directions in which such acts may do the greatest good, has virtually been stationary for generations, and many of those provisions are entirely wanting which are essential to the securing of an equitable adjustment of many of those sanitary relations which our social proximities entail. The practical workings of such laws as ours cannot fail to be highly unsatisfactory, since they were framed to meet particularly the danger from those pests which prevail now at rare intervals or not at all, instead of to meet the danger of those diseases which are now actually causing our too large mortalities.

A somewhat detailed examination of our present law and a comparison of it with some of the points in other public health codes will show the justice of these strictures.

Our provisions for local sanitary government form an anomaly among the other statutory acts for the same purpose.

"A town at its annual meeting, may choose a health committee of not less than three nor more than nine, or one person to be a health officer; who at the expense of their town shall remove all filth found in any place therein, which in their judgment endangers the life or health of any inhabitant; and may require the owner or occupant, when they think necessary, to remove or discontinue any drain or other source of filth."

The restriction of the choosing of the health committee to the annual meeting is not prudent; for exigencies are likely to arise at any time, and have been observed by the Board this past year, in which it is highly desirable and necessary that a special meeting be called and a health organization of some kind be immediately effected, either by the choice of a health committee or a board of health.

It will be noticed that it is optional with the towns to choose either a health committee or a health officer, and that their specified duties are identical and very limited, being, in fact, confined to the removal of filth, or in other words restricted to the duties of the scavenger. This assignment of powers and duties of the health officer is unique and not to be found elsewhere in the United States. Usually the health officer is the executive officer of the local sanitary authority performing his duties under the general direction of the local board; in some of the States being himself a member of the Board and in others not. In either case the full board constitutes a board of appeal from the acts and decisions of the health officer, and exercises a restraining influence over any possible vagaries of that official.

"If any town, at its annual meeting, omits to choose such committee or officer, the municipal officers shall be a health committee and have all the powers and perform all their duties."

"A town may choose a board of health of not less than three nor more than nine persons, who shall have all the powers and be subject to all the duties, restrictions, liabilities and penalties of the municipal officers, and of the health committee or officer."

Thus it may be noticed that a multiplicity of choices is open to the towns — a health committee, a health officer, the municipal officers as an *ex-officio* health committee, or a board of health. This abundance of resources, as the result of legislation at various times, has been a source of perplexity and misunderstanding for the towns. The distinction between the duties and powers of the health committee or health officer and the board of health has not usually been kept in view, and the one or the other has been chosen, according as the ruling spirit of the town meeting took a fancy to the one or the other of what very often have been considered as elective synonymes. Whether the one or the other be chosen is very far from being a question of no moment. The powers and duties of the board of health are far more ample than are those of the health committee. Within the jurisdiction of the former fall a score or more of questions of the greatest importance in the preventing or staying of diseases, particularly the contagious diseases, which the health committee can have nothing to do with.

The terms health committee and health officer, as defined in our law, are useless, and such offices with their present limitations of functions should be abolished, and the health authority inhere in the health board or in the municipal officers as an ex-officio board. It is generally admitted, however, that better work and better results may be secured with an independent board than with an ex-officio board, and in several instances States have enacted that in no case shall any member of the board be connected with the municipal government. It is important that the health officials should be persons who are interested in sanitary work. No part of local government is more important than the sanitary management of the town, and unless the board in whom the town intrusts the supervision of its health interests is alive to the value of such work, but little will be done. The municipal officers are usually men who have been chosen for their qualifications in other directions, rather than for their fitness as custodians of the public health; consequently they do their work in those directions in which they feel assured they are the most competent to act, regarding their ex-officio position as health officials when the force of circumstances throws it upon their attention, as only a troublesome deviation from their legitimate sphere. To have tolerably good work done it is essential that the board be acquainted with the modern methods of dealing with the many questions which are now coming up for the consideration of such bodies, for instance, house drainage, whether in the country or in the city; economical and efficient ventilation, particularly of dwellings and school-houses; water supply and the most frequent sources and dangers of its pollution; the peculiarities of the contagia of our prevailing infectious diseases and the proper methods to be employed for the destruction of these contagious principles; the methods of managing endemic and epidemic diseases and especially the prompt care of the primary cases, thereby avoiding the occurrence of the epidemic. That these and the many other vital questions, some or all of which are always before every community, great or small, for solution, shall receive fitting treatment, it is better that boards of health have, when possible, at least one physician on the board, and that the term of office of the members be for more than a single year.

As regards the question of election of the board by the town or its appointment by the municipal officers, the practice in nearly all the States is to have it appointed by the municipal officers. The advantages are vastly in favor of this latter method, in that political partisanship is to a considerable extent eliminated from the choice and in that a wise discrimination is more likely to be exercised in the selection.

If we in this State are to have decent local sanitary government, such as obtains in many of our neighboring States, and such protection to life and health as the State owes to her people, and such as our summer visitors have a right to expect, we must have a permanent sanitary organization in every town. This is indispensable. No health body organized in the face of an impending epidemic or in its midst can cope successfully with such a danger, to say nothing of the more important work of staying the hand of the destroyer which comes in the shape of those indigenous diseases, as we might term them, which are always within our borders.

Our law dealing with the matter of contagious diseases has a few good features too valuable to be lost in any future attempts in the direction of the amendment or codification of our sanitary legislation; but most of it, as has been remarked, is better adapted to the public needs and to epidemiological conditions as they existed many years ago rather than to our present wants and to the present phases of diseases. We have provisions for the issuing of a writ for the purpose of ejecting an infected tramp from our State in a neighborly way back again into the State whence he came, and if our neighboring commonwealth have a similar legal provision, everything would be complete whereby to give the citizens of the two States the full benefit of this infected shuttlecock. We have also provisions for the securing of infected persons and goods and the care of them, but we have no legislative declaration of what diseases shall be deemed contagious so that there may be no doubt or hesitation with health officials in doing their duty. Neither have we any distinct legislative provisions for the disinfection of persons, rooms, clothing and other things which have been subjected to the infection of dangerous contagious diseases. a matter of prime importance without which there can never be any assurance that a focus of infection will be stamped out or destroyed. Nor have we any sufficient statutory law restricting communication with the sick ; nor forbidding the removal of persons and clothing and things from one house to another, unless permission be granted by the board of health or physician ; nor regulating the behavior of nurses and other attendants in view of lessening the danger of spreading these diseases ; nor any statutory guaranty that convalescents may not spread such diseases at will before the dangerous period has passed. There ought to be a strict prohibition of public funerals of those who have died of certain dangerous contagious diseases, or at least the statutes should distinctly state that boards of health shall have power to specify from what diseases deaths shall not be followed by a public funeral. In want of such a law strictly enforced, a malignant outbreak of diphtheria destroyed several lives last spring and seriously threatened to ruin the business, for this year at least, at one of our principal summer resorts. We ought to have, but have not, a law prohibiting the entrance by infected persons into public conveyances without notice to the driver of the fact of infection, nor have we any provision for the disinfection of such conveyances after they are infected. An infected public hack, for instance, may be a veritable death trap for succeeding occupants, and considering the small trouble of disinfecting should not be tolerated for a moment. Infected clothing should not be permitted to be sold, lent or given away, until disinfected and rendered harmless. For want of legal prohibition, and a local board of health to enforce it, a serious and very fatal outbreak of diphtheria has occurred this past year in Deering.

Bedding which cannot be disinfected should be burned and compensation given by the town. Our law should say, but does not, that infected houses shall not be let nor offered for rental until they are disinfected.

All the disinfection which has been mentioned should be done under the direction and to the satisfaction of the local health authority, for much which is called disinfection is a delusion and a snare, leading to the belief that safety has been secured when it has not in fact.

There should be some provision to protect the public from the danger of improper burial, disinterment and transportation of bodies after death from certain infectious diseases.

All these matters which our statutory law wholly ignores, or provides for in no direct and satisfactory way, have been the subject of careful legislative consideration in many other States and governments, and the acts resulting therefrom have been highly satisfactory to the health authorities and to the people at large.

NOTE.—On account of the late date of publication of this report we are enabled to say that, through the act of the Legislature which has but lately adjourned, most of the defects in our public health laws, pointed out in the above, no longer exist. Instead of the bill which was drafted by the Board, we have the pleasure of presenting to the people of our State the following act, which is a slight modification in some points of the original bill.

An Act to establish Local Boards of Health, and to protect the people of this State from Contagious Diseases.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECT. 1. There shall be a local board of health in each city and town in this State to be composed of three members, anything in the charter of such city to the contrary notwithstanding.

SECT. 2. Their appointment shall be as follows: On the second Monday in April, one thousand eight hundred and eighty-seven, the municipal officers in each town shall appoint three persons, one for three years, one for two years, and one for one year, and thereafter annually before the 15th day of April one person to serve three years, and each to hold office until another is appointed in his stead. Any vacancy arising from any cause shall be filled at the first meeting thereafter of the municipal officers. If for any reason the appointments are not made at said dates, the same shall be made as soon as may be thereafter.

SECT. 3. Before the fifteenth day of May in each year the board of health shall meet for the transaction of business and shall choose a chairman and a secretary from their number.

SECT. 4. The chairman shall preside at all meetings of the board. The secretary shall in a book kept for that purpose make and keep a record of all the proceedings at the meetings and of all transactions, doings, orders and regulations of the board of health. The secretary shall be also the executive officer of the board when a health officer is not appointed.

SECT. 5. The municipal officers may appoint a health officer who shall be a well-educated physician, who shall be the sanitary adviser and executive officer of the board, and who shall hold office during the pleasure of the board. The municipal officers shall establish his salary or other compensation and shall regulate and audit all fees and charges of persons employed by each board of health in the execution of the health laws and of their regulations

SECT. 6. It shall be the duty of the health officer, or where there is no health officer appointed, of the secretary of each local board of health, at least once in each year, to report to the State Board of Health their proceedings, and such other facts required, on blanks, and in accordance with instructions received from said board. He shall also make special reports whenever required to do so by the State Board of Health. He shall, within one week following their meeting and election of officers, report to the Secretary of the State Board of Health the name and address of each member of the local board, of the chairman and secretary, and of the health officer when one is appointed.

SECT. 7. Each local board of health constituted under this act shall have power and it shall be its duty:

I. To hold regular quarterly meetings, and special meetings whenever considered necessary by its executive officer, also whenever requested by the State Board of Health, or the president and secretary thereof.

II. To prescribe the powers and duties of the local health officer, when there is one, and to direct him from time to time in the performance of his duties.

III. To guard against the introduction of contagious and infectious diseases, by the exercise of proper and vigilant medical inspection and control of all persons and things coming within the limits of its jurisdiction from infected places, or which for any cause, are liable to communicate contagion; to give public notice of infected places, by displaying red flags or by posting placards on the entrances of the premises; to require the isolation of all persons and things that are infected with, or have been exposed to, contagious or infectious diseases, and to provide suitable places for the reception of the same; and to furnish medical treatment and care for persons sick with such diseases who cannot otherwise be provided for; to prohibit and prevent all intercourse and communication with, or use of, infected premises, places and things and to require, and, if necessary, to provide the means for the thorough cleansing and disinfection of the same before general intercourse therewith, or use thereof, shall be allowed. And it shall be its duty to report to the State Board of Health promptly facts which relate to infectious and epidemic diseases, and every case of small-pox, varioloid, diphtheria, and scarlet fever, occurring within the limits of its jurisdiction.

IV. To receive and examine into the nature of complaints made by any of the inhabitants concerning nuisances dangerous to life and health within the limits of its jurisdiction: to enter upon or within any place or premises where nuisances or conditions dangerous to life and health are known or believed to exist, and personally or by appointed agents to inspect and examine the same; and all owners, agents and occupants shall permit such sanitary examinations; and every such board of health shall have power, and it shall be its duty, to order the suppression and removal of nuisances and conditions detrimental to life and health found to exist within the limits of its jurisdiction.

V. To make, alter or amend such orders and by-laws as they shall think necessary and proper for the preservation of life and health and the successful operation of the health laws of the State, subject to the approval of any justice of the supreme judicial court. Notice shall be given by the board of health of all by-laws made or amended by them by publishing the same in some newspaper, if there is one published in such town, if there is none, then in the nearest newspaper published in the county, and a record of such publication of said orders and by-laws in the office of the town clerk shall be deemed a legal notice to all persons.

SECT. 8. Where any local board of health is of opinion that the cleansing and disinfecting of any house, building, car, vessel or vehicle, or any part thereof, and of any article therein likely to contain infection, would tend to prevent or check infectious disease, it shall be the duty of such local board of health to give notice in writing to the owner, agent, or occupier of such house, building, car, vessel or vehicle, or part thereof, requiring him to cleanse and disinfect to the satisfaction of the health officer, or board of health, such house, building, car, vessel or vehicle, and said articles within a time specified in such notice.

SECT. 9. If the person to whom notice is given fails to comply therewith, he shall be liable to a penalty of not less than five dollars and not exceeding ten dollars for every day during which he continues to make default; and the local board of health shall cause such house, building, car, vessel or vehicle, or any part thereof, and articles to be cleansed and disinfected at the expense of the town, and the town may recover the expenses so incurred from the owner, agent, or occupier in default, by act of special assumpsit.

SECT. 10. Whenever any householder knows or has reason to believe that any person within his family or household has small-pox, diphtheria, scarlet fever, cholera, typhus or typhoid fever, he shall within twenty-four hours give notice thereof to the health officer of the town in which he resides, and such notice shall be given either at the office of the health officer or by a communication addressed to him and duly mailed within the time above specified, and in case there is no health officer, to the secretary of the local board of health either at his office or by communication as aforesaid.

SECT. 11. No householder in whose dwelling there occurs any of the above-mentioned diseases, shall permit any person suffering from any such disease, or any clothing or other property to be removed from his house, without the consent of the board, or of the health officer, or attending physician, and the said board, or health officer, or attending physician, shall prescribe the conditions of removal.

SECT. 12. No parent, guardian, or other person, shall carelessly carry about children or others affected with infectious diseases, or knowingly or wilfully introduce infectious persons into other persons' houses, or permit such children under his care, to attend any school, theatre, church or any public place.

SECT. 13. Whenever any physician knows or has reason to believe that any person whom he is called upon to visit is infected with small-pox, scarlet fever, diphtheria, typhus or typhoid fever, or cholera, such physician shall within twenty-four hours give notice thereof to the secretary of the local board of health, or the health officer of the town in which such person lives.

SECT. 14. No person affected with small-pox, scarlet fever, diphtheria, or cholera, and no person having access to any person affected with any of the said diseases shall mingle with the general public until such sanitary precautions as may be prescribed by the local board or attending physician shall have been complied with.

SECT. 15. Persons recovering from small-pox, scarlet fever, diphtheria, or cholera, and nurses who have been in attendance on any person suffering from any such disease, shall not leave the premises till they have received from the attending physician, board of health, or health officer, a certificate that they have taken such precautions, as to their persons, clothing, and all other things which they propose bringing from the premises as are necessary to insure the immunity from infection of other persons with whom they may come in contact, and no such person shall expose himself in any public place, shop, street, inn or public conveyance without having first adopted such precautions.

SECT. 16. Nurses and other attendants upon persons sick with small-pox, scarlet fever, diphtheria, or cholera, shall adopt for the disinfection and disposal of excreta, and for the disinfection of utensils, bedding, clothing and other things which have been exposed to infection, such measures as may be ordered in writing by the local board of health.

SECT 17. No person shall give, lend, transmit, sell or expose any bedding, clothing or other article likely to convey any of the above diseases, without having first taken such precautions as the local board of health may direct as necessary for removing all danger of communicating any such disease to others.

SECT. 18. Any local board of health may direct the destruction of any bedding, clothing, or other articles, which have been exposed to infection.

SECT. 19. Whenever small-pox, diphtheria, scarlet fever, or other contagious disease shall appear in a town or a school district it shall be the duty of the local board of health immediately to notify the teachers of the public schools in the neighborhood, of the fact, and it shall be the duty of all teachers and school officers when thus notified, or when otherwise they shall know or have good reason to believe that any such disease exists in any house in the neighborhood, to exclude from the school-house all children and other persons living in such infected houses or who have called or visited at such houses, until such time as the local board of health (or attending physician) shall certify that such children or other persons may safely be readmitted.

SECT. 20. When persons from houses or places which are infected with any of the diseases specified in section nineteen have entered any school-room, or when, from any other cause, the school-room has probably become infected, it shall be the teacher's duty to dismiss the school, and notify the school officers and local board of health, and no school shall be again held in such school-room until the room has been disinfected to the satisfaction of the local board of health, and it shall be the duty of the school officers and board of health to have the room disinfected as soon as possible.

SECT. 21. The board, when satisfied upon due examination that a cellar, room, tenement, or building in its town, occupied as a dwelling-place, has become, by reason of want of cleanliness, or other cause, unfit for such purpose, and a cause of sickness to the occupants or the public, may issue a notice in writing to such occupants, or the owner or his agent, or any of them, requiring the premises to be put into a proper condition as to cleanliness, or, if they see fit, requiring the occupants to quit the premises within such time as the board may deem reasonable. If the persons so notified, or any of them, neglect or refuse to comply with the terms of the notice, the board may cause the premises to be properly cleansed at the expense of the owner, or may close up the premises, and the same shall not be again occupied as a dwelling-place until put in a proper sanitary condition. If the owner thereafter occupies or knowingly permits the same to be occupied without putting the same in a proper sanitary condition, he shall forfeit not less than ten nor more than fifty dollars.

SECT. 22. No person having small-pox, diphtheria, scarlet fever, cholera, or other disease dangerous to public health, shall enter, nor shall any person allow anyone under his charge who has any such disease to enter any conveyance without having previously notified the owner or person in charge of such conveyance of the fact of his having such disease.

SECT. 23. The owner or person in charge of any such conveyance shall not, after the entry of any person so infected into his conveyance, allow any other person to enter it without having sufficiently disinfected it under the direction of the local board of health or the supervision of the health officer.

SECT. 24. No person shall let or hire any house or room in a house in which small-pox, diphtheria, scarlet fever, cholera or typhoid fever has existed, without having caused the house and the premises used in connection therewith to be disinfected to the satisfaction of the local board of health.

SECT. 25. Any member of a local board of health, or any health officer or other person employed by the local board of health may, when obstructed in the performance of his duty, call to his assistance any constable or other person he thinks fit, and it shall be the duty of every such constable or person so called upon to render such assistance.

SECT. 26 Any person who shall wilfully violate any of the provisions of this act or of said regulations and by-laws—the penalty for which is not herein specifically provided for—and any person who shall wilfully interfere with any person or thing to prevent the execution of the provisions of this act or of said regulations and by-laws, shall be guilty of a misdemeanor; and upon conviction thereof shall be subject to a fine not more than fifty dollars, and judges of municipal and police courts, trial justices, shall have jurisdiction original and concurrent with the supreme judicial and superior courts of all offences under this act.

SECT. 27. Sections fourteen, fifteen, thirty-two and thirty-four of chapter fourteen of the Revised Statutes and all acts and parts of acts inconsistent with this act are hereby repealed. All acts and parts of acts which read "health committee" are hereby amended so as to read 'local board of health', and said chapter fourteen, sections one to thirteen inclusive, and sections sixteen to twenty-nine, inclusive, are hereby amended so as to make "municipal officers" read 'local board of health.'

SECT. 28. This act shall take effect on the second Monday in April, 1887.

[Approved March 16, 1887.]

DIPHTHERIA AT ALLEN'S CORNER, DEERING.

Upon petition from the inhabitants of Allen's Corner, Deering, I went to that place June 21st to investigate in regard to the cause of an outbreak of diphtheria. I learned that there had been but few cases of diphtheria in the town of Deering for years, and at Allen's Corner, no cases for several years,—careful enquiry could elicit no information of any antecedent cases to which the present outbreak could be referred as the source of its contagion, except one. The history of this and of the subsequent cases is as follows:

In the fall of 1885, Mrs. A. went to Boston, Mass., on a visit and took her child with her. While in Boston her child sickened with diphtheria and died. The mother returned to Allen's Corner soon after the death of her child, bringing home the clothes of the little one. After her return, Mrs. A. herself had a light attack of diphtheria, as I have been informed by the physician who attended her.

Soon after the return of Mrs A , she was visited by Mrs. B., accompanied by her eldest daughter Jennie. During this visit Mrs. A. gave the clothes of the recently deceased child to Mrs. B. for her children In a few days diphtheria appeared in the B. family. All, six or seven in number, were sick, but all recovered. In four or five days after the visit, Jennie was taken sick at Mr. C.'s where she worked, and went home.

In the C. family only one person, a boy, had the disease.

The next family with this disease was that of Mr. D. He lived near the B. family and in each house there was a little boy of seven years of age These two little fellows "chummed" together, and soon after the recovery of the B. boy, he was over playing with the D. boy. The latter was the first to be attacked in this fourth house. All the members of this family, six or seven in number, were sick; the father and the baby died. There were also in this family two boarders, Mr. E. and Mr. F., both young men. Both had the disease and after a severe sickness both recovered.

During the sickness of Mr. F. he was visited by Miss G. She lived with her father alone, and during her attack of diphtheria, which soon followed, Mrs. H., a neighbor, was out and in helping her. Mrs. H. had a rather mild form of the disease, and Miss I., a teacher, who was boarding with her, had a severe form of the disease.

Again, from the D. family, we find the disease carried to the J. family. Two weeks after their sickness the children of the D. family were over to play with the J. children. A few days after this the sickness of the J. children began. In this family there were three children all of whom were sick and with them the mother. All recovered. During the sickness of the J. family Miss K., a teacher, visited them and soon after began a term of school at Morrill's Corner, but was obliged to leave it in a few days and went to the J.'s where she was sick with the rest of them with diphtheria.

These cases occurred between September, 1885, and the early part of the following January. There was then a lull until spring.

During the sickness of the J. family, in the winter, a niece of Mrs. J.'s, who made it her home with them a part of the time, was away.

She returned in April and soon after the "spring cleaning" had an attack of what the neighbors supposed to be diphtheria.

Diphtheria appeared in the L. family in May. The three children had the disease and all died. The first one sick was attacked on the 23d. The other two were sick later and probably received the contagion at home. The one which was first sick had attended school until its sickness. The J. children and others that had been sick with diphtheria were also attending school.

At the time of the death of the first L. child, Mrs. M. and Mrs. N. aided the family in laying it out. Mrs. M., who was fifty-three years of age, was attacked in a few days and died in three more. Mrs. N. had a light attack soon after helping the L. family.

At the time of my visit there was a case in the family of Mr. O. which I was unable to connect with the other cases by the link of contagion. A few other mild cases occurred whose history I could not get. Making a schematic arrangement of these cases and families we have the following to show how the contagion traveled:

Mrs. A.
B. family.
C. family.
D. family.
Mr. E.
Mr. F.
Miss G.
Mrs. H.
Miss I.
J. family.
Miss K.
Mrs. J.'s niece.
L. family.
Mrs. M.
2 Mrs. N.

From the time of my visit to Allen's Corner in June there were no other cases of diphtheria until November. On the last day of August a house was vacated by a family which is not included in the above history, but which had diphtheria in the winter or spring. Early in September another family moved into this house. The five children and the father were attacked with diphtheria in November and four of the children died. Following the precautions which were taken by the neighborhood there have as yet been no other cases.

DIPHTHERIA IN EAST MADISON.

July 2d, I went to East Madison on account of an endemic of diphtheria which at that date had caused the death of seven persons in that village within a few weeks. There was also in the evening when I left, a man rapidly sinking with the disease who died the next morning.

East Madison is pleasantly situated on the east side of Madison Pond, and on a branch of the Wesserunset River which forms the outlet of the lake. The principal part of the village, where most of the cases of diphtheria occurred, is perhaps a quarter of a mile from the pond. Immediately in the village is the Wesserunset Woolen Mill and its mill-pond, and above, at the outlet of Madison Pond, is the dam which holds back the water in this larger pond. On the 24th of May this upper dam broke and flooded the village, washing down at the same time as the people think, considerable mud into the lower, or smaller pond. There was considerable testimony to show that since the breaking of the upper dam there had been more smell than usual coming from the little pond in the village, especially during the evening and night, for during the last few weeks the Corporation had been in the habit of shutting down the upper gate when the mill closed in the evening to save the water. As the result, the water became low in the pond during the night and the shores were more exposed, and the offensive smell became quite perceptible.

Certain persons in the village were so thoroughly convinced that this was the sole cause of the outbreak that they could not accept any other factors in the causation. Further than what has been mentioned, the general sanitary condition of the village was like what can be found in most New England villages which have given no special attention to health matters. The objectionable accumulative privy system was in vogue and generally badly neglected, as usual. Sink drainage was badly managed in many cases, and in one case passed dangerously near the well. In another case the well from which the water was said to be good, was so situated that it must necessarily receive the soakage from the stable and other out-buildings; in another case a neighbor's stable and pig-pen were only five feet from the dining-room window.

These things are generally considered prejudiced to the health conditions of homes and villages, and rightly; but in these outbreaks of diphtheria this Board has almost invariably found, in addition to any unsanitary conditions of premises or of towns, which might be present, the history of the propagation of the disease by contagion. The grounds for believing that the contagion may have been imported, and that its spread may have been largely due to infection are these:

Just before the outbreak in East Madison there had been quite a prevalence of diphtheria in Skowhegan, and several deaths were attributed to that disease. Miss A. had been at work in a hotel in the latter place and came home sick with a sore throat.

She was sick a week, but had no physician to attend her. Two other children in this family were sick in the same way, the second one being attacked just two weeks after Miss A.'s return from Skowhegan. Their mother told me that all three of the patients had quite a sore throat, had white patches, some of which were as large as a bean, and that they all subsequently, during their convalescence, had paralysis of the throat, so that it caused some difficulty of speech and the return of fluids through the nose when swallowing was attempted.

Another young lady, Miss B., had been taking music lessons in Skowhegan, making her last visit there two weeks before she became sick on the 1st of April. Mrs. B. said that she had quite a sore throat, white patches in the throat, and as a sequel, the nasal voice and return of fluids through the nose. Two other children in this family had the same sore throat in a short time after Miss B.'s sickness.

Neither of these young ladies who had been in Skowhegan, was aware that she had been exposed to the contagion of diphtheria.

Mrs. C., who was a near neighbor of the B.'s, helped to take care of the children while they were sick. She took the disease and died.

Mrs. D., who was also a near neighbor, helped at the laying out of Mrs. C. and was attacked in a few days and died after a sickness of only five days. Her age was fifty-six.

Miss E., fifteen years of age, who lived near the B family, was the next case. She died after a sickness of three weeks. Her mother thinks that she took the disease from the B. family, as she called there while the children were sick.

In the family of Mr. F. a daughter had the disease and recovered.

These cases which have been given occurred in April and May. During the month of June there were the following cases:

At Mr. F.'s house another case, that of a little boy who died.

In the G. family, two cases, one fatal.

In the H. family, three cases, one fatal.

Mr. I., a young man who sat up with the H. boy who died, had diphtheria in a few days after, but recovered.

In the J. family, two cases, one fatal. The earlier of these two cases was the first case at the Lower Mills. It was in a boy twelve years of age, who had played with the children at the Upper Mills, and attended Sabbath school. He died June 12.

Mrs. K., a neighbor at the Lower Mills, who had helped while the boy was sick, became sick June 17, but recovered.

In the L. family, two cases, both recovering.

H. M., a young man living just outside the village, recovered. He was in the habit of spending his evenings in the village stores.

Mr. N., who was sick while I was in the village, died the next morning.

Thus it will be seen that there occurred eight deaths in as many different families. All but one of these fatal cases occurred at the Upper Mills and not far from the suspected mill-pond. This fact served to strengthen the opinion, which was held by some, that the disease was due to the evil influence of the mill-pond. While it seems quite reasonable to believe that the offensiveness of the pond may have been an accessary, a predisposing cause, it must be borne in mind that, let the diphtheritic infection once be introduced into a sequestered village like the one under consideration, and, given the same want of isolation of the sick and the same want of thorough disinfection, it is pretty sure to find victims, whether there is a mill-pond in the village or not, or whether the village is clean or filthy. While it is quite likely that the unsanitary conditions of this particular village played a bad part, it is very certain, as may be seen in the above account, that contagion played a principal part. It was not possible to trace out its course so completely and satisfactorily as in some of the other outbreaks of this year, for the reason that in many of the cases there were so many possible ways for its reception. In the village, there were several stores, and in these the mill hands and the other people of the village were in the habit of congregating outside of working hours. In one of these stores, there was constantly a pail of iced water and a drinking-cup for the accommodation of the public, and on account of the hot weather which then prevailed this drinking-cup passed very frequently from mouth to mouth. Besides the cases of diptheria which have been enumerated, there were many cases of sore throat which were not considered diphtheritic, but which, from a hygienic point of view, it perhaps might have been safer, during an epidemic of diphtheria to regard as such. Adding still further to the difficulty of tracing the course of the contagion from person to person, were the facts that many of the funerals following the diphtheria deaths were public, that the Sunday school was not closed, and that the village school was not closed until two weeks before my visit.

Directions were given to the people in regard to what ought to be done, particularly emphasizing the need of strict isolation of the sick, thorough disinfection, improving the sanitary condition of the place, and the abolition of the public drinking-cup from the store. It was further recommended that they should form a local voluntary sanitary organization at once. These recommendations they accepted and put into operation immediately. In some cases where the owner was not able to abate or remove nuisances, the neighbors turned out, and helped him to do it. In the case of the stable which was within five feet of a dining-room, they moved it back for the owner. The result of this activity in the right direction was that only one more case occurred, and that a relapse and re-appearance of diphtheritic symptoms two days after my visit, in one of the cases which has already been mentioned.

DIPHTHERIA IN CANTON.

July 8th I went to Canton at the request of Dr. Stanwood, chairman of the local board of health. Diphtheria had broken out in Gilbertville, a village about a mile from the village of Canton.

The first to suffer was the family of J. P. Three children were sick. The first case, three years old, was first seen by the medical attendant June 26. It then had an eruption over the whole body which he called measles. On the third day there was sore throat followed by an extensive formation of diphtheritic false membrane. On the 27th another little one five years old had an eruption appearing with the characteristic blotches, and in six days more the throat trouble began. In this case there was also an extensive formation of false membrane. On the same date, also, the third one became sick. In this case the eruption was not so general in its distribution as in the others. It was confined mostly to the posterior aspect of the body and to the thighs. In the first two cases the eruption appeared first on the forehead and followed the course of distribution which is usual in measles. In the youngest one there was but little cough, but there were the usual premonitory symptoms of coryza. In the older ones there was a slight cough.

In the family of J. D. a girl eleven years of age became sick with diphtheria June 28. She was sick a week and died. There was no eruption in this case.

In the family of J. J. a little boy four years old was attacked July 3rd and died in three days. A girl five years old was taken July 4th; at the time of my visit she was still very sick.

In the McL. family a little girl had recently been attacked, and in a French family there had been two cases.

This was the status of affairs at the time of my visit.

August 30th I was again called to Canton on account of the re-appearance of diphtheria. There had been in this present lot eight cases and one death, which had occurred on the 28th.

As regards the origin of the infection which started the outbreak of diphtheria in Canton nothing more satisfactory than a basis of conjectures could be arrived at. The first family in which the disease appeared had recently returned from a visit to New Hampshire, where measles had prevailed earlier in the season, and the children had come in contact with a child in the station at Mechanic Falls who had recently had measles. This on their return, however, was four weeks before their sickness. Further than this it was impossible to get any history which would point to the importation of the diphtheritic poison. Many facts that were gathered seemed to point to the school-house as the probable source of infection. The school-house was used Sundays as the place of meeting of the Catholic church, and there was the possibility that an unrecognized case of diphtheria had been in the school-house so as to infect it. If, however, we were to admit the possibility of the spontaneous origin of diphtheria and were to look to the school-house for its inception, this outbreak would very aptly fit into the category of outbreaks due to local unhygienic conditions.

The school-house stands on a knoll around which on the west and north Whitney Brook loses itself in a boggy swamp. This swamp is not more than three or four rods from the school-house. On the west side of the school-house also is the privy, not more than six feet from the school-house, the two windows of which were kept open during the hot weather which prevailed before the outbreak. The vaults were in a very unsatisfactory condition and the prevailing west wind carried their dangerous emanations in through the windows. On the south side of the school-house, not more than two or three rods distant, was a piece of ground a quarter of an acre or more in extent on which, in the spring, a large number of privy-vaults had been emptied and harrowed in, not plowed in. The rank, dark-green growth of grain on it showed how liberal had been the dressing.

All the children who had been attacked at the time of my first visit had been attending school. The first case was seen by the doctor June 26, and school was not closed until July 2. The first child sick was only three years old but was attending the school until her sickness, and after this the other children from the same house attended until they were taken down.

At the time of my first visit to Canton I found that the local board of health had already begun vigorous measures in the way of cleaning up and abating or removing certain nuisances. Their efforts, however, to secure proper isolation of the sick and the disinfection of rooms and things which ought to be disinfected were not at all satisfactory to the State Board, nor had their success in this direction been satisfactory to themselves. This failure to keep the sick separated and isolated from the well was the most serious trouble, also, during the second outbreak; and it was due mainly to the inherent defects and shortcomings in our present public health laws. These two little outbreaks illustrated, as almost every similar outbreak does, statutory defects in more than one direction. At the second visit the health authorities were found searching the Revised Statutes to see what provisions were there contained as regards the burial and transportation of bodies after death from the contagious diseases. They found nothing. The friends of a little girl recently deceased from diphtheria were about to transport the body to another town for burial. If this were done it seemed very desirable for the safety of the town into which the burial party was to go, that certain precautions should be taken. The parents of the child promised to have the body disinfected before starting, and the chairman of the board of health went after disinfectants for this purpose. When he returned, however, he met the people with the corpse on their way to the neighboring town, not having waited to have the disinfecting precautions taken. I fear that in our neighboring States this would be considered an anomalous condition of sanitary affairs that these things should occur while both the local and the State Board of Health found themselves powerless to interfere. Again, in one instance at least, a public funeral was held after one of the diphtheria deaths, and friends came from a distance to attend the funeral and remained some days. Again, precautions due to the public were not taken by a man who ran on the local train. As a result of this lack of care the disease was carried into other towns and gave rise to outbreaks in several families.

DIPHTHERIA AND OTHER DISEASES IN BRUNSWICK.

Through various reports the Board became aware in the early part of July that there was much more sickness than there ought to be, and that an excessive death rate prevailed, among the French population in certain parts of Brunswick. Accordingly I visited the town July 13. Unfortunately I was not able to see any of the members of the local board of health on account of their absence from home. I saw, however, Dr. Paré, in whose practice the larger number of the cases of sickness in this part of the village had occurred, and through his courtesy was able to gather many of the facts concerning the above-mentioned sickness and to examine the condition of many of the houses in which the recent cases of sickness had occurred.

I could not learn that there had been any unusual sickness this year in any other part of the town or village excepting in the lower part, and particularly in that part near the mills of the Cabot Manufacturing Company. As regards the diseases which had been prevalent during the year 1886, during the first three months of the year there were quite a large number of cases of measles, from which there resulted about half-a-dozen deaths. During these same months, there occurred six deaths from typhoid fever, and five from acute lung diseases. In April there had occurred five deaths from diphtheria, one from typhoid fever and one from cerebro-spinal-meningitis. In May the Doctor had seen twenty-nine cases of diphtheria, mostly in a light form, from which two deaths had resulted. In June the number of cases of diphtheria was not stated, but there occurred six deaths during that month from this disease. So far in July there had been fifty-six cases of diphtheria and diphtheritic sore throat with only three deaths from this disease. While talking with the Doctor a new case of diphtheria came into his office which he said was a fair sample of many of the milder cases. There could be no question as regards the diphtheritic nature of this case; the formation of false membrane, though of limited extent, was tough and adherent, not pultaceous and easily wiped away, nor did it proceed from the tonsillary follicles. In this part of the village there are many cases of typhoid fever every year, and one interesting fact mentioned was that, after every thaw which occurred in the winter, from three or four to a dozen very marked cases of typhoid fever were sure to follow in from ten to fourteen days. This, he said, had occurred not only in one winter, but in every winter since he had been in Brunswick. Another thing which he had noticed was that when French families first came into this part of the town they had almost always been attacked with diarrhœa which had usually been obstinately prolonged, and that it did not make much difference whether the families arrived in the summer or in the winter. In summer there had always been very many cases of the diarrhœal diseases among the children. Every year there had occurred cases of cerebro-spinal-meningitis.

Visiting, in company with Dr. Paré, many of the houses and tenements in which these diseases had occurred, I found the sanitary condition generally of the worst possible kind. It resulted from an entire absence of any systematic method for removing and disposing of the various wastes which occur in such a population.

Three days later another visit was made to Brunswick, during which I was able to see only one member of the local board of health. Soon after this a movement was made to empty some of the vaults, but whether any improvement in the sanitary condition of the premises resulted from it is very doubtful. Through the month of July complaints were continually received of the unendurable condition of this part of the village, and, as the number of cases of diphtheria had largely increased through this month, the town was visited on the second of September by three members of the State Board of

Health for the purpose of seeing what could be done to improve the conditions of things. In company with Dr. Paré and one of the members of the local board of health, a careful inspection of the buildings and premises which were at fault was made, and the following report was given to the local board and a copy of the same was sent to Mr. B. Greene, agent of the Cabot Manufacturing Company.

MAINE STATE BOARD OF HEALTH.

AUGUSTA, September 2, 1886.

To the Board of Health, Brunswick:

For some weeks this Board has heard complaints concerning the prevalence of diphtheria in Brunswick, and of the unhealthful condition of certain premises in the immediate vicinity of the occurrence of most of the cases of this disease. Being requested to investigate the circumstances, we, the undersigned, members of the Board, visited the town on the 27th of August, and carefully examined the sanitary arrangements in and about many buildings in the quarter where we were informed diphtheria had most prevailed, particularly those on the Cabot Manufacturing Company's grounds.

We did not attempt to ascertain by personal examination the present prevalence of diphtheria in the premises examined, as our Secretary had previously seen and recognized as diphtheria a case which Dr. Pare' had thus diagnosticated, and we were content to take this case as a sample of the disease and an evidence of Dr. Pare''s skill in distinguishing this affection from others with which it is sometimes confounded. Furthermore, we were creditably informed that a dozen or more deaths had occurred within a few months from the disease which was called diphtheria by Dr. Pare', who has treated a majority of the cases; and this fact confirmed our opinion that the malady which has afflicted the French quarter of the village was what it had been alleged to be. That it has been of a mild type, has been marked by a comparatively small mortality, and is now subsiding, are circumstances quite in accord with the frequent behavior of this disease, and do not in the least militate against the correctness of the diagnosis, or diminish at all the necessity for extraordinary precautions against a return of the distemper.

While, in the following description of the conditions which we observed and in our recommendation for their removal or improvement, we especially emphasize the part played by filth influences in promoting the spread of diphtheria, we would not have it understood that we ignore contagion as an important factor in its production. But this, in the existing circumstances, needs only to be mentioned. We wish particularly to insist that accumulations of filth of any kind,—excrement, urine, swill, slop-water, and the like—in the neighborhood of human dwellings are dangerous to health and life, because they render impure the air that is breathed and the water that is drunk, thus lowering the tone of the system and rendering it more susceptible to the impression of malign influences of every sort and, in some cases, actually inducing disease of a fatal character. Further than this, these filth accumulations furnish material for the rapid propagation of the essential elements of such a disease as diphtheria, and thus aid in its spread through a community. For example, the matter coughed or spit out by a diphtheria patient, being thrown into a privy, is at once received into soil which is singularly favorable for the development of this poison; and being borne on the air like offensive odors from excrement, or soaking through the ground to the nearest well or spring, is breathed into the air-passages or swallowed into the stomach of the healthy, some of whom have the seeds of the disease thus implanted in their systems.

We found the methods of disposing of excreta and the common waste of dwellings to be of the worst character. The privies were all in horrible condition, some being so full that their contents overflowed on the surface of the ground. The sink-spouts were placed on the outside of the houses, were badly made, were all extremely vile, and discharged for the most part very near the houses. In some places, the narrow space between two closely-set dwellings was used as the receptacle for the most offensive waste-materials. Pig-sties were next to tenements, and cow-stables, reeking with filth, were not far away. The putrid swill, destined for the food of cows, stood around in open buckets. Some of the wells and cisterns were too near the privies and pools of decomposing liquid to escape serious contamination. In short, we found a condition of affairs utterly inimical to the hygienic welfare of the people inhabiting the neighborhood, —a condition which would furnish a rational explanation why diphtheria, typhoid fever, and the diarrhœal diseases have been so prevalent.

For the purpose of improving the health conditions of the above-mentioned part of the town, we wish to make the following recommendations:

1st. Very urgently we would remind you of the need of a radical change in the method of the disposal of human excreta. With the present arrangement of privies and vaults it is utterly impossible to keep the ground and dwellings in a condition fit to be the habitations of human beings of any class.

We recommend, therefore, as being under the circumstances the most practicable, a system of box vaults into which dry earth or coal ashes shall daily be strewn for the purpose of absorbing the moisture as far as possible. These box-vaults should be made of plank, coated inside and out with hot coal-tar to make them impermeable to fluids, and should be of moderate size that they may be easily drawn out and emptied at not too long intervals. This would require that the privies be placed in accessible positions, that the present vaults be cleaned out and filled level full with fresh earth, and the boxes placed wholly above ground. This system would also require absolutely that all slops shall be excluded from the privy vault. Some other system of disposal of them must be provided.

2nd. With so large a number of persons to the acre as there is in the part of the village to which we now refer, sewerage is absolutely required.

This need not be costly, even with the blasting, for the whole locality is close to the river, deep drains are not required and the cuts would need to be only wide enough to hold four and six-inch glazed earthen-ware drain-pipes. These laid in a proper way might be flushed and washed thoroughly their whole length by means of a tank filled from the mill or from the village water supply, thus giving a sewerage system on a small scale which would be a credit to any town or corporation.

The kitchen and other waste water from the houses should be carried down in pipes inside of the walls through the basement or sub-space to enter the drains.

3rd. With the arrangements recommended under 1 and 2, properly cared for, the present supply of water from wells and cisterns would not be so objectionable as it now appears to be. The artesian wells probably supply a pure water. The other wells and even the cisterns are to be looked upon with extreme suspicion on account of the nearness of probab'e sources of contamination. It is well known that a well 20 feet deep is sure of being affected by the soakage on the surface of the ground at the distance of 100 feet, and this circle widens in proportion to the increase in the depth of the well. Sandy soils make this undesirable filtration into wells the more likely to occur. Brick cisterns, even when cemented, are quite porous and allow fluids to readily transude.

4th. All garbage which cannot be disposed of under 1 and 2 should be carted off regularly. This might be done systematically at little cost by the horse and cart that should be detailed a part of the time to empty the privies and supply dry earth and ashes.

5th. A frequent, careful inspection should be made by both the local health authority and by the corporation, to see that everything is kept neat and clean.

FREDERIC H. GERRISH, M. D.,
EDWARD C. JORDAN, C. E.,
A. G. YOUNG, M. D.,
Members of State Board of Health.

Immediately after this visit I requested Dr. Paré to prepare for me a list of the deaths which had occurred during the year among the French population of the village, giving, in connection with each, the date of death, the name, the cause, and the age. In accordance with this request he sent me the list to the end of August, copied from the church records, and at the end of the year the Rev. J. P. Gorman kindly furnished me with the mortality record for the last four months. For the whole year it is as follows:

Date.		Name.	Cause.	Age.	
Jan.	2,	Edward Gagnion,	Measles,	2	years.
"	3,	Marie Gagnion,	Measles,	5	"
"	5,	Carolina Desjardins,	Typhoid Fever,	2	"
"	10,	Louis Leclairs,	Epilepsy,	26	"
"	11,	Francois Bergeron,	Typhoid Fever,	1	year.

Date.		Name.	Cause.	Age.	
Jan.	14,	William Labbei,	Measles,	9	months.
"	14,	M. B. Cardillac Labber,	Measles,	3	years.
"	16,	Magenic Thebault,	Typhoid Fever,	4	"
"	18,	Joseph Drapeau,	Pneumonia,	28	"
"	21,	Marie Beaulier,	Diarrhœa,	2	months.
Feb.	15,	George Mercier,	Measles,	2	years.
Mar.	11,	Milfred Colombres,	Typhoid Fever,	2	"
"	13,	Marie Dione,	Acute Lung Dis.	6	months.
"	14,	Adelle Reneau,	Typhoid Fever,	14	years.
"	18,	Aglaie Rineau,	"	18	"
"	21,	Joseph McMahon,	Bronchitis,	4	"
"	26,	George Brillant,		1	day.
"	26,	Henry McDuff,	"	2	years.
"	26,	Archus May,	Measles,	1	year.
April	13,	Marie St. Marie,	Diphtheria,	2	years.
"	13,	Elixis St. Marie,	"	3	"
"	16,	Emile Labre,		3	"
"	17,	Marie Gauther,	"	1	"
"	19,	Napoleon Ray,	Typhoid Fever,	14	"
"	19,	Pierre N. Letarte,	Cerebro Spinal Meningitis,	7	months.
"	26,	Josephine Terdiff,	Diphtheria,	21	"
"	30,	Exzilia Lebel,	"	3	years.
May	19,	Alfred Gadrault,	"	2	"
"	27,	Alfred Jacques,	"	1	year.
June	4,	Catharine Leclairs,	Gangrene of feet,	60	years.
"	11,	Marie Forten,	Diphtheria,	2	"
"	13,	Joseph Aubns,	Epilepsy,	52	"
"	24,	Marie Lebel,	Sequel Diphtheria,	17	months.
"	25,	Joseph Carou,	"	15	"
"	29,	Joseph H. Baribeau,	"	7	"
"	29,	Marie L. Dubie,	Diarrhœa,	1	year.
"	30,	Rosanna LeBlauce,	Diphtheria,	9	years.
July	5,	Aunund Desjardins,	"	2	"
"	7,	Marion Desjardins,	Diarrhœa,	8	months.
"	15,	H. E. Dumont,	Typhoid Fever,	3	years.
"	15,	Eugene Garmach,	Diarrhœa,	8	months.
"	16,	Alice Bellanger,	"	5	"
"	16,	Bernadette Caron.			

Date.		Name.	Cause.	Age.
July	20,	Michael Quintal,	Diphtheria,	4 years.
"	20,	Amede Theberge,		1 month.
"	20,	Louis LeBel,		1 day.
"	21,	Marie O. LeBel,	Sequel Diphtheria,	8 months.
"	22,	Adelord Silvest,	Diphtheria,	13 "
"	28,	Glevia Levesque,	Exhaustion,	4 "
Aug.	7.	Joseph Thebault,	Diphtheria,	5 years.
"	9,	Marie Dumont,	Typhoid Fever,	8 "
"	9,	Marie O A. Tetu,	Diarrhœa,	4 months.
"	10,	M. E. Leplant,	"	5 "
"	17,	Alphosin Revando,		1 month.
"	20,	Augustin Caron,	Typhoid Fever,	32 years.
"	21,	Horace Michaud,	Consumption,	33 "
"	21,	Hanna Terrien,	Diphtheria,	2 "
"	23,	Rose Caron,	Diarrhœa,	69 "
"	24,	Remued Thebault,	Typhoid Fever,	6 "
"	25,	Elbridge Desjardins,	Diphtheria,	1 year.
"	26,	Joseph E. Lapoint,	"	1 "
"	28,	Marie Lavois,	Diarrhœa,	6 months.
"	29,	Jos. Alford Duchinne,	"	7 "
"	28,	Francois Caron,	"	9 "
Sept.	3,	Joseph Chuonard,	Diphtheria,	2 years.
"	3,	Joseph Couiltard,	"	2 "
"	5,	Pitre Dufort,	Whooping Cough,	5 mo. 15 d.
"	20,	Charles Merciere,	Consumption,	34 yrs. 6mo.
"	24,	Charles Sebastian Ragot,	Bronchitis,	3 yrs. 6mo.
"	25,	Lorea Leclair,	Don't know,	24 days.
Oct.	10,	Adelaid Panquet,	Whooping Cough,	1 year.
"	16,	Joseph Thomas Tetu,		1 day.
"	22,	Joseph Legros,	Whooping Cough,	2 months.
"	28,	Joseph Couinard,	"	1 year.
Nov.	9,	Marie Olevine Normaud,	Consumption,	5 years.
"	21,	Margarite Bourgoin, *nee* Laforge,		85 "
Dec.	14,	Joseph Amede Caron,	Sore Throat,	2 yrs. 8mo.
"	26,	Albert St. Pierre,	Whooping Cough,	6 months.
"	26,	Julian St. Pierre,	"	6 "

This list is a sad commentary on a wrong state of things. It is also interesting and instructive and for being so is given here in full.

We find that in this community of about 1,650 inhabitants, there were 78 deaths, giving a death-rate of 47.2 per 1,000. Running the eye down the list we find that nearly all the deaths were from the zymotic diseases. Six deaths from measles, eleven from typhoid fever, eleven from diarrhœal diseases, 21 from diphtheria, one from cerebro-spinal-meningitis, three from consumption, and six from whooping cough. Another thing is shown in this list. It is well known that children are much more susceptible to the more prevalent causes of disease than are adults. The contagion of the zymotic diseases, filth, want of ventilation, polluted water—all these show their baneful influence most markedly upon the child population. Again running the eye down the list, we find that of the 78 deaths 33 were of the age of one year or less, and that 62 were of the age of 5 years or less.

The following gives a comparative view of the deaths by months for the last three years:

	1884. Deaths.	1885. Deaths.	1886. Deaths.
January,	2	2	10
February,	1	3	1
March,	1	2	8
April,	5	1	8
May,	3	4	2
June,	2	none,	8
July,	7	5	12
August,	5	none,	15
September,	3	2	5
October,	2	none,	4
November,	3	5	2
December,	5	4	3
	39	28	78

TYPHOID FEVER IN VAN BUREN.

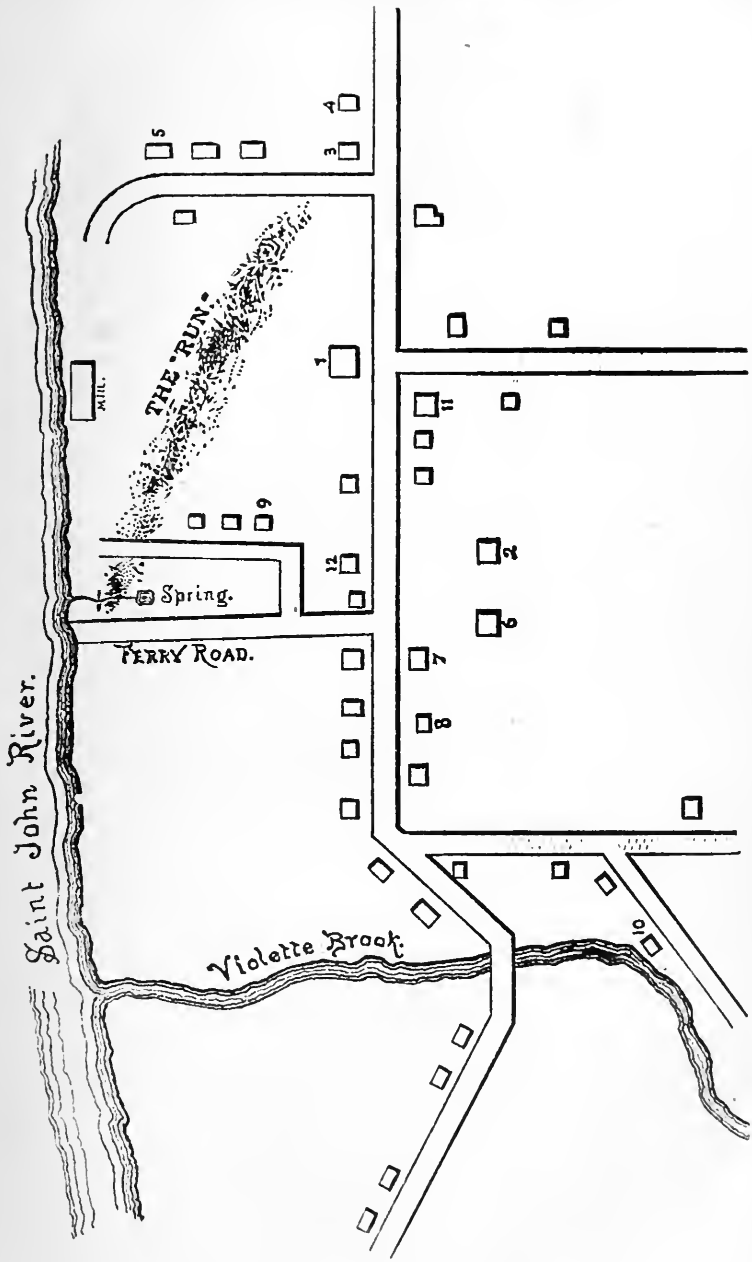
September 24th, while waiting in Caribou a few hours for the train, I made some enquiries about a fever which, incidentally a short time before, I had heard was prevailing in Van Buren. The report which I had received in the office was that a fever of some kind prevailed, that it lasted only a short time, and that all the patients recovered rapidly. I learned at the hotel where I was waiting that it was far different; that there were then quite a large number of persons sick with the disease, that one, the representative-elect, Charles Farrell, had already died, that several others were not expected to recover, and that in answer to a summons by telegraph, Dr. Thomas of Caribou had gone up there early in the morning. Waiting a few hours until the Doctor returned, I got a team and drove up in the evening. The next day, the 25th, was spent in investigating the history of the outbreak and its causes.

From Dr. G. C. Upham, to whose kindness I am indebted for much help in getting the facts regarding the outbreak, I learned that there had so far been eighteen cases of typhoid fever in the village. The following is a list of the names of the fever patients and as far as could be obtained, the date, or approximate date, of the beginning of the sickness of each.

x	12,	Mrs. J. B. Farrell,	July 1.
x	7,	Mr. Douglass,	Aug. 13.
x	3,	Charles Farrell, Jr.,	Aug. 22.
x	9,	Mrs. Soucis,	Aug. 28.
x	2,	Charles Farrell,	Sept. 5.
x	5,	J. B. Boyd,	Sept. 5.
x	4,	Geo. Watson,	Sept. 7.
x	12,	Miss Gagnon,	Sept. 7.
x	8,	Nellie Pike,	Sept. 14.
x	6,	Mrs. Hall,	Sept. 14.
x	6,	Child,	
x	6,	Child,	
x	6,	Servant,	
	11,	Mrs. Davis,	Sept.
	13,	Joe Bernard,	Sept.
		Johnnie Ward,	Sept.
x	5,	John De Rosa,	Sept. 18.
	10,	Allen Hammond,	Sept. 23.

Since the 25th of September there have been five cases in the village whose names and the dates of whose attacks I have not been able to obtain. It will be noticed that the first illness of most of these cases must be referred to the period of time included in the last week of August and the first three weeks of September, and that the larger number began during the first half of the latter month.

Until this season there had never occurred in this village an outbreak of typhoid fever nearly so extensive as this. There was no


Saint John River.
THE RUN.
MILL.
Spring.
FERRY ROAD.
Violette Brook.
1
2
3
4
5
6
7
8
9
10
11
12

history within recent years of anything more in the village or surrounding country than a few isolated cases at a time, usually affecting a single family, or a few houses.

An examination of the village and particularly of the premises where the cases had occurred, and a careful inquiry into the facts gave the following:

The principal street of the village, and the one on or near which most of the cases of fever had occurred, runs in a direction nearly parallel to the St. John River and at a distance of about 40 rods from it. As will be seen by the map, a road runs from this street to the ferry, and a little way below the ferry is a large steam saw mill. Near this ferry road, and a little way up from the river, there is a spring from which almost all of the village had obtained the drinking water, including the fifty or sixty hands who worked in the mill. All the other sources of water supply which had been used in that part of the village in which the fever prevailed were two private wells and one aqueduct. One of the wells, a deep one, is dry much of the time and had been for some time before the beginning of the fever, so it may be left out of account; the other was at house No. 5, where two of the fever cases originated, and it was only six feet in depth and had only eight inches of water in it at the time of my visit. This well was so situated that it could not fail to be badly polluted with soakage from the sink-spout, stable and privy. The two cases, however, which occurred in this house were in men who worked in the mill and drank the water from the spring. The aqueduct came from a spring which was situated to the west and above the town and where there was no suspicion of the water. It supplied the hotel and one other house before it reached the hotel. Excepting the hotel and this other house, the village was generally supplied with drinking water by bringing it from the spring, a pailful at a time.

There was no common milk supply, each house in most cases owning its own cow, and, though the local sanitary conditions of the houses were often at fault, there was nothing which could be regarded as a common source of the contagion except the spring. Additional circumstances which served to cast suspicion on the spring were these: The village rests upon a shallow soil beneath which, at the depth of only a foot or two, there is an impervious hardpan, or stratum of clay. This peculiarity of soil and sub-soil, I was told, extends over all this part of the village and to the river. Below the village there extends somewhat diagonally through a meadow, a little swale or "run" in which there is found no water in the dry season, but which is filled by every shower and pours its surface wash into the outlet of the spring at the distance of perhaps twenty feet below the spring itself. Just below the junction of this "run" and the little brook from the spring there is an old dam which was built some years ago to supply water for a steam engine. This dam is only two or three rods from the spring and there is but very little fall from the spring to the dam; consequently, every time a shower occurs the surface wash flows back into the spring. This "run" takes the wash from the principal part of the village, including the hotel stable and its pile of manure, which are on the lower side of the street.

But there is a second way in which it does not appear unreasonable that the spring could become polluted. On account of the considerable inclination of the ground from the principal street to the spring, it would be quite conceivable that the drainage from the houses and the out houses might settle into the soil until it reached the impermeable hardpan and then flow rapidly in the direction of the spring until it met and mingled with its sources or feeders. The results of the chemical examination of a specimen of the water which Mr. W. G. Hammond, Jr., kindly sent to this office would seem to give some support to the possibility of this latter way for noxious matter to reach the spring. The specimen was sent to Prof. F. C. Robinson of Bowdoin College, and he reported that "it is badly contaminated with animal matter, — is in short the worst water I have examined for some time."

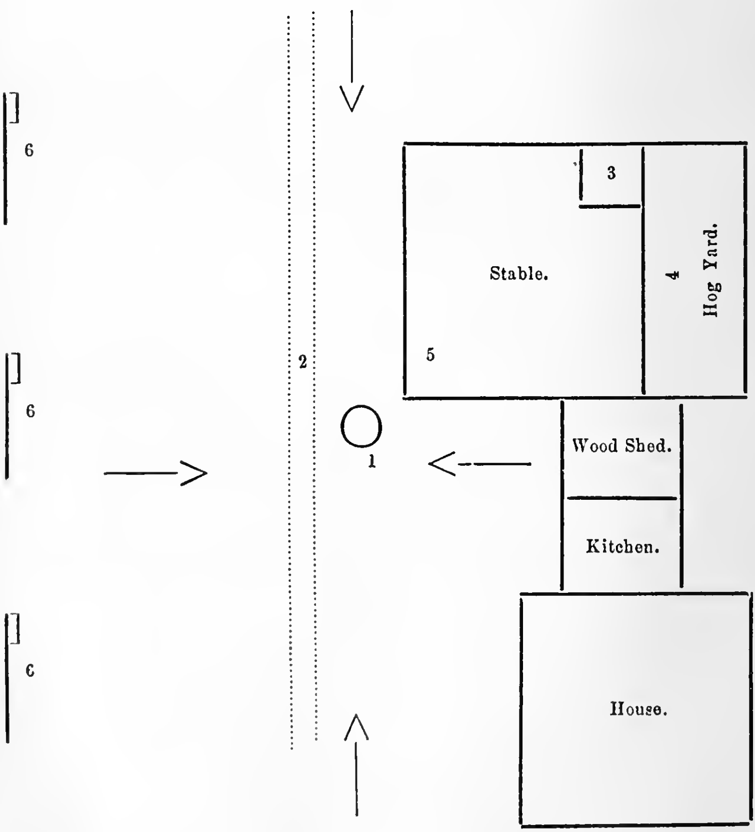
At the time when the jugful of water was taken from the spring there was no setting back of the water of the "run" into the spring, nor had there been recently enough rain to lead to the supposition that the spring was then contaminated with the surface drainage.

The reasoning which would indicate the spring as the source whence the people derived the cause of the fever was largely a process of exclusion. As has already been remarked, there seemed to be no other possible way to account for the somewhat sudden appearance of a considerable number of cases in so many houses at about the same time. I would now, however, call attention to other facts in connection with this outbreak which are not without interest and which may be said to throw some light upon its causation. By referring to the map and to the list of cases, it will be observed that the sickness of the first case began July 1st, and that the house (numbered 12) in which it occurred was located on the lower side of the principal street, directly above the spring. From this case it would seem quite likely that the contagion of the disease, thrown out either in the alvine discharges, or in the wash water, may have reached the spring. This would be more likely to happen during some shower that might occur. Unfortunately there are no records at hand pertaining to that place which would show whether any showers occurred near or shortly before that interval of time to which we would refer the reception of the poison by the larger number of the patients.

The date which follows each name gives the beginning of the attack for the given case, the figure which precedes the name refers to the house on the map in which the case occurred, and the mark (x) before a name indicates that the person used, or probably used, the water of the spring. Of the four which are indicated as not having used the water, the first was at the hotel and used the water which was supplied by the aqueduct. There is no certainty that the others did not, at times, drink the water from the spring.

TYPHOID FEVER IN OTHER TOWNS.

In several other towns in the State outbreaks of typhoid fever have been reported to the Board and requests made for a personal visit and examination of the localities where the disease had appeared. A somewhat exaggerated newspaper report represented that there were in the beginning of October thirty cases of typhoid fever in the village of Fairfield. Through a personal visit to the place it was learned that the number of cases in the town had been somewhat greater than was found in the average season. But the number of cases which had recently occurred was not more than one-third of what had been reported. An examination of several premises where typhoid fever had lately occurred was made and in one case, particularly, conditions were found which were certainly unfavorable to health, and could be readily believed to act as a cause of the fever. The following illustration will show the arrangements at one of the houses where the fever prevailed.



1. Represents a shallow well with the water within four or five feet of the surface. The water in the well is not cold and is decidedly roily or milky. The ground inclines slightly in all directions towards the well, as shown by the arrows.

2. Represents a shallow furrow or ditch, the lowest point of which is opposite the well.

3. The privy thirty feet or less from the well.

4. Hog yard about twenty-five feet from the well.

5. Stable only four or five feet from the well.

6. Rear of several houses and outbuildings the descent from which to the well is more considerable than from other directions, and the surface wash from which is caught by the shallow ditch.

In another place where a death had occurred from the disease, the cause was not apparent. Attention, however, was called to the fact that the cow which supplied the family with milk stood while in the stable so that her head was directly over the privy vault, which latter was in an offensive condition. It was an interesting question as to what extent the poison inhaled by the animal under these circumstances would be eliminated in the milk supplied. Though under the circumstances it would not be safe to venture an opinion that the milk thus polluted had been the cause of the fever, there have been cases enough observed in which disease has been transmitted by milk which has been made unwholesome by the unhealthy conditions and surroundings of the cow, to make it very apparent that it is not at all safe to use the milk from cows circumstanced as this one was.

In another town a family was visited in which the fever could not be traced to any anterior cases outside of the family. The house was on a dry knoll some little distance from the road and from neighboring houses, the well was distant from the house and other buildings and furnished no reason to suppose that the source of the contagion could be sought in this direction; the privy and other outbuildings were also distant from the house, and there was no history of any previous sickness in or around the house resembling typhoid fever. The cellar, however, was not walled up but was said not to be wet, and there was abundant testimony that the general domestic economy was exceedingly filthy.

The first case, a little boy of ten years, was attacked with a mild form of typhoid fever, August 13th, and recovered. The second, third, and fourth cases were attacked respectively September 18th, 23rd and 25th, and died respectively September 30th, October—— and September 28th. The father had a mild form of the disease and the mother was sick after my visit.

The most rational explanation which could be given of the sudden outbreak of the cases in September was that the contagion from the first case had infected the privy vault or, what is still more likely, had been ingested through lack of care and cleanliness.

NUISANCE IN DEERING.

Saturday, May 29, the president and secretary of the Board visited Capisic pond in Deering for the purpose of inspecting the pond and its surroundings as regards alleged nuisances. For years a local nuisance had existed in the shape of a tripe factory and bone-boiling establishment. The water which came from this and which crossed the public highway below the factory and flowed a considerable distance through meadows before it reached Capisic pond, made the air very offensive the whole length of the little brook and had completely spoiled the little sheet of water which is known as Capisic Pond, and from which formerly there was gathered ice of a very excellent quality. Some cases of sickness had lately occurred near the pond which the inhabitants had attributed to the unsanitary conditions of the surroundings of the pond. At the time of our visit one case of typhoid fever existed in the house at the foot of the pond, and the family attributed the origin of the case to the inhalation of the stench which arose from the brook which flowed into the pond from the tripe factory. The well which supplied the drinking water of this house was beneath the house in the cellar and probably not more than twenty-five or thirty feet from the margin of the pond. A special town meeting had been called for the purpose of seeing what action would be taken in regard to the nuisances, and our report was requested so that it could be presented to the meeting. The following report was left.

PORTLAND, May 29, 1886.

To Warren Harmon and others, inhabitants of Deering:

In compliance with your written request for an official opinion concerning the sanitary condition of the neighborhood of Capisic Pond, we have this day visited the locality and have personally made an investigation of the pond and its tributary brooks. The time at our disposal between the completion of the survey, and the town meeting, at which we understand you wish to make use of our opinion, forbids a detailed report; but we believe that a concise statement of our conclusions will meet all the practical requirements of the case at present.

We find the water of the pond extremely filthy and, consequently, entirely unfit for domestic purposes. The drinking of such water would be productive of disease, as also would the ingestion of ice formed in the pond. The impurity of the water we attribute to the discharge into the pond of the waste materials from the tripe factory and bone-boiling establishment near the town-house.

Not only is the water spoiled, but the air of the entire region around the pond and the stream which runs into it from the establishment mentioned is so polluted with emanations from putrefying animal matter as to be very offensive to the sense of smell and injurious to health. We believe this state of affairs to constitute a nuisance, and to fall within the statutory regulation which provides that municipal officers shall remove accumulations of filth which menace the public health.

Very sincerely yours,

FREDERIC HENRY GERRISH, M. D., *President.*
A. G. YOUNG, M. D., *Secretary.*

At the town meeting, which was held on the afternoon of the same day, the 29th, the selectmen were by vote instructed to proceed against all nuisances when complained of by three citizens in writing. The tripe and bone-boiling establishment was subsequently removed from that neighborhood.

VISIT TO NORWAY.

At the instance of the municipal officers of Norway, that town was visited July 22, for the purpose of examining its sanitary condition and advising them in regard to what improvements seemed required. The village, like many other of our Maine villages, was preparing to introduce a general water supply. The source was to be Pennesseewassee Pond, a mile or less above the village. The putting in of a supply of water, such as this seems to be, is a decided move in the direction of gaining for a town the best possible conditions for healthfulness; but with the very great advantages which come from furnishing a purer supply of water for drinking and a greater abundance of it for purposes of cleanliness, there comes in an undrained or unsewered town an offsetting evil. The water, which at every house runs to waste, increases the soil-dampness in a marked degree, and this increased saturation of the soil with water, and especially with dirty water, is a considerable evil. This the people of Norway were aware of, and hence sewerage for the village came to be regarded as an improvement which must speedily come. But irrespective of the new water supply, sewerage has for some time been very much needed. The increase of the various branches of manufacturing in the village has brought together many work people, in some cases under the same roof, and in and about these larger factories the disposal of human and manufacturing wastes has come to be a serious question, the solution of which without a system of sewerage seems to be hard or impossible.

The following report was made to the selectmen:

OFFICE OF STATE BOARD OF HEALTH,
AUGUSTA, July 27, 1886.

To the Municipal Officers, Norway:

In the necessarily brief visit which, a few days ago, I made to your village, I noted the following facts which have a relation to its health conditions:

Most of the way from the foot of the pond to the "Steep Falls" the Pennesseewassee River runs, either naturally or from artificial obstruction, a very sluggish course. A part of this distance the stream flows through marshy interval lands, which a slight rise in the water overflows, and which an inconsiderable falling leaves partly exposed to the air again. With these conditions, and the further one, that, in especially the hotter and dryer season of the year, the volume of water flowing in the stream is very small, it would be very unwise to think of discharging the sewage of the village, either wholly or in part, into the above-mentioned portion of the stream. It is also very apparent that a wise provision for the health interests of the town should also forbid the continued wholesale pollution from other sources. The using of small brooks or streams in villages as the common receptacle into which to discharge water-closets and privies, as well as to throw decayed vegetables and dead animals, is reprehensible, and a general regard for the public welfare should seek to rectify such errors as soon as possible.

Some of the sanitary conditions of your village do not admit of immediate rectification; others can and should be undertaken at once. One of the most serious of the former is the fouling of the lower part of Shallow Brook by the shoe factory and tannery. The intolerable stench, however, coming from the tannery may and should be mitigated by the prompt removal of all accumulations of the scraps and fleshings and other waste parts.

Some of the undesirable conditions which have been referred to as not admitting of immediate removal can be removed by the adoption and building of a system of sewerage, and probably in no other way. It seems advisable that the town should immediately take this matter into consideration. If the town should see fit to act in this matter, a complete survey of the village, and a systematic plan of the whole sewerage system should be made before a pipe is laid down. The unsystematic and fragmentary way in which the sewers have been put into most of the towns of Maine which have any sewerage, is very unsatisfactory in results and much more costly in the long run than would be a systematic plan at the start and good work done in accordance with that plan, either all at once or extending over a series of years, as the town might elect. The waste resulting from working in a haphazard way is often more costly than would be the paying of the interest on an indebtedness incurred for permanent drainage improvements planned and done in a better way.

Respectfully,

A. G. YOUNG, *Secretary.*

Various other places have been visited, usually at the request of the local health authorities or others. Bar Harbor was visited with reference to the question of garbage disposal. In previous years the way in which garbage had been taken care of seems to have been somewhat unsystematic and gave rise to some dissatisfaction. It was transported in carts two or three miles out of the village and buried or otherwise disposed of upon a farm. The carts in use were not specially designed for the purpose and consequently leakage along the highway was complained of. This year, a contract was made to have the garbage carried out in a steam scow two or three miles from the town and dumped where the current constantly sets seaward. The Board understand that this method of disposal has been more satisfactory than the old method as far as Bar Harbor and its vicinity is concerned. The point of departure, however, of the scow is somewhat objectionable, at least from an æsthetic point of view, on account of its proximity to some of the principal hotels. The method of garbage disposal by cremation by means of furnaces specially constructed for this purpose was suggested to the local board of health as probably offering a better solution of this question than any other method for Bar Harbor and our other summer resorts. As regards this, the attention of the reader is called to what is said in this report under the heading of "Garbage Furnaces."

Brewer was visited at the request of the chairman of the local board of health for the purpose of advising in regard to certain nuisances, and also in regard to improvements in the way of sewerage and drainage.

At the request of the trustees of the State Normal Schools, the Normal School building and its boarding house in Gorham were visited by E. C. Jordan, C. E., member of the Board, and the Secretary, on August 16th. The sanitary condition of the boarding house, on account of the lack of proper drainage and sewerage, was found to be bad. A report was made to the trustees detailing the changes which ought to be made, and on account of the late publication of this report we are able to say that an appropriation was made by the Legislature for the needed changes, and also for making some improvements in the Normal School Building, which were recommended in the report.

CIRCULARS.

The two following new circulars have been issued for general distribution.

Contagious and Parasitic Diseases of Animals.

The law establishing the State Board of Health provides that "they shall investigate the causes of disease occurring among the stock and domestic animals in the State." To those who are aware of the close relationship which exists or may exist between the diseases of animals and those of man it will appear eminently fitting that the sanitary supervision of the State should not be restricted to human diseases. This idea of the inter-relation between the diseases of man and of animals rests upon the fact of the communicability to man, through contagion, of certain of the diseases of animals, and, vice versa, of the transmissibility of certain human diseases to animals; and of the further fact that the deterioration as a result of disease of the quality of the meat and milk supply may be a cause of human disease.

As far as concerns the transmission of diseases from the animal to man, or from man to the animal, it may be said that man is the greater sufferer in this exchange, for, whereas there are but few of the human diseases which may be given to animals, as diphtheria and tuberculosis, the number of animal diseases which may be communicated to man is considerably greater; among them may be mentioned glanders, tuberculosis, anthrax, rabies, foot-and-mouth disease, diphtheria, and actinomycosis. As affecting the food supply, not only the contagious diseases which have been enumerated but other contagious and non-contagious maladies may render the meat or milk supply positively dangerous.

Aside from the questions of public health, there are other important questions of human interest involved in the consideration of the contagious diseases of animals,—that is, the question of economics, of profit and loss. So far, we have been remarkably fortunate in our comparative exemption from those epizoötic diseases which may swiftly and fatally sweep over a country, or which, like pleuro-pneumonia and tuberculosis, may more slowly and insidiously disseminate themselves. From either the more swiftly or from the more slowly spreading diseases, the pecuniary losses may be enormous. In England in 1865–6 the cattle plague destroyed 500,000 cattle; in France the loss among sheep from anthrax was until lately 20,000,000 francs annually; in Hungary in a few years, glanders destroyed 20,000 horses; swine plague has some years caused a loss of $20.000,000 in the United States; and pleuro-pneumonia cost England during the first twenty-five years after its introduction into that country nearly $500,000,000. These examples show how great a blow to our material prosperity the importation and failure to promptly prevent the spread of these animal plagues may bring us.

With the greater prevalence of some of these diseases in some of the states and countries from which importations of cattle and other animals are made, our continued exemption from these animal diseases can probably only be continued by means of laws touching this subject not far behind existing veterinary knowledge. But in addition to wise laws and systems of veterinary police the effectiveness of any such precautionary arrangement, as in human sanitary matters, must depend largely upon the intelligent watchfulness and coöperation for their own good, of the local authorities and of the people at large. To help somewhat in this direction, this circular is published for distribution among those who are interested in, or have the care of stock, and for those local authorities whose duty it is to guard against the spread of their contagious diseases. In it only those infectious diseases are mentioned which are liable to spread and assume the form of a serious and fatal epizoötic, or which are specially dangerous to human life and health through their infective or parasitic qualities.

Glanders

Is a specific disease propagated by contagion and contagion only; and never caused by exposure, poor feed and the other unfavorable conditions to which many horses are subjected. It is a disease affecting principally horses, but may be transmitted to man and to all the domestic animals except cattle, and must be considered incurable. The infectious principle which gives rise to the disease exists in the nasal discharges, in the expired air, and in the purulent discharges from the glanders ulcers. According as the disease affects principally the nose, the lungs, or the skin, it is usually described as nasal, pulmonary or cutaneous glanders,—the last is known as farcy. According to duration, it is classed as acute or chronic. Acute glanders may terminate in from ten to fifteen days, while the chronic form may last for months or years. The chronic or slow form is much the most common. Farcy or external glanders is usually the most rapid in its course. Nasal glanders is usually slower, but the pulmonary form of the disease is the most chronic, being often prolonged to two or three years before a fatal termination occurs.

The most characteristic symptoms of nasal glanders are these three: discharges from the nose, swelling of the glands beneath the jaw, and ulcers of a peculiar kind in the mucous membrane of the nostrils. The first,—the discharge from the nose,—taken alone, is not a trustworthy symptom, but with the presence of one or both of the others, we may be tolerably sure of the nature of the disease.

Pulmonary glanders may remain latent or concealed for a long time, —for months or years,—and all this time the diseased animal is a source of danger to his fellows and to the persons who care for him. During all this time the horse may appear to be in good condition, excepting some respiratory trouble which would be likely to be attributed to "heaves." There is a "peculiar, weak, and dry cough;" if, furthermore, other symptoms of glanders should develop, and if the animal in question is known or suspected to have been exposed to the contagion, and particularly if other horses after having been with this animal, show symptoms of glanders, we should have a strong suspicion of this disease and should take precautionary measures to prevent other animals from being affected.

In the external form of the disease, or farcy, some constitutional symptoms usually precede the local manifestations. The latter consist of circumscribed inflammatory swellings or "farcy buds." These superficial tumors, which appear more frequently where the skin is the thinnest,—inside the limbs, along the side of the neck, on the face,—soon soften and break, forming open, ragged, cup-shaped sores, or ulcers, which have a constant tendency to enlarge, rarely to heal.

More than one of these three forms are often found in the same animal. Nearly every chronic case dies at last with the aggravated symptoms of the acute form.

As every case of glanders is a constant danger to every other horse which comes near him, and, to every person who cares for him, a constant menace of death from a loathsome disease, it is evident that justice and humanity alike demand that every declared case of this disease be promptly destroyed, and every suspected case strictly quarantined. Every glandered horse which goes at large or is driven on the public roads endangers other animals through the medium of hitching-posts, watering troughs, and other things which the infected horse has come in contact with. Everything which may have become infected should be disinfected. Bedding and tainted hay or grain should be burned.

Pleuro-Pneumonia.

A contagious disease of the lungs and their coverings in cattle. Infectious Pleuro-Pneumonia is a disease which is noted for its vagaries. At one time it may be of a very malignant type, destroying life in a few days; at another it may assume a mild form. At one time, perhaps not more than five per cent of the cattle exposed to the disease contract it, in other cases nearly all in a herd take the disease from a single infected animal. The period of incubation, that is, the time which elapses from exposure to the contagion to the appearance of the disease, is very variable, being sometimes not more than eight or nine days, or it may be three or four months before the disease shows itself. It is a particularly dangerous disease on account of its frequently insidious character. It may exist in animals for weeks, all the time exposing the well members of the herd to danger, before its dangerous nature is discovered. During this time, while it is in this latent or concealed form, the affected animals may appear to be in perfect health, or it may be noticed that there is a slight cough or that there is a partial loss of appetite for a few days. Another circumstance which increases the danger of spreading the infection is that there may be an apparent recovery while the animal may still bear about with him the power of giving the disease to others for an indefinite time, —some say as long as twelve or fifteen months.

In well marked cases of the disease the symptoms are similar to those produced by the ordinary non-contagious acute inflammations of the lungs and pleura:—loss of appetite, slight shivering, fever, roughening of the hair, an occasional cough which is dry and hard, breathing rough, harsh and painful, usually constipation, and, if a cow, diminution or cessation of the yield of milk.

There is nothing in these symptoms which is very distinctive and the history or suspicion of contagion is often required to complete the diagnosis. The disease may be confounded with tuberculosis, with the "lung-worm disease," or with the acute non-contagious lung inflammations.

Contagious pleuro-pneumonia is propagated in no other way than by infection. The poison is supposed not to be diffusible through the air to any great distance, so there is no danger of the spread of the disease to other herds except by the movements of cattle; therefore a rigid restriction should be put upon the movements of all cattle in infected regions, and both the diseased and suspected ones should be immediately slaughtered. No medical treatment should be thought of: such a course would be disastrous to both the individual owner and to the community. Sheds and stables in which the diseased animals have been kept are the most surely disinfected by burning. When so radical a method would prove too expensive, as it usually would, the building may be disinfected by sulphur fumigation on a large scale when the building can be made tight enough to hold the fumes. This fumigation should be very prolonged and repeated several times at intervals, and then followed by prolonged and thorough airing-out. Hay and grain which has been in infected barns should be burned or fed to horses.

Inoculation to prevent this disease has been practised considerably in some countries, but its efficacy is still disputed by eminent authorities, and many facts and opinions which have been recorded, especially during the last few years, seem to prove that the disease may sometimes be spread by the inoculated animals. Inoculation, therefore, should not be permitted in our State.

Tuberculosis.

Tuberculosis or the "Pearl Disease" of cattle is essentially the same disease as human consumption. It is both contagious and hereditary, but contagion, in animals at least, is a greater factor in its propagation than heredity. Of the domestic animals, cattle and swine show the greatest predisposition to tuberculosis; though others are liable to contract the disease when exposed to its infection. Undoubtedly the contagion is received into the system, in the natural way, almost always by inhalation or by swallowing; experimentally, it is found that it may be communicated to many kinds of animals by inoculation and by other methods. The period which elapses between the receipt of the infection and the appearance of the disease is usually very long. The course of the disease varies greatly, the symptoms developing either rapidly or slowly; hence we may have the disease lasting three months or less or extending over many months or years. In some cases it follows an insidious or concealed course, and quite extensive changes may occur in the lungs and other organs while yet the animal suffers but little change in its external appearance. Usually, however, it is seen that the animal is not benefited as he ought to be by his food. The appetite is often capricious, the skin looks dull and the hair dirty, cough may or may not be noticeable ; when it is, it is more likely to be after taking food or drink, or being hurried. Later in the course of the disease loss of flesh is marked, the cough becomes troublesome, and there is often diarrhœa. In cows the flow of milk may not be much diminished until the disease has lasted some time.

The most characteristic appearance which is shown by a post mortem examination is that presented by the so-called "pearl tumors" or "grapes," as the butchers often call them. These tubercular new-formations vary in size from that of a pea or smaller to that of an egg. They are often confluent and one apparent mass may weigh several pounds, and the aggregate of these masses many pounds. These tubercles are found the most frequently in the lungs and on the smooth membrane which covers them ; they are also often found on the membrane which covers the bowels.

Between tuberculosis and pleuro-pneumonia there are many points of resemblance. Both are contagious, the period of incubation in tuberculosis is long and it may be in pleuro-pneumonia, fever and the lung symptoms are common to both, the disease in both often assumes a concealed form, dangerous to the remainder of the herd from the difficulty of its recognition. When either disease is suspected, the determination of its character should be made by the veterinary surgeon.

Feeding experiments have conclusively shown that tuberculosis may be transmitted by means of the milk or flesh of diseased animals. Therefore prevention has to regard both the danger to other animals and to man. The milk from cows with this disease, even in its earliest stages or when suspected, should never be used as human food. The flesh should never be used unless the disease is in its earliest stages and is so localized that the tubercular growth can be entirely removed ; even then, though it is not proved that the eating of such meat may give rise to the disease, there is a chance to doubt its wholesomeness and fitness as human food. As regards the animals, all diseased and suspected ones should be kept from other animals and the diseased ones slaughtered. Infected stalls and mangers should be disinfected, and the safer way would be to remove the woodwork of the cribs and eating boxes and replace them with new.

Lung-Worm Disease.

(VERMINOUS BRONCHITIS). A disease caused by the development of a parasitic worm, the *Strongylus micrurus* in calves and the *Strongylus filaria* in lambs. Adult animals are sometimes infested. The symptoms presented are difficulty of breathing, especially when hurried, cough, usually hoarse and spasmodic, and in long continued cases debility and emaciation. During the paroxysms of cough masses of mucus are sometimes discharged which contain eggs, embryos and the adult forms of the parasite. The disease may prove fatal in a few days or may last from two to four months. Its nature is to be determined by an examination with a lens or with the naked eye of the mucus which is discharged from the mouth and nose, or in case of death, by an examination of the interior of the windpipe and bronchial tubes. The parasites are white, filiform worms, looking very much like pieces of white thread, from one to two inches in length according to the species with which we have to do, and may be found rolled up in considerable masses, or may pretty completely plug up the smaller air tubes. Deaths following bronchial or lung symptoms in calves or lambs should lead to a post mortem examination as to its cause. This trouble is more likely to be mistaken for pleuro-pneumonia or tuberculosis than for any other diseases.

As the disease may be communicated from the sick to the well by means of water, fodder, or pastures which have been contaminated with the parasites or their ova, all cattle or sheep suspected of having this disease should be carefully quarantined, and all known to have it should be slaughtered. The lungs and other parts containing the parasites, as well as any mucus coughed up, should be destroyed with fire. The ova, with which many of the parasites are filled, are hard to kill with chemicals.

Swine Plague.

This disease, or "hog-cholera," as it is commonly called, is an infectious disease which has been terribly destructive of swine in some parts of this country: in Illinois alone over three and a half million hogs were lost by it in the years 1877-8-9. The contagion of this disease is very easily diffusible, more so than that of most other contagious diseases of animals. It may be communicated directly from animal to animal, or indirectly by other animals which are not affected, or by means of the clothing of visitors, and there are reasons to believe that it may be spread by the wind. It is communicable to other animals than swine,—dogs, cats, lambs, mice, and chickens,—and from these it may be communicated again to hogs. In fatal cases the disease may last from a few hours to three or four weeks. In ordinary cases the brunt of the attack falls upon the lungs and larger intestine; therefore when a post-mortem examination is made the lungs are often found inflamed and more frequently the lining of the large intestine is found inflamed or ulcerated.

The most characteristic symptoms are great debility, want of appetite, or vitiated appetite for excrement, drooping of the ears and of the head, a tendency to bury the nose or the head in the bedding, rapid emaciation, weak and undecided and often staggering gait, very offensive smell, especially in severe cases before and after death, and rapid decomposition of the body after death. Most characteristic, however, is the diarrhœa, with fetid and usually dark colored discharges. Instead of the diarrhœa, there is often constipation, especially early in the disease. Cough is a symptom when the lungs are affected.

To prevent the spread of the disease, separate the well from the sick. Avoid all the methods of spreading the contagion which are indicated above. Do not be in too great haste to refill the sty, for the freezing of winter will often fail to eradicate the infection from the premises. The "*Rouget*" of France is probably not identical with the swine-plague of America, therefore it is not prudent to employ here the method of inoculation which has been used for the former disease.

Trichinosis.

The much written-about trichinosis of man is caused by eating pork containing *trichinæ*. These are small parasitic worms, from 1-8 to 1-18 of an inch in length, encysted in the red or lean part of the meat. They are detected with difficulty with the unaided eye, but are readily discoverable, when present, by means of the microscope. These parasites, being eaten by man or animals in raw or partially cooked pork, are liberated from their capsules by the process of digestion, and then rapidly multiply. The innumerable multitude of the new progeny forthwith take up their line of march from the digestive tract, penetrating all the intervening tissues, until they reach the muscles in the various parts of the body.

Here they become encysted as the parent trichinæ were in the meat which was eaten. The symptoms caused by the migration of the trichinæ and their fixation in the substance of the muscles are feverishness, sudden swelling of the face, swelling of the muscles all over the body, muscular pains and lameness, usually diarrhœa. These symptoms have considerable likeness to those of typhoid fever and rheumatism, and the trichinous disease has undoubtedly sometimes been mistaken for these. The symptoms of trichinous infection in animals are less severe but resemble somewhat those in man. To prevent human infection one precaution only is needed,—*cook the pork thoroughly.*

Foot-and-Mouth Disease.

Though rarely fatal, this disease is said to have caused nearly as much loss and trouble to the farmers of Great Britain as the contagious pleuro-pneumonia. It is contagious in a high degree; when introduced into a flock or herd but few of the exposed animals escape. It affects principally cattle, sheep and swine, but may be communicated to other animals, and to man by direct contagion or by using the milk from diseased cows. The contagion is not readily diffusible through the air, but is spread by means of direct contact, and by means of food, watering-troughs, litter, grounds and roads with which the diseased animals have come in contact, or it may be carried from animal to animal through the medium of infected hands or clothing.

The period of incubation, that is, the length of time between exposure to the contagion and the outbreak of the disease, is usually two or three days but may be only one day or may be as long as ten or twelve days. After 24 or 48 hours of feverish symptoms, the characteristic eruption appears in the mouth and on the feet, and often on other parts of the body, particularly where the skin is not thickly covered with hair. As seen in the mouth, the eruption at first consists of whitish or yellowish blisters varying in size from that of a mustard seed to that of a bean. On the feet we find heat, redness, and swelling around the edge of the hoofs and especially towards the heel and in the space between the toes, followed in one or two days by the blisters at these points. After the rupture of these vesicles, bright red and very tender ulcers are left, and by the coalescence of the vesicles these ulcers are often of considerable extent. The sore-ness of the mouth makes it impossible for the animals to take their accustomed food, and in the feet the pus may burrow and cause the loss of the hoof. This is not likely to be confounded with any other disease except the "Foot-Rot" of sheep and with "Ergotism" which has appeared in some of the States. In these diseases there are no mouth symptoms.

Very strict measures should be put in force to prevent the spread of the disease. Diseased animals should be isolated and guarded carefully. Persons not having the care of them should not be permitted to visit them, and the attendants should not visit other cattle, sheep, or swine. No sick animal must be permitted on roads or grounds where other animals may go. Food or bedding must not be moved from the infected premises and manure must be burned or plowed in on the infected farm. Grounds on which infected animals have run should be plowed with horses. The sale or use of infected milk should be strictly prohibited. A thorough cleansing and disinfection of everything infected should be followed by prolonged airing-out.

Foot-Rot in Sheep.

This disease begins with an inflammation of the interdigital spaces and is followed by a swelling which may extend all the way around the edge of the hoof, and this inflammation soon runs on to suppuration, burrowing of pus, and may lead to separation of the hoof. The discharge is purulent, very offensive, and is the medium for transmitting the disease to other flocks. This disease may be spread rapidly from animal to animal or from flock to flock until it becomes ruinous to the sheep-raising industry where it exists. It should not be confounded with the foot and mouth disease previously described.

Preventive treatment should consist in isolating all affected sheep and keeping all healthy ones away from them. Diseased animals must not be transported from place to place.

Sheep-Pox.

A contagious, eruptive disease of sheep resembling considerably human small-pox, and probably having some relationship to it. During some epizoötics of this disease it has proved itself to be one of the most destructive of animal pests. It may be communicated to other animals. As in the allied disease in man, prompt isolation and "vaccination" have been found to be the two effective measures to be employed.

Anthrax.

(CARBUNCLE; SPLENIC FEVER; MALIGNANT PUSTULE; CHARBON.) —This disease has prevailed but little in New England, but in some countries it has been a veritable scourge to the husbandman, attacking cattle, horses, sheep, and quite frequently other animals and man. Sixty or seventy per cent of the animals attacked die. The period of incubation is short, from a few hours to three or four days. The symptoms vary so much in different cases that no concise description of them can be given. The apoplectic form may kill in a few minutes or in several hours, the acute in a few hours or days, and other forms are slower in their course. There is usually evidence of severe blood poisoning, trembling, difficulty of breathing, dark purplish color of the mucous membranes, spasms or convulsions, coldness of the extremities, and death. After death the blood is often found dark and tarry, and dark, serous, or semi-gelatinous infiltrations are frequent. This disease is intensely contagious. Malignant pustule, the same disease, has often been communicated to man by handling wool or hides from animals which have had anthrax, and the disease may be carried from one animal to another by the bites of flies.

Preventive measures include strict quarantine of sick animals, immediate destruction with fire of the carcasses of the dead, or, when this is impracticable, very deep burial with fencing of the place to keep other animals from the spot, and very thorough disinfection of everything possibly contaminated.

Rabies.

Rabies, or Hydrophobia when it appears in man, is never generated spontaneously; but is due to inoculation by means of bites or otherwise from other rabid animals, usually carnivorous. In the dog, there is an incubative period from three to six weeks after the bite is received before the first symptoms appear. The earliest symptoms consist in but little more than a change in the disposition and manners of the animal, with loss of appetite or sometimes a disposition to eat indigestible or repulsive substances. Later there comes the stage of excitement, during which the dog shows a tendency to range at large, attacking other animals as he goes. After a period of from four to eight days, death closes the scene with the paralytic or exhaustive stage. In some cases,—the "dumb" or "torpid" form of the disease, —the paralytic symptoms come on early. These cases are marked by the "dropping" of the lower jaw, thus rendering the animal unable to bite or bark. There is in this disease no fear of water, but there is a difficulty or inability to drink it. It is believed that many cases of so-called hydrophobia in man are due to the mental effect of the receipt of the bite. Therefore, for the sake of the peace of mind of such, the dog should not be killed, if he can be secured without danger to other persons. If he does not die within six or eight days it may be known that he was not rabid. If he should die, however, he may not have been rabid, but may have died of some other disease. Only the skilled veterinary or medical authority should decide this. The question regarding the protective power of Pasteur's anti-rabic inoculation is not yet decided to the satisfaction of most physicians. Not more than half the persons bitten by rabid dogs have the disease, and of those bitten by suspected dogs not more than eight or ten per cent have hydrophobia.

Fowl-Cholera.

The characteristic symptoms are: "Drooping of the wings, an unconquerable somnolence, on startling the animals and forcing them to open their eyes, they seem to wake as from a deep sleep, and soon the lids close again, and usually death occurs without any particular movements of the animal, and after a mute agony; at most its wings flutter a little as it dies."

The contagion of the disease is not diffusible through the air but seems to be quite fixed. It passes off from the diseased bird by means of the excrement, and infects other fowls by being taken into the body in the food and drink.

To prevent the disease, remove the infected droppings daily and disinfect the floor or ground. Remove promptly the diseased birds from the unaffected ones. Pasteur's inoculation for this disease has proved successful.

Gapes.

A disease of fowls caused by a parasitic worm, *Syngamus trachealis*, in the wind-pipe. This worm is of a red color, half an inch or more in length, forked or branched like a rudely drawn letter "Y," and attached to the mucous membrane of the bird's wind-pipe by means of suckers at the ends of the two upper branches of the "Y." The symptoms are sneezing, coughing, suffocation and death. Suspicions of the nature of the disease may by verified occasionally by the bird's coughing up the worms, or by opening the wind-pipe. The life-history of the parasite briefly is this: The matured worm is full of eggs, and these, after the death of the parent, when falling upon moist ground or in water, hatch, and food, water, or earth-worms, infested with these minute larvæ, may carry them into the crops of healthy birds; or the *syngami* coughed up, may be seized and swallowed. From the digestive tract they make their way to the lungs and ultimately into the wind-pipe.

Preventative measures are obviously the keeping of healthy birds from the sick, and from infected grounds. Burn all syngami found. Burn or bury deeply all dead fowls. Infected grounds may be treated liberally with salt, lime, ashes, or chemicals.

Actinomycosis.

A contagious tumor affecting the head and face of cattle, which until lately was considered to be cancerous or tubercular in its nature. It is caused by infection with a microscopic fungoid plant. It may be transferred to man and other animals.

Diphtheria.

It is known to medical men and veterinarians, but not to the general public as it should be, that diphtheria is a disease of the domestic animals as well as a human disease. It has been known to prevail quite extensively and with fatal effect among cats, dogs, pigs, poultry and other animals. It is thought by some that many local outbreaks of this disease among children are referable to its prior existence in animals. In some cases the truth of this supposition has been verified.

Cattle-Plague.

(Rinderpest.)—This disease in 1865–6, in eighteen months, destroyed 500,000 cattle in Great Britain. When once it invades a country, unless prompt and vigorous stamping-out measures are employed, its extreme contagiousness makes its spread over the land rapid, and its malignancy is so great that most of the cattle attacked die. The period of incubation is very short, and is followed by fever, an eruption on the mucous membrane of the mouth, and often a salmon-red or purple color of the mucous membranes. "Then ensue the urgent symptoms,—the drooping head, hanging ears, distressed look, rigors and twitchings of the superficial muscles, failing pulse, oppressed breathing, fetid breath, and the discharge from the nose, eyes and mouth."

Prompt slaughter of all diseased and suspected animals, thorough disinfection, and rigid quarantine of infected places,—nothing short of this is of any avail.

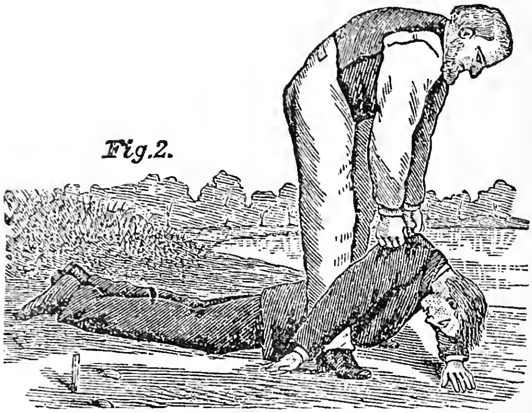
TREATMENT OF THE DROWNED.

Two Things to be Done: Restore Breathing; Restore Animal Heat.

Rule 1. Remove all obstructions to breathing. Instantly loosen or cut apart all neck and waist bands; turn the patient on his face, with the head down hill; stand astride the hips with your face towards his head, and, locking your fingers together under his belly, raise the body as high as you can without lifting the forehead off the ground (Fig 1), and give the body a smart jerk to remove mucus from the throat and water from the windpipe; hold the body suspended long enough to slowly count one, two, three, four, five, repeating the jerk more gently two or three times.

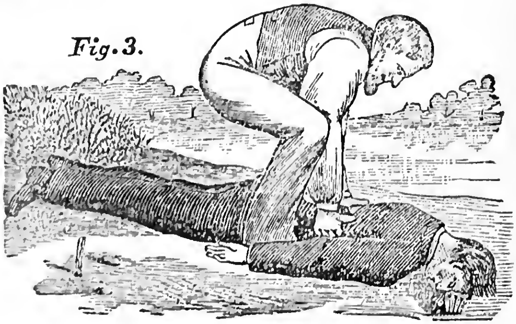
Fig 1.

Fig.2.



Rule 2. Place the patient face downward, and maintaining all the while your position astride the body, grasp the points of the shoulders by the clothing, or, if the body is naked, thrust your fingers into the armpits, clasping your thumbs over the points of the shoulders, and raise the chest as high as you can (Fig. 2) without lifting the head quite off the ground, and hold it long enough to *slowly* count one, two, three. Replace him on the ground, with his forehead on his flexed arm, the neck straightened out, and the mouth and nose free. Place your elbows against your knees and your hands upon the sides of his chest (Fig. 3) over the lower ribs, and press downward and inward with increasing force long enough to slowly count one, two. Then suddenly let go, grasp the shoulders as before and raise the chest (Fig 2) ; then press upon the ribs, &c. (Fig. 3). These alternate movements should be repeated 10 to 15 times a minute for an hour at least, unless breathing is restored sooner. Use the same regularity as in natural breathing.

Fig.3.



Rule 3. After breathing has commenced, restore the animal heat. Wrap him in warm blankets, apply bottles of hot water, hot bricks, or anything to restore heat. *Warm the head nearly as fast as the body, lest convulsions come on.* Rubbing the body with warm cloths or the hand, and slapping the fleshy parts may assist to restore warmth, and the breathing also. If the patient can surely swallow, give hot coffee, tea, milk, or a little hot sling. Give spirits sparingly, lest they produce depression. Place the patient in a warm bed, and give him plenty of fresh air; keep him quiet.

Beware.

Avoid delay. A moment may turn the scale for life or death. Dry ground, shelter, warmth, stimulants, etc., at this moment are nothing,—artificial breathing is everything,—is the one remedy,—all others are secondary.

Do not stop to remove wet clothing before efforts are made to restore breathing. Precious time is wasted, and the patient may be fatally chilled by the exposure of the naked body, even in the summer. Give all your attention and effort to restore breathing by forcing air into and out of the lungs. If the breathing has just ceased, a smart slap on the face, or a vigorous twist of the hair will sometimes start it again, and may be tried incidentally, as may, also, pressing the finger upon the root of the tongue.

Before natural breathing is fully restored, do not let the patient lie on his back unless some person holds the tongue forward. The tongue by falling back may close the windpipe and cause fatal choking.

If several persons are present, one may hold the head steady, keeping the neck nearly straight; others may remove wet clothing, replacing at once clothing which is dry and warm; they may also chafe the limbs, and thus promote circulation.

Prevent friends from crowding around the patient and excluding fresh air; also from trying to give stimulants before the patient can swallow. The first causes suffocation; the second, fatal choking.

Do not give up too soon. You are working for life. Any time within two hours you may be on the very threshold of success without there being any sign of it.

In suffocation by smoke or any poisonous gas, as also by hanging,—proceed the same as for drowning, omitting effort to expel water, etc., from the windpipe.

In suspended breathing from effects of chloroform, hydrate of chloral, etc., proceed by Rule 2, taking especial pains to keep the head very low, and preventing closure of the windpipe by the tongue falling back.

The foregoing method, originally published by the State Board of Health of Michigan, has the sanction of other State and City Boards of Health, and is fully endorsed by the State Board of Health of Maine, and printed for general distribution as a life-saving measure.

Address STATE BOARD OF HEALTH, Augusta.

LIBRARY.

The collecting of a useful working library for the Board is an important matter which has been constantly borne in mind, and the result is that we have already a pretty respectable collection of home and foreign sanitary literature in the library. The collection has been made largely through exchanges with other health organizations, local, State and national. Some valuable and indispensable works which cannot be so procured it has been necessary to get by purchase. The following list includes the works which are now in the library and also a few which have been loaned for the use of the Board.

REPORTS AND OTHER PUBLICATIONS OF BOARDS OF HEALTH.

National Board of Health, Annual Report, 1879, 1880, 1881, 1882, 1883, 1884, 1885.

The Local Government Board, England, Annual Report, 1882, 1883, 1884, 1885, 1886.

——— ———, Model By-Laws, 15 Pamphlets.

Mittheilungen aus dem Kaiserlichen Gesundheitsamte, Berlin, Vols. I and II.

Arbeiten aus dem Kaiserlichen Gesundheitsamte, Berlin, Vol. I.

Ontario, Annual Report, 1882, 1883, 1884, 1885.

Disinfectants.

Preventable Disease Circulars.

New Hampshire, Annual Report, 1882, 1883, 1884, 1885, 1886.

Disinfectants and their use.

Massachusetts, Annual Report, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1882, 1883, 1884, 1885.

Public Health Statutes, Manual.

Quality of Milk in Massachusetts.

Preventive Disease Circulars.

Rhode Island, Annual Report, 1877, 1879, 1882, 1883, 1884, 1885.
Asiatic Cholera.
Connecticut, Annual Report, 1884.
On Disinfection, 1884.
Preventable Disease Circulars.
Registration Laws.
Suggestions on Rural Hygiene.
State Preventive Medicine. 1879.
New York, Annual Report, 1880, 1881, 1882, 1883, 1884, 1885.
Manual of Public Health Laws. 1880.
New Jersey, Circulars.
School and Health Circular.
Health Counsels for Working People.
Protection to Bathers.
Contagious Diseases of Animals.
Petroleum, Kerosene, etc.
Marriages, Births and Deaths, 1878.
Pennsylvania, Annual Report, 1885.
Constitution and By-Laws.
Delaware, Annual Report, 1883, 1885.
Domestic Hygiene and Quarantine.
Maryland, Annual Report, 1886.
West Virginia, Report, 1884.
North Carolina, Report, 1884.
Prevention of Diphtheria.
Post Mortem Examinations. 1879.
South Carolina, Report, 1885, 1886.
Mississippi, Report, 1882, 1883.
Tennessee, Report, 1877–80, 1880–84.
Preventable Disease Circulars.
Bovine Tuberculosis.
Sanitary Propositions.
Vital Statistics in Tennessee.
Prisons and Public Charities, 1878.
Indiana, Report, 1882, 1883, 1884, 1885.
Rules, Regulations and Suggestions.
Illinois, Report, 1879, 1880, 1881, 1882, 1883, 1884, 1885.
Register of Physicians, 1884.
Conspectus of Colleges, 1884.
Preventable Disease Circulars.

Illinois, Proceedings of Sanitary Council, 1885.
Various Reports of Proceedings.
Public Health Laws, 1884.
State Sanitary Survey, 1885.
Michigan, Report, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885.
Preventable Disease Circulars.
Prevention and Restriction of Contagious Diseases.
Wisconsin, Report, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885.
Preventable Disease Circulars.
Infant Mortality.
Local Boards of Health, Powers and Duties.
Minnesota, Report, 1872–82, 1883–84.
Contagious Diseases.
Minnesota from the Standpoint of Public Health.
Iowa, Report, 1881, 1883, 1885.
Preventable Disease Circulars.
Contagious Diseases in the Public Schools.
The Typhoid Fever of America.
Rules and Regulations for Local Boards of Health.
Illuminating Oil.
Health Laws. 1883.
Geology and Topography.
Diseases of Animals. 1885.
Registration Report, 1883.
Kansas, Report, 1885.
State and Local Boards of Health.
California, Report, 1870–71, 1871–73, 1874–75, 1876–77, 1877–79, 1879–80, 1880–81, 1882–83.

Other Reports.

Surgeon-General of the Navy, 1879, 1880, 1881, 1884.
Secretary of the Navy, 1882, 1883, 1884.
Massachusetts Drainage Commission.
Last Two Cholera Epidemics of London, 1856.
Cholera Epidemic of 1866 in England. London.
Commissioner of Education, 1884, 1885.
Hygienic and Medical Reports, U. S. N., 1879.
Department of Agriculture, 1881–82, 1884, 1885.

New York State Dairy Commissioner, 1886.
Cholera in Europe in 1884.
Cholera Epidemic of 1873 in U. S.

Reports of Local Boards of Health.

Hartford, Connecticut, 1886.
New Haven, " 1882.
Boston, Massachusetts, 1884, 1885.
Fall River, " 1885.
Franklin, New Hampshire, 1884, 1885.
Providence, Rhode Island, 1884.
Augusta, Maine, 1885.
Burlington, Vermont, 1882.
Newark, New Jersey, 1885.
Cleveland, Ohio, 1881.
Detroit, Michigan, 1883.
Kansas City, Missouri, 1882.
Atlanta, Georgia, 1884.
Charleston, South Carolina, 1882.
Memphis, Tennessee, 1881, 1882.
San Francisco, California, 1884.
Oakland, " 1885.

Public Health in General.

Parkes, Practical Hygiene. Philadelphia, 1883.
De Chaumont, Lectures on State Medicine. London, 1875.
Fothergill, Maintenance of Health. New York, 1874.
Wight, Maxims of Public Health. New York, 1884.
Simon, Filth Diseases and their Prevention. Boston, 1876.
Smith, Foods. New York, 1884.
Kingsley, Health and Education. New York, 1884.
Bible Hygiene. Philadelphia, 1880.
Reports of the American Public Health Association, Vols. I, II, III, IV, V, VI, VII, VIII, IX, X, XI.
Prize Essays of the American Public Health Association. 1885.
Gardner, Homes and How to Make Them. Boston, 1874.
Carter, Good and Bad Eyesight. Philadelphia, 1882.
American Health Primers. Philadelphia, 1885.
    Lincoln, School and Industrial Hygiene.
    Cohen, The Throat and the Voice.

Wilson, The Summer and its Diseases.
Osgood, Winter and its Dangers.
Richardson, Long Life and How to Reach It.
Harlan, Eyesight and How to Care for It.
Wood, Brain-work and Over-work.
Packard, Sea-Air and Sea-Bathing.
Bulkley, The Skin in Health and Disease.
White, The Mouth and the Teeth.
Burdett, Hearing and How to Keep It.
Hartshorn, Our Homes.

Corfield, Dwelling Houses. New York, 1880.
Farr, Vital Statistics. London, 1885.
Nightingale, Notes on Nursing.
Tracy, Handbook of Hygiene.

Drainage and Sewerage.

Waring, Drainage for Profit and Health. New York, 1884.
———, The Sanitary Drainage of Houses and Towns. Boston, 1884.
French, Farm Drainage. New York, 1884.
Gerhard, House Drainage and Sanitary Plumbing. New York, 1884.
———, Drainage and Sewerage of Dwellings. New York, 1884.
Corfield, Sewerage and Sewage Utilization. New York, 1875.
Staley and Pierson, The Separate System of Sewerage. New York.
Putnam, The Principles of House Drainage. Boston, 1886.
Fox, The Disposal of the Slop Water of Villages. London, 1877.
Philbrick, American Sanitary Engineering.

Water and Water Supply.

MacDonald, Water Analysis. London, 1883.
Nichols, Filtration of Potable Water. New York, 1879.
Corfield, Water and Water Supply. New York, 1875.
Frankland, Water Analysis. Philadelphia, 1880.

Heating and Ventilation.

Billings, Ventilation and Heating. New York, 1884.
Morin, Warming and Ventilating Buildings. Washington, 1882.

Bacteriology and Microscopy.

Hueppe, Methods of Bacteriological Investigation. New York, 1886.

Crookshank, Practical Bacteriology. New York, 1886.
Friedlænder, Use of the Microscope. New York, 1885.
Sternberg, Bacteria. New York, 1884.
———, Photo-Micrographs and How to Make Them. New York, 1884.
Beale, How to Work with the Microscope. Philadelphia, 1880.
Martin, Manual of Microscopic Mounting. London, 1878.
Bausch, Manipulation of the Microscope. Rochester, 1885.
Sedgwick and Wilson, Biology. New York, 1886.
Frey, Das Mikroskop und die Mikroskopische Technick. Leipzig, 1870.
Black, The Formation of Poisons by Micro-Organisms. Philadelphia, 1884.
Gradle, Bacteria. Chicago, 1883.
Thumen, Die Bacterien im Haushalte des Menschen. Vienna, 1884.

Veterinary Science.

Billings, Animal Diseases. New York, 1884.
Lydtin, Fleming and Van Hertsen, Propagation of Tuberculosis. London, 1884.
Walley, The Four Bovine Scourges. Edinburgh, 1877.
Diseases of Swine and Other Animals. Washington, 1879.
The Journal of Comparative Medicine and Surgery. Vols. I, II, III, IV, V, VI, VII.
Bollinger, Zur Aetiologie der Tuberkulose. Munich, 1883.
Johone, Athmung, Athmungsluft, und Luftverderbuiss. Berlin, 1884.

School-Houses and School Hygiene.

Lincoln, School and Industrial Hygiene. Philadelphia, 1880.
Baginsky, Handbuch der Schulhygiene, Stuttgart, 1883.
Whitford, Plans and Specifications of School-Houses for Wisconsin. Madison, 1882.
Education Department of Ontario, School Architecture and Hygiene. Toronto, 1886.
Board of Education of New Brunswick, Plans of School-Houses, with Specifications. Fredericton, 1872.
Manual of the School Law of New Brunswick. Fredericton, 1880.
Henderson, Manual of Kentucky School Architecture. 1876.
Report on School Architecture, with Plans. Washington, 1870.
Chase, School-Houses and Cottages. Washington, 1868.

Bureau of Education, Rural School Architecture. 1880.

Rules to be observed in Planning and Fitting up Schools. London, 1883.

Report of the Minister of Education, South Australia. Adelaide, 1886.

Weber, Ueber Schul-Hygiene in England. Wiesbaden, 1884.

Planat, Construction et Amenagement des Salles d'Asile et des Maisons d'Ecole. Paris, 1881.

Plans-Modeles pour la Construction des Salles d'Asile. Paris, 1861.

Planat, Nouveau Reglement pour la Construction et l' Ameublement des Ecoles Primaires. Paris, 1881.

Narjoux, Les Ecoles Normales Primaires. Paris, 1880.

Nonus, Les Batiments Scolaires. Paris, 1883.

Riant, Hygiene Scolaire. Paris, 1882.

Wettstein, Unterrichtswesen. Zurich, 1884.

Linsmayer, Die Munchener Schulbank. Munich, 1876.

Bericht der Kommission für Schulbau-Normalien ueber die Moglichkeit von Ersparnissen beim Bau von Primar-Schulhausern. 1885.

Program für den Bau von Schulhausern in Munchen.

Bericht der Kommission für Schulbaunormalien an den Regierungsrath des Kantons Basel-Stadt. 1882.

Inspection Hygienique and Medicale des Ecoles. Antwerp, 1882.

Reglement op de Ongezonde Woningen. Antwerp, 1884.

Verordnungsblatt für das Volksschulwesen im Konigreiche Bohem Stunk VII. Prague, 1873.

Bongioannini, Gli Edifizi per le Scuole Primarie. Rome, 1879.

Ministero Della Pubblica Istruzione, Bollettino Ufficiale. Rome, Seven Numbers.

Fifteen Plates giving plans for School-Buildings from Amsterdam.

Notizen ueber die neuern Schulgebaude in Basel.

Plans of Three South Australian School Buildings. Traced for the State Board of Health of Maine by the Superintendent of Public Buildings, Adelaide, South Australia.

Verfugung des K. Ministeriums des Kirchen und Schulwesens. Stuttgart, 1870.

South Australia Education Department, Acts and Regulations. 1885.

Lincoln, Hygiene of Public Schools in Massachusetts. Boston, 1879.

Randall, Book of Designs for School-Houses. Chicago, 1884.

Briggs, Suburban School-Houses. Concord, 1882.

Monroe, Physical and Vocal Training. Philadelphia, 1870.

Richey, Vision in School Children. Concord, New Hampshire, 1885.

Robertson, Over-Pressure in Schools. Des Moines, 1885.

Bureau of Education, Causes of Deafness among School Children, 1881.

————————, Effects of Student Life upon the Eyesight. 1881.

————————, English Rural Schools. 1880.

Reglement pour la Construction et l'Ameublement des Maisons d'Ecole. Paris, 1880.

Regulations for the Public Schools, Charlottetown, P. E. I., 1886.

MISCELLANEOUS.

Library of Surg.-General's Office, Index Catalogue. Vols. I, II, III, IV, V, VI, VII.

Webster's Dictionary.

Quain, Dictionary of Medicine.

Cutter, Dictionary of German Terms. New York, 1880.

Foster and Langley, Practical Physiology. London, 1884.

Foster, Text Book of Physiology. Philadelphia, 1885.

Hinton, Physiology for Practical Use. New York, 1874.

Walker, Physiology and Hygiene. New York, 1885.

Martin, The Human Body. New York, 1885.

Tracy, Anatomy, Physiology and Hygiene. New York, 1884.

Hutchinson, Physiology and Hygiene. New York, 1885.

Steele, Hygienic Physiology. New York, 1884.

Mills, Physiology and Hygiene. Philadelphia, 1885.

Emergency and Hygiene Association, School Hygiene. Boston, 1885.

Smith, The Human Body and Its Health. New York, 1885.

————, Primer of Physiology and Hygiene. New York, 1885.

Fothergill, Animal Physiology. New York, 1881.

Dunglison, Elementary Physiology. Philadelphia, 1885.

W. N. C. T. U., Hygiene for Young People. New York, 1885.

Johonnot and Boton, How We Live. New York, 1885.

Buckelew and Lewis, Practical Work in the School-Room, N. Y., 1885.

Brands, Lessons on the Human Body. Boston, 1883.

Jacobi, Infant Diet. New York, 1885.

Shepard, Inorganic Chemistry. Boston, 1885.

Richards, Food Materials and Adulterations. Boston, 1885.
Clapp, Is Consumption Contagious? Boston, 1882.
Burdett, Cottage Hospitals. London, 1880.
Jaccoud, Pulmonary Phthisis. New York, 1885.
Foster, Vaccination. Concord, 1884.
Hunt, Principles of Hygiene. New York, 1886.
Harrison, Legislation on Insanity. Philadelphia, 1884.
Sattler, Tuberculosis. Cincinnati, 1883.
Almquist, Wie Entstehen unsere Masernepidemien? Goeteborg, 1885.
Braus, Die Diphtherie. Essen a. d. Ruhr.
Colby, Atlas of Maine. 1884.
Revised Statutes of Maine. 1883.
Laws of Maine, 1885.
Public Health Acts. London, 1886.
Varney, Gazetteer of Maine. Boston, 1886.
Eulenburg, Real-Encyclopadie der Gesamten Heilkunde. Vols. I to XV, inclusive. Leipzig, 1883.
Transactions of the Maine Medical Association, 1853–62, 1866–68, 1871, 1872, 1873, 1874, 1875, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884.
Saunders, Disposal of Refuse by Cremation. London, 1881.

Journals.

Sanitary Engineer, New York, Vols. XII, XIII, XIV.
Sanitarian, New York, Vols. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII.
Sanitary News, Chicago, Vols. I, II, III, IV, V, VI, VII, VIII.
Building, New York, Vols. IV and V.
Sanitary Record, London, Vols. VII and VIII.
Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege, Berlin, Vols. XVI, XVII, and XVIII.
Revue D'Hygiene, Paris, Vols. VII and VIII.
Annals of Hygiene, Vol. 1.
Nebraska Farmer, Vol. X, Nos. 16, 17, 18, 19, 20, 21, 22, 23, 24.
American Monthly Microscopic Journal, Washington, Vols. VI and VII.
Zeitschrift fur Hygiene, Leipzig, Vol. I, Nos. 1 and 2.
Medical Record, New York, Vols. XXIX, XXX.

Boston Medical and Surgical Journal, Vols. LXXXIII to CXII (inclusive).
United States Government Publications, Vols. I and II.
Public Health in Minnesota, Vol. II.

PAMPHLETS.

Watson, Water Pollution—Wells.
Crosby, Water Pollution.
Baker, Typhoid Fever.
Conn, Ventilation.
Hull, Ventilation.
School Hygiene.
Hart, The Truth about Vaccination.
Watson, Common Law Citations.
Bartlett, Adulteration of Food.
Gallinger, The Religion of Health.
Robertson, Sanitary Science and Public Hygiene.
Holt, The Sanitary Protection of New Orleans.
History of Vaccination Controversy in Rock Island,
Gerrish, The Sanitary Condition of Portland.
Hueston, Sanitary Progress in Michigan.
How to make Photographs.
Fulsom, Public Schools and Disorders of the Nervous System.
Angell, Sanitary Examination of Drinking Water.
Chaille, Small-Pox and Vaccination.
Provincial Board of Health, Instructions to Vaccinators.
Memorial of the Dedication of the Public Latin and English High School-House, Boston.
Ladies' Sanitary Association, London, 26th An. Rpt.
———, Tracts and Pamphlets.
Australian Health Society, Tenth Annual Report.
———, Tracts and other Publications of.
National Health Society, London, Thirteenth Annual Report.
Citizen's Sanitary Society, Brooklyn, Tracts and Circulars.
New Orleans Auxiliary Sanitary Association, Various Pamphlets.
The Worcester Sewage and the Blackstone River. Boston, 1882.
Sternberg, Diagnosis of the Yellow Fever.
Andrews, Lighting and Seating School-Houses.
Parish, Study out of School Hours.

Bureau of Education, Various Pamphlets.

Proceedings at Sanitary Conventions in Michigan. Various Pamphlets.

Thompson, Address at Detroit. 1883.

Wight, Laws Requiring Medical Men to Report Deaths and Infectious Diseases.

Anagnos, Kindergarten and Primary School for the Blind.

Kedzie, Health Homes for Farmers.

Farquharson, Hospitals for Contagious Diseases.

Lindsley, Prevailing Methods of Sewage Disposal. 1880.

Philbrick, The Disposal of Sewage in Suburban Residences. 1883.

Preliminary Report of the Committee on Disinfectants.

Registration Laws of New Brunswick.

Holt, The New Quarantine System. New Orleans, 1885.

EXPENSES OF THE BOARD.

The amount and character of the expenditures of the Board for the year 1886 were as follows:

Engraving and drawing	$7 61
Books and sanitary journals	79 90
Instruments	25 85
Paper and stationery	49 44
Postage	194 00
Printing and binding	176 20
Secretary's salary	2,000 00
Expenses of members	156 90
Express and telegraph	41 66
Expenses of Secretary	84 68
Clerical help	130 00
Miscellaneous	33 70
Chemical and microscopical supplies	20 06
Total	$3,000 00

Reports from Medical Correspondents.

Nearly all of these reports are for only the first nine months of the year 1886.

Abbot—C. D. Sprague, M. D.

Diphtheria—Two fatal cases.

Typhoid Fever—None reported.

There was one death from phthisis, and two from diarrhœal diseases of children. Whooping cough went through the schools.

Alfred—F. W. Smith, M. D.

Diphtheria—Two cases, not fatal.

Typhoid Fever—One case, recovered.

Scarlet Fever—Three cases, none fatal.

From phthisis there has been one death. The diarrhœal diseases have been quite prevalent, the most frequent cause of which has been impure water. In our village there is a low piece of land that ought to be filled, as its odor is very bad during hot weather. It is flooded nearly all the time.

A large number of horses in this town have been sick this summer, and the dogs in Sanford. The trouble has been in their throats, which swell and sometimes burst, it is said.

Alton—A. H. Twitchell, M. D.

Diphtheria—Three cases, none fatal.

Typhoid Fever. None observed.

Upon the whole it has been an unusually healthy season. There was a prevalence of whooping cough having as a noticeable feature the absence of the distinctive whoop in a large percentage of the cases.

As sanitary improvements I would suggest the building of three or four good sensible school-houses in place of the rickety tumble-downs where the schools are now held

A case has come under my observation in which the contagion of diphtheria seemed to have retained its vitality for eighteen months in rooms and perhaps in the clothing.

Andover—Walter W. Barnes, M. D.

Diphtheria—None observed.

Typhoid Fever—No cases.

The summer complaint of children has prevailed to an unusual extent.

Anson—E. M. Wing, M. D.

Diphtheria—None.

Typhoid Fever—Two cases; one in Embden, fatal.

The diarrhœal diseases of children have been very prevalent, the most frequent causes of which have been neglect, filth and poor diet. In September there was an epidemic of dysentery.

Appleton—Frank A. Gushee, M. D.

Diphtheria—None.

Typhoid Fever—No cases.

We have had one case of severe enteritis and quite a large number of light cases continuing half a week. In the severe case a high atmospheric temperature followed by a cool exposure at night was evidently the cause.

Auburn—A. M. Peables, M. D.

Diphtheria—Twenty-two cases in Auburn, and five in Lewiston.

Typhoid Fever—Five cases in Auburn, four in Lewiston.

Scarlet Fever—Twelve cases in Auburn, six in Lewiston.

From phthisis there were in my practice three deaths in Auburn, and four in Lewiston. From Lake Auburn we have a very excellent water supply in this town. We have given attention to sewerage. There is less diphtheria and typhoid fever in our city, where it is thickly settled and where we have Lake Auburn water and sewers, than on the farms outside the city proper.

Augusta—L. J. CROOKER, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed in the city.

Our local board of health is doing an excellent work. I have known scarlet fever to be carried in clothing from one town to another and that in very cold weather, and have known diphtheria to be communicated to a family by moving into a house where the disease had caused deaths three months previously.

Augusta—J. O. WEBSTER, M. D.

Diphtheria—Two cases observed, one fatal.

Typhoid Fever—Two cases, both recovering.

Scarlet Fever—Six cases observed.

From phthisis there have been three deaths under my observation. There has been quite a large number of cases of the diarrhœal diseases in children. The more frequent cause of these diseases has been the hot and dry weather with artificial feeding. Pneumonia was quite prevalent in June and was unusually fatal.

Augusta—G. H. BRICKETT, M. D.

Diphtheria—None observed.

Typhoid Fever—Ten cases, with two deaths.

From phthisis there have been three deaths. Infantile diarrhœa has been quite prevalent, seeming to be caused mostly by exposure to cold, and improper food.

A better system of sewerage would be an improvement. There has been considerable work done in this direction the past year and there will be more done next.

Bar Harbor—C. C. MORRISON, M. D.

Diphtheria—Eleven cases, four fatal.

Typhoid Fever—Six cases, one died.

The cases of diarrhœal diseases in children have come under observation quite frequently; four have died. Bottle-fed babies have suffered severely and I believe the artificial feeding to have been the cause of every death. None of the children have died that were nursed.

About the middle of June, 1886, I was called to see an Indian, aged nineteen, who had been out shooting sea birds on some of the larger islands near Mount Desert. I found he had typhoid symptoms and on enquiry, he gave history of drinking water from the outlet of a meadowy alder swamp. It ran very slowly and he said it was quite full of green slime which was clinging to every twig in the stream. The next morning after seeing the Indian, I was called to see a young fellow of seventeen who had been gunning at the same islands but not a companion of the Indian. He also had typhoid symptoms, and on asking if he had drank from any old well, he said he drank from the above place. He did not know the Indian had given me any history of such a place, neither was he any acquainted, nor had he been with him. The drinking was about ten days or two weeks before I saw them. They both had about four weeks run of typhoid fever and recovered. There had been no typhoid fever for weeks previous, nor did there follow any for weeks after.

Baring—J. R. N. SMITH, M. D.

Diphtheria—Two cases in Baring, both recovering, and two in Meddybemps, one fatal.

Typhoid Fever—None observed.

Scarlet Fever—No cases in Baring; three in Meddybemps, and one in Charlotte. One case fatal.

One death from consumption has occurred in my practice in Baring and one in Cooper. The diarrhœal diseases have been quite prevalent, and three children have died.

Bath—A. J. FULLER, M. D.

Diphtheria—Two cases observed.

Typhoid Fever—I have not seen a genuine case of typhoid during the year.

Scarlet Fever—Two cases observed.

From phthisis there have died in my practice two cases in Bath and one in Freeport. The diarrhœal diseases have not been very prevalent. In this town the year has been very healthy, with the exception of quite a prevalence of measles last winter.

Good sewerage would improve the condition of Bath, as it will that of any place. A few cases of lead poisoning in painters have come under my observation.

Bath—E. M. Fuller, M. D.

The total number of deaths in Bath for the nine months of 1886 ending October 1st, was 149. Arranged by months the mortality was as follows:

January—Old age 2, dyspepsia 1, pneumonia 1, consumption 2, dropsy 1, cancer 3, marasmus 1, Bright's disease 1; total, 12.

February—Consumption 4, typhoid fever 1, abscess of lung 1, paralysis of heart 2, pneumonia 1, measles 1, still born 1, old age 1, apoplexy 1; total, 13.

March—Pneumonia 2, rheumatism of heart 1, old age 1, still born 1, disease of heart 2, cerebro-spinal-meningitis 1, dropsy 2, drowned 2, consumption 1, heart and lung disease 1, measles 1, paralysis 1, unknown 1; total, 18.

April—Inflammation of bowels 1, bronchitis 1, still born 3, paralysis 1, pneumonia 1, canker 1, cystitis 1, consumption 2, heart disease 1, tubercular meningitis 1, Bright's disease 1, unknown 1; total, 15.

May—Inflammation of bowels 1, marasmus 1, canker of stomach 1, pneumonia 1, paralysis 2, heart disease 1, Bright's disease 1, consumption 2, cholera infantum 1, unknown 1, cancer 2, accident 1, canker 1; total, 16.

June—Canker 1. cholera infantum 1, congestion of brain 1, consumption 3, rubeola 1, apoplexy 1, dropsy 1, heart disease 2, still born 3, typhoid pneumonia 1, meningitis 1, paralysis 2, croup 1, rheumatism of brain 1; total, 20.

July—Consumption 2, paralysis 2, marasmus 1, insanity 1, pneumonia 1, cancer 1, suicide 1, drowning 1, still born 1, whooping cough 1; total, 12.

August—Cholera infantum 13, still born 2, consumption 4, disease of brain 1, marasmus 1, dropsy 1, indigestion 1, dysentery 1, child bed fever 1; total, 25.

September—Paralysis 2, unknown 1, cholera infantum 3, marasmus 2, nervous prostration 1, pneumonia 1, dropsy 3, drowned 2, heart disease 1, diphtheria 1, old age 1; total, 18.

Bath—M. S. Briry, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases.

There have been three deaths from phthisis. The diarrhœal diseases in children have been more prevalent than usual, and three deaths have occurred. Improper feeding is the more potent cause; the three cases who died were under five months of age and all were fed from the bottle. None have been lost who nursed the breast.

Measles and mumps prevailed during the winter and spring; they were brought here from an adjoining town. The condition of the town would be improved if the privies and cess-pools were properly constructed and cleaned at suitable times.

One of the cases of typhoid fever which I have mentioned occurred in a young girl of sixteen, the daughter of a sea captain. While her father's vessel was in reloading she occupied the cabin which had been occupied by another captain on a recent return voyage from Baltimore. On this return voyage this captain was sick with what was called malarial fever, but not intermittent fever. I think that the same blankets were also used by my patient that had been used by the sick man. The water used on board was taken in part from the Kennebec River and in part at Baltimore.

Belfast—Jas. H. Sherman, m. d.

Diphtheria—Two mild cases contracted elsewhere.

Typhoid Fever—None observed.

Under my observation three deaths from phthisis. The diarrhœal diseases of children have been less prevalent than usual. Imprudence in eating has been the cause in every case under my observation. It has been an unusually healthy year here.

Our drainage is largely upon the surface, and hence the chances for the contamination of the wells by the introduction of surface water are great, but from the continuous drought there has thus far been but little wash from the hills. Should there be heavy rains this autumn, I look for a large increase of sickness, with probably more fatality.

Biddeford—S. J. Bassford, m. d.

Diphtheria—Two cases, both recovering.

Typhoid Fever—Five cases, one fatal.

Under my observation there have been two deaths from phthisis in Biddeford, and one in Saco. During the summer months the diarrhœal diseases of children were very prevalent, and dysentery has prevailed much more than usual. These diseases I think are due to the influence of the weather, unhealthy surroundings and improper food. Whooping cough has been quite prevalent and a number of deaths have resulted from it among the French children, but none, I think, among Americans.

For the improvement of our city I would suggest better drainage, closing certain wells and the introduction of water into tenements. We have a good water supply lately introduced and already much has been done towards improvement.

Two cases of typhoid fever, I feel sure, were caused by drinking water taken from polluted wells. The water was analyzed, condemned, and the wells were closed. Much credit is due our present board of health for efforts put forth, to put down certain nuisances, such as polluted wells, foul privies, etc. Some of the physicians have assisted and entered complaints of unhealthy localities, and the board has done its duty. We are encouraged to complain more, and thus see more accomplished.

Biddeford—Frederick Bacon, M D.

Diphtheria—Six cases observed and one death.

Typhoid Fever—None observed.

From phthisis there has been one death in my practice. The diarrhœal diseases have been somewhat prevalent among the French children. I have thought that one cause of these diseases has been due to bad drainage.

Biddeford—C. J. Emery, M. D.

Diphtheria—Four cases, two fatal.

Typhoid Fever—Twenty-two cases in Biddeford, one fatal; one in Saco.

Scarlet Fever—One case, recovered.

Under my observation there have been three deaths from phthisis in Biddeford. The diarrhœal diseases of children have been very prevalent, and particularly dysentery. Two deaths have resulted. As causes of these diseases have been improper food, too early weaning on account of the parent's desiring to work in the mills, exposure and filth. Whooping cough and measles have been prevalent, the former very fatal to children under two years of age.

Better sewerage and more attention to proper trapping would improve our health conditions. Vaults are necessarily emptied into sewers and the community generally do not understand the necessity of trapping.

One case of lead poisoning came under my observation in the case of a plumber. The lead appeared to have been taken in by chewing tobacco which had received the lead from the hands of the man.

Biddeford—S. Abbott, M. D.

Diphtheria—Four cases observed in Biddeford, and one in Saco; none fatal.

Typhoid Fever—None observed.

Boothbay—Alden Blossom, M. D.

The mortality of Boothbay for 1886 has been as follows:

January,	9
February,	2
March,	3
April,	1
May,	5
June,	7
July,	8
August,	3
September,	7
October,	8
November,	2
December,	5

AGES.

Under	5 years	14
Between	5 and 10,	5
"	10 and 20,	9
"	20 and 30,	3
"	30 and 40,	3
"	40 and 50,	3
"	50 and 60,	5
"	60 and 70,	7
"	70 and 80,	8
"	80 and 90,	3

Consumption 9, pneumonia 4, rheumatism 2, heart disease 4, scrofula 1, gun shot wound 1, old age 3, diabetes 1, drowned 2, marasmus 4, neuralgia of brain 1, bronchial catarrh 1, cancer 1, jaundice 1, intussusception 1, Bright's disease 1, gastritis 1, diarrhœal diseases

5, cerebro spinal meningitis 1, still born 1, typhoid fever 6, gastric catarrh 1, diphtheria and croup 6, dropsy 1, fits 1; total, 60.

Brewer—C. P. THOMAS, M. D.

Diphtheria—Four cases, three in Eddington.

Typhoid Fever—Two cases.

Scarlet Fever—None in this town; three cases in Eddington, one fatal.

From phthisis I have observed two deaths, one in Eddington. The diarrhœal diseases of children have been quite prevalent, with one fatal case. The most frequent causes have been extreme heat and poor water. There has been no epidemic except of whooping cough.

For improving the general sanitary condition of this place better sewerage and cleaner wells might be mentioned.

One case of long retention of the vitality of the diphtheria contagion came under my observation. A man brought home some clothes and rags from a town where they had had this disease the year before. These rags were put in the barn and the children played on them and in a few days came down with diphtheria and nine persons in the family were sick. The vitality of the contagion in this case was retained nearly one year, if the children received the infection from the rags, as was probable.

Brewer—L. H. WHEELER, M. D.

Diphtheria—Three cases.

Typhoid Fever—One case.

The diarrhœal diseases of children have been very prevalent. The hot weather, improper diet, and dentition have been the more potent factors in producing the disease.

To improve the sanitary condition of the village I would suggest a better water supply.

One case of diphtheria seemed to be due to emanations from a foul sink drain and other filthy accumulations about the building. A case of diphtheria came under my observation which seemed to be contracted by using a pillow which had been on the bed of a former diphtheritic patient six months previously. The pillow in the meantime had been cleansed by the steam process, or was said to have been so cleansed.

Bridgton—John B. Bray, m. d.

Diphtheria—None observed.

Typhoid Fever—One case, still sick.

One case of poisoning from lead occurred as follows: A boy fourteen years of age had been poisoned with "mercury," or poison ivy, and his parents washed the pustular eruption with a solution of acetate of lead of unknown strength. The result was a very serious case of lead poisoning from which the patient is still suffering though now somewhat better.

Bridgewater—W. W. White, m. d.

Diphtheria—None observed.

Typhoid Fever—Two cases in Mars Hill, one in Blaine.

From phthisis one patient died in Bridgewater, and one in Blaine. The diarrhœal diseases of children have been quite prevalent, caused by improper diet and impure air. During the year there has been a marked prevalence of pneumonia and dysentery.

Last year a healthy young girl assisted in removing the wall paper from a room in which there had been treated a case of typhoid fever the year before. In less than two weeks after removing the paper she was taken to bed with typhoid fever. There were no other cases in the settlement previous to her taking it.

Brooks—J. T. Collier, m. d.

Diphtheria—No cases observed.

Typhoid Fever—One case under my observation.

The not very prevalent diarrhœal diseases in children have been caused here by green apples and cucumbers.

Brownfield—W. L. Gatchell, m. d.

Diphtheria—None observed.

Typhoid Fever—Two cases, one fatal.

One death from phthisis. The summer diseases of children have been unusually infrequent. If there has been any peculiarity in the diseases this year it is that the "summer complaints" have been more common among adults than among children. Measles and whooping cough prevailed in the schools.

Brownville—W. Sawyer, M. D.

Diphtheria—In Brownville, twenty cases, one fatal. In Katahdin Iron Works fifteen cases, none fatal.

Typhoid Fever—None observed.

One death from phthisis. The diarrhœal diseases of children have been quite prevalent. In my opinion the bad condition of a slaughter house in the village has contributed largely as the cause of the prevalence of diphtheria. At Katahdin Iron Works I think that better drainage should be enforced. The drinking water there is probably badly contaminated.

Brunswick—O. F. Pare, M. D.

Diphtheria—One hundred and fifty-two cases in my practice, with nineteen deaths.

Typhoid Fever—Seventy-eight cases, eleven deaths.

From phthisis three deaths in my practice. The diarrhœal diseases of children have been very prevalent and sixteen deaths have resulted from them. The cause of these diseases I think may be referred largely to the milk supply. The cows in this district are kept in close contact with privies which are overflowing and they are fed on putrid swill. Two facts will sustain this opinion: 1st, Previous to this year there were only a few cows kept amongst the French people, this year there are twenty-seven cows, which furnish nearly all the milk used. 2nd, The milk bought from milk carts, or the milk from the country, can be kept sweet six or ten hours longer than that which is produced by the cows which are fed on the putrid swill. Among adults the diarrhœal diseases have been largely due, I think, to polluted water and to air which is rendered impure by the crowded condition of the population and the neglect of the sanitary conditions, such as were seen by you.

I should like to emphasize particularly the ill results of keeping cows in this crowded French population, and would wish to draw attention to the fact that the larger number of the fatal cases of the diarrhœal diseases have occurred in the children who have used the milk from these swill-fed cows; and on many occasions when the milk supply has been changed and the milk from the country taken instead of the other, the children would speedily improve and get well without any medicine. There have been but very few exceptions to this. The milk of these swill-fed cows can be kept sweet only a few hours after the milking.

Regarding the deaths from consumption, I would say that I know of six cases besides the three reported above who went back to Canada to die, as is a common occurrence with these French Canadians when they are attacked with any similarly serious disease.

Bucksport—Geo. H. Emerson, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

Two deaths from phthisis. The diarrhœal diseases have not been very frequent. The sanitary condition of this locality would seem to be good, as indicated by the small number sick during the last year.

Buxton—J. A. Fellows, M. D.

Diphtheria—In Hollis, two cases.

Typhoid Fever—In Buxton, one case; in Hollis, two.

In Hollis one death from phthisis, the same in Buxton. Rheumatism and neuralgia have been quite prevalent.

Buxton—F. A. Southwick, M. D.

Diphtheria—Six cases, two fatal.

Typhoid Fever—Saco, two cases; Scarboro, three, none fatal.

One death from phthisis. Of the diarrhœal diseases of children there have been upwards of fifty cases, one death. A large part of my cases occurred in the summer months when we were having hot days and cold nights, hence I believe climatic influences a potent cause Eating blueberries, green corn, and cucumbers cause many cases.

The general sanitary condition of the town is good, but there are but few who might not improve the sanitary condition of their dwellings. Diphtheria broke out in our school, four being taken in different families at about the same time. The school was closed and there was no further extension of the disease.

Buxton (Bar Mills)—Martin Coffin, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases.

From phthisis one death in Hollis. The diarrhœal diseases have been very prevalent among adults as well as children.

Cambridge—G. F. Merrill, M. D.

Diphtheria—Two cases in Cambridge, and three in Harmony. One fatal in each place.

Typhoid Fever—One case.

Scarlet Fever—One case.

One death from phthisis in Parkman. The diarrhœal diseases of children have been very prevalent; the most common cause has been artificial feeding.

Caribou—J. Cary, M. D.

Diphtheria—None observed.

Typhoid Fever—One in Caribou, and three in Washburn, one of which in the case of an infant ended fatally in convulsions.

One death from phthisis in Washburn. During the last of August and through most of the month of September the diarrhœal diseases of children were very prevalent; from them one death occurred in Caribou, and two in Washburn. According to my observation drouth is the most potent cause of these diseases; cases improve and the malady disappears after the advent of copious rain. I would suggest for diminishing the prevalence of these diseases the use only of pure water and the boiling of any water which is suspected of being otherwise.

For the improvement of our general sanitary condition I would suggest a system of public water works and a sewerage system.

Castine—J. H. Sylvester, M. D.

Diphtheria—Three cases in Castine, and one in Brooksville.

Typhoid Fever—Three cases observed.

Scarlet Fever—Six cases in Castine, four in Brooksville.

From phthisis two deaths in Castine. The extreme drouth and bad water supply caused an unusual prevalence of the diarrhœal diseases of children. Our sanitary condition would be improved by digging the wells deeper and improving the house and street drainage.

At Brooksville a father came home from sea with scarlet fever and communicated the disease to his family. He derived the disease from the clothing of one of his men whose family had suffered from the disease some six months previous to his going to sea.

Castine—G. A. Wheeler, M. D.

Diphtheria—Three cases in Castine, twelve in Penobscot, of a mild form, none fatal, but unmistakably diphtheria.

Typhoid Fever—One case, fatal, did not originate here.

Scarlet Fever—Two cases in Castine, three in Penobscot.

No deaths observed from phthisis. The diarrhœal diseases in children have been very prevalent, though no deaths were observed. As causes, the hot weather and indiscretion in diet have been the more operative.

Pneumonia, bronchitis, acute rheumatism, and cholera morbus have been more prevalent than usual. An annual house to house inspection of the town would improve its general sanitary condition.

A woman from another town visited her friends in Penobscot. She stayed one night at a house where they had had diphtheria six months before. By accident she was compelled to put on a night shirt of a young lad who had been ill with the disease. Within a week or ten days she was taken down with diphtheria. The whole house had been disinfected and, it was supposed, all the clothing.

Cherryfield—C. J. Milliken, M. D.

Diphtheria—No cases observed.

Typhoid Fever—One case.

Scarlet Fever—Three cases. Five deaths from phthisis in Cherryfield, one in Columbia. The diarrhœal diseases of children have been very prevalent in a mild form, though one case has resulted fatally. The hot, dry weather has seemed to be the cause. Upon the whole, there has been but little sickness in the town during the year.

China—F. C. Perkins, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases in Windsor.

Scarlet Fever—Five cases in Vassalboro, one fatal. From phthisis one death in China, two in Windsor. The diarrhœal diseases of children have not been very prevalent.

Scarlet fever has spread through one school in Vassalboro, nearly all the scholars having the disease at about the same time.

Corinna—O. H. MERRILL, M. D.

Diphtheria—None observed.

Typhoid Fever—Eight cases.

Six deaths from phthisis. The so-called summer complaint has been very prevalent among children; two deaths have occurred. Improper food is the most common cause.

Corinth—E. H. STANHOPE, M. D.

Diphtheria—Six cases in Lagrange, four in Charleston.

Typhoid Fever—Four cases in Lagrange, one in Corinth.

From phthisis there has been one death each in Lagrange, Corinth, and Orneville. The bowel diseases of children have been very prevalent; one death occurred in Lagrange. The more frequent cause has been eating indigestible substances, and the hot weather. I think this is a very healthy locality, plenty of pure air and pure water.

One case of the contagion of diphtheria communicated at a funeral was in the case of a man who died in the woods and was brought out. His brother took the disease and had a severe sickness, but recovered. Another case of diphtheria was communicated by infected clothing.

I call to mind one case of sporadic fever in the town of Lagrange. The patient was a little girl ten years of age. Her home was beautifully situated on high ground. Everything about the house, both inside and out, was perfectly neat. The water used was from the well where others obtained their supply. She was attending school at the time her sickness began. The fever ran forty-two days and she was delirious twenty days. There were no other cases in town at that time. Certainly her disease could not come from filth or cesspool, for there was no such thing in the whole village. It seems to me as though such cases as this do not agree with the prevailing theory regarding typhoid fever.

Corinth—C. S. PHILBRICK, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

One death from phthisis in Corinth, and one in Bradford. The diarrhœal diseases of children have been moderately prevalent, caused, it would seem, this fall by atmospheric influence. 6

Cornish—O. M. Brown, M. D.

Diphtheria—Four cases.

Typhoid Fever—None observed.

Scarlet Fever—One case in Sebago. The bowel diseases of children have been very prevalent, and one death occurred. The frequent cause of this disease has been the eating of unripe fruit.

There has lately been a disease which closely resembles influenza, the germ or cause of which seems to have been transmitted by the medium of the atmosphere.

Many things might be suggested to improve the sanitary condition; improving the drainage of many of the houses is one of them.

Cumberland Mills—A. F. Murch, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

Scarlet Fever—One case. Two deaths from phthisis. The diarrhœal diseases of children have been quite prevalent. A frequent cause of the disease has been improper feeding.

One case of scarlet fever came under my observation which seemed to have been contracted by wearing clothing which one year before had been worn by a scarlet fever patient.

Cumberland—C. T. Moulton, M. D.

Diphtheria—Seven cases in Cumberland, three in Falmouth.

Typhoid Fever—One in Cumberland, one in Falmouth.

One death from phthisis. The diarrhœal diseases of children have been very prevalent; one death. Errors in diet, together with atmospheric influences, have had much to do in causing this disease. The sanitary condition of Cumberland Center is very good—much better than that of most country villages.

In October, 1885, I was called to see a little girl nine years of age, who had been sick some four days with what the family called a bad cold and sore throat. I found the little patient almost in a moribund condition—a case of malignant diphtheria, and she died the next day but one. The sanitary condition of the place seemed very good; no other cases of diphtheria were in the neighborhood. I ascertained that the grandfather, an aged gentleman, of whom the child was very fond and in whose lap she would sit much of the time, had come from a neighboring town to spend a few weeks with them—that in his family in the previous June there had been several cases of diphtheria, one fatal case. The children had been sick in a room adjacent to which was a clothes-press where the old gentleman's clothes had hung. He had had no occasion to use them until the present visit to his daughter's. That clothes-press was not disinfected, hence the communication to my patient, I think. The father of the little girl was taken sick with diphtheria in just one week from the day the child was confined to her room ; he recovered. One boy thirteen years of age in the family was kept out of the room, and all precaution taken to prevent the further spread of the disease. Directions were given for thorough disinfection. No other case occurred in that house or in that neighborhood at that time. In January, 1886, I was again summoned to the same house to see the boy before mentioned, who was sick with what I pronounced diphtheria, although no membranes had yet made their appearance. The case seemed a mild one. The next day I found light membranous formations with the usual symptoms. On the fourth day a "professional nurse" was called to care for the boy. She immediately applied a tobacco poultice to the throat, and thoroughly steamed him with vinegar, as she said, and she thought the boy better. The next day I found the nasal cavity, also the larynx involved,—result, patient died the next day from suffocation. I will give no further particulars of these cases, as enough has been said to show that the contagion will remain for a long time in contact with clothing and articles of furniture without losing its virulence.

Cumberland Mills—JOHN SWAN, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

Two deaths from phthisis, and two from the bowel diseases of children.

Damariscotta—E. F. STETSON, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

One death from phthisis. The diarrhœal diseases of children have not been very prevalent. Most of the cases have been caused by indiscretion in diet.

Danforth—M. L. Poter, M. D.

Diphtheria—No cases observed.

Typhoid Fever—Two cases.

Two deaths from phthisis. There has been an unusual prevalence of "summer complaint" and two children have died. Weather changes have had much to do with the disease. I would suggest better drainage to improve our sanitary condition.

Deblois—I. C. Davis, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

The diarrhœal diseases have been very prevalent among the children, but have been very mild.

Last year some kind of a disease not classed, affected quite a large number of cows, and about one-third of those attacked died. The disease extended over a number of towns.

Dexter—W. A. Bumps, M. D.

Diphtheria—Three cases.

Typhoid Fever—Two cases in this town, two in Garland.

Scarlet Fever—Three cases. From phthisis two deaths. There have not many children been sick with the diarrhœal diseases. No diseases have been very prevalent excepting tonsillitis. I would suggest a better condition of sewerage. A disease has been quite prevalent amongst swine in some localities.

A young man visited Dexter three weeks after his recovery from diphtheria in Skowhegan. Apparently by means of his clothing he communicated the disease to two persons. I have known scarlet fever to have been contracted by occupying a room and using clothing one year after they were infected.

The whole number of deaths in town has been 36. From cerebro-spinal-meningitis, 2; pneumonia, 2; paralysis, 8; heart disease, 4; phthisis, 11; cancer, 3; infantile disease, 2; cirrhosis, 1; septicæmia, 2; Bright's disease, 1.

Dixfield—Jas. S. Sturtevant, M. D.

Diphtheria—None observed.

Typhoid Fever—Three cases in Peru.

The bowel complaints of children have been very prevalent, caused principally by improper food and bad water.

Eaton—P. W. Cody, M. D.

Diphtheria—Twelve cases, six fatal.

Typhoid Fever—Five cases, two fatal.

Scarlet Fever—Six cases, two fatal. Six deaths from phthisis. The diarrhœal diseases of children have been very prevalent, with a considerable mortality. The mode of feeding has much to do with its cause as I have observed that in nearly all the cases I have attended, cow's milk has been substituted instead of the breast milk. Another cause observed by me has been, feeding children with indigestible and improper food.

Our town, in respect to its sanitation, is in a very unsatisfactory condition. We have no health authorities to look after our surroundings. Wells in many cases are in close proximity to privies, and these are generally left in a filthy condition, with the accumulations sometimes unremoved for years. In fact we need a very great change and it has surprised me much that more diseases do not occur in our midst.

I attended a case of typhoid fever some months ago. The patient was a young man aged twenty-one years. The cause of the disease seemed to be drinking water from a spring and well both situated so that they received all the drainage from the barn-yard which was used as a privy, as none other was erected on the premises. I ordered a discontinuance of the use of said water, and they obeyed. Four weeks after the first patient was taken sick, his brother, aged twenty-eight years, showed symptoms of the disease and in a few days the case was fully developed. As the brother did not reside in the house with his sick brother, but in one near to it, I was at a loss to know the cause of his contracting the disease, as his surroundings were in an excellent condition. But on questioning his wife I learned that their well became dry and that they had been using the water from the well that was contaminated, thinking that it was nonsense to follow the directions I had given the others. Both brothers recovered and the first has constructed a water closet and obtains water from a new well situated in a proper place.

Eliot—J. L. M. Willis, M. D.

Diphtheria—Ten cases in Eliot, two in Kittery, one in South Berwick.

Typhoid Fever—Seven cases, one fatal; two in South Berwick, one in Kittery.

Scarlet Fever—Seven cases in the town, one fatal. Bad water and improper food appear to have been the principal causes of the diarrhœal diseases of children, which have been unusually prevalent. There has also been a greater prevalence than usual of dysentery, probably caused by the small rainfall and the lowness of the water in the wells.

Exeter Mills—S. W. L Chase, M. D.

Diphtheria—None observed.

Typhoid Fever—Four cases, one fatal.

One death from phthisis. The diarrhœal diseases have been quite prevalent among children, due largely to faulty sanitary conditions. Whooping cough appeared to have been brought into the town through infected clothing.

Fairfield—M. S. Goodrich, M. D.

Diphtheria—Eleven cases, one fatal.

Typhoid Fever—Eight cases, one fatal.

There has not been as great a prevalence as usual of the diarrhœal diseases of children; two deaths. The cause is largely the heat and improper diet.

In Fairfield we have no local board of health, and to improve the general sanitary condition of the place I would suggest that we have such a board if there is any way of having it.

Fairfield—F. J. Robinson, M. D.

I was called to see a little girl about six years of age, whom I found affected with a well marked case of diphtheria. Before this one there had been no cases of this disease of any importance in the village for a long time. I was told by the mother that her boy had a few days previously had a sore throat and that he had patches in his throat, but was not very sick and so no physician was called to him. She also told me that when this boy was an infant he was very sick with diphtheria and that in years past, several times each year, he had suffered with sore throat with patches in it as mentioned. I remember of meeting other similar cases.

Fairfield—D. C. Perkins, m. d.

Diphtheria—Three cases.

Typhoid fever—Four cases.

The bowel diseases of children have been quite prevalent. Several cases were directly traceable to improper diet.

There has been a greater prevalence of typhoid fever than usual, but its cause has been very obscure. I have no doubt that cleanliness and isolation of individual cases would diminish the prevalence of the disease.

Better drainage and a health committee that would do its duty could improve the general sanitary condition of the village. One serious case of illness came under my care, resulting from eating canned beef. Another from bad pork; others from food improperly cooked.

Farmingdale—F. M. Putnam, m. d.

Diphtheria—Two cases.

Typhoid Fever—One case.

Scarlet fever—One case. Among children the diarrhœal diseases have been quite prevalent, due in greater part, probably, to the hot weather, improper food and impure air.

Fort Fairfield—A. D. Sawyer, m. d.

Diphtheria—None observed.

Typhoid Fever—Eight cases, one fatal.

Three deaths from phthisis. Infantile diarrhœa has not been especially prevalent.

Freeport—D. D. Spear, m. d.

Diphtheria—None observed.

Typhoid Fever—One case.

Two deaths from phthisis. The diarrhœal diseases of children have not been very prevalent, one death only resulting. At the time of this report there is an unusual prevalence of pneumonia; I have now on my hands three cases in one family, two in another, and one in another. Causes, probably, the recent damp weather.

The past year there has been but little sickness in Freeport. I find recorded seven fatal cases—one old age, 82; one cystitis, aged 77; two of consumption, aged 57 and 81, respectively; one cancer of the stomach, aged 47; one case of cholera infantum, 3 months; one case of puerperal fever, aged 26. These are all the fatal cases occurring in my practice since October 1, 1885, which is somewhat remarkable and unusual. Typhoids are always rare here. Most of the deaths in Freeport result from pneumonia or have pneumonia as an original cause. The form of consumption seen here has resulted from frequent inflammation of the lungs. Yet we do see here sometimes true tuberculous consumption, but it is not prevalent.

Freeport—H. F. Twitchell, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

Scarlet Fever—Six cases.

Among children the diarrhœal diseases have been quite prevalent, two cases resulted fatally. The causes have been either a low condition of the water or local atmospheric conditions. I know of no diseases having prevailed amongst animals excepting catarrhal ophthalmia among dogs. No diseases have spread through the schools excepting scarlatina in our primary school, but it was confined pretty much to that school by quarantine.

Typhoid fever is extremely rare in Freeport. We have no fresh water river. Yarmouth, six miles west, and Brunswick nine miles east, are somewhat noted for this disease. The case reported above is the only case, except one imported from Yarmouth, that has occurred in our town for two years and perhaps longer. This young man camped on French's Island late in August. The water of the spring from which he drank was very foul. The island is uninhabited, but is within two miles of Great Chebeague and not much farther from the mouth of the Yarmouth River. He had not been out of our town for more than a few hours for many weeks. His fever commenced about five days after he left the island and ran the usual course of four weeks.

Friendship—C. A. Parsons, M. D.

Diphtheria—No cases of the real disease, but a few somewhat resembling diphtheria.

Typhoid Fever—A few cases of simple fever, but no marked symptoms of typhoid.

There have been only a few mild cases of the diarrhœal diseases of children.

Fryeburg—W. C. Towle, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases.

Scarlet Fever—Three cases. The so-called summer complaint of children has been quite prevalent, caused apparently by sudden changes in the temperature and the low condition of the wells and the springs. I think that the local health officer might improve the sanitary condition for public houses and boarding-houses.

Fryeburg—Geo. H. Shedd, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

The bowel complaint of children has been very prevalent, with one death in Fryeburg.

I noticed in connection with my scarlet fever patients a posssible means of spreading contagious diseases, viz: "sale work." During the progress of the disease there were in the room, several coats partially completed and a number of bundles not undone. If I had not protested vigorously, they would have been sent away by the man who delivered them to be completed by some other family or families before fumigation. I may say that there were four children sick in this family with scarlet fever and, so far as I could learn, they had not been in communication with any known source of contagion. The family was an isolated one and no member of it had been away, nor had they been visited by any one from away. I know of no other cases anywhere in their vicinity.

Gardiner—W. P. Giddings, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

One death from phthisis in Pittston. The diarrhœal diseases of children have been very prevalent; one death in West Gardiner. Indiscreet feeding is probably the most potent cause.

Garland—E. S. Coan, M. D.

Diphtheria—None observed.

Typhoid Fever—There has not been a case in town for two years.

Scarlet Fever—Twenty cases, but none fatal. The diarrhœal diseases of children have been very prevalent, as well as similar diseases with adults.

Twenty-five years ago diphtheria was brought into our neighborhood by a person who had attended a funeral at a neighboring town. Fifty cases resulted, several of which died.

In August last there occurred in this village eleven cases of cholera infantum and cholera morbus within a radius of twenty rods. All of the families in which these cases occurred obtained their water from one well. Upon investigation the water in this well was found to be very impure. The well had not been cleansed for several years.

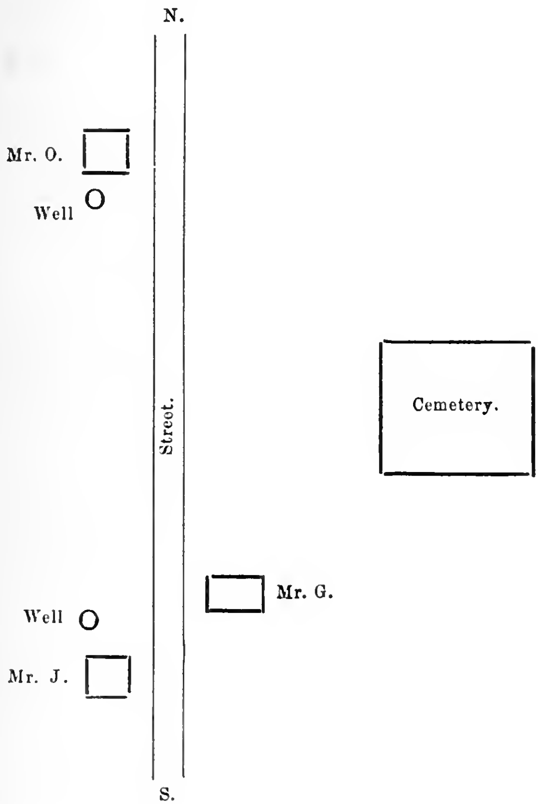
During the prevalence of scarlet fever last winter, it was a notable fact that where ventilation was imperfect the disease was the most severe. Some of the dwellings in which the disease occurred had outside windows with no provision for ventilation other than the doors. In one instance every window in the lower part of the house had outside windows excepting one, and that in a part of the house unoccupied. This family was under the charge of another physician, but the cases were all severe and protracted. I have no doubt that the severity was due to imperfect ventilation. All the cases recovered, however, under the skillful management of the attending physician.

The following is a brief history of the first series of cases of typhoid fever in my practice. They occurred in the town of Bradford in 1870. The season had been hot and dry, but about the first of the month heavy rains set in, and lasted for a week, when it became hot again.

October 19, I was called to attend the wife of Mr. O.; on the 20th, I was called to a boy six years of age, son of Mr. P.; on the 21st to attend a girl ten years of age living with Mr. G. All were cases of typhoid fever with well-marked and characteristic symptoms, and all these houses were in the same neighborhood, the last two within forty yards of each other, on opposite sides of the street, and the first about two hundred yards distant. Mrs. O. recovered after a three weeks' run of the fever; the girl at Mr G.'s also recovered after sixteen days; the boy, son of Mr. J., died on the twenty-second day from purpura hæmorrhagica.

The point of interest in these cases is the possible cause of the infection. I searched the premises in each case, but could find no cesspool, filth or defective drainage as an explanation of the sickness.

The street upon which the three houses were situated ran north and south, the house of Mr. O. being north from the other two. On the east side of the street and about seventy yards from it and a hundred yards or more from Mr. O.'s well and about the same distance from the well used by Mr. G. and Mr. J., and on ground fifty feet higher there was a cemetery, as shown by the accompanying diagram. The distances are approximations, as no measurements were taken.



The soil was gravelly and beneath it at a depth of, I think, about six feet there was an unpermeable hardpan Query: Is it not probable that infection was carried in the subsoil from the cemetery to the wells on a lower plane in the vicinity? I would here mention that diphtheria had occurred in the same neighborhood ten years previously, and that it also occurred there eight or ten years later in a malignant form.

Diphtheria. This town is not naturally a good field for this disease to work in. Twelve miles east from here, in the town referred to in connection with typhoid fever, diphtheria caused nearly one hundred deaths in the epidemic that visited this State twenty-five years ago. Seven miles west from here is another town where, ten years ago, this fatal disease carried off about the same number. During the latter epidemic one family in the west part of this town contracted the disease by coming in personal contact with it there. Five members of this family had diphtheria, and all recovered. No other case came from that source. Four years ago the body of a person who had died from the disease and that had been placed in a tomb, was removed and interred. Some children were playing in the vicinity, and, attracted by curiosity, went near to the place while the work was going on. They contracted the disease and it spread to other families. A year later one of these families moved to this town. All but one had had diphtheria the winter before. When cold weather came on, and clothing that had been worn the winter before was brought into use, the remaining member of the family, a child six years of age, came down with the disease in a putrid form, and after ten days of suffering, died. I attended the case, and used every precaution to prevent a spread of the disease. No public funeral was allowed. I was more careful with others than with myself, and in two days after the death of the child I came down with diphtheria I immediately isolated myself and prepared for battle. I had the disease in a severe form, but conquered. The disease spread no further. It was stamped out.

Garland—F. A. C. Emerson, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

Scarlet Fever—Fourteen cases. One death from phthisis. The bowel diseases of children have not been very prevalent. There has been no unusual prevalence of any disease excepting scarlatina, and with this disease I have been able to trace the communication of the contagion from convalescents or nurse to the patients in every case but one. The people will not understand the necessity of care. In one instance scarlet fever was spread by the too early return of a convalescent to school.

Among horses the influenza affected perhaps one-half of the number of adult animals.

Gorham—O'Neil W. R. Straw, m. d.

Diphtheria—None observed.

Typhoid Fever—None observed.

Scarlet Fever—One case. One death from phthisis. There have not been so many cases of the diarrhœal diseases of children as in preceding summers. The attacks were of short duration in most of the cases. The most frequent causes have been poor milk and neglected nursing bottles. In these cases the mothers do not seem to understand how to take proper care of their children.

To improve the general sanitary condition of the town, I think it would be a good idea to do away with the wells and in the place of them have Sebago Lake water.

In the early spring we had one case of glanders, but the horse was killed at once and no other cases resulted.

Gray—E. A. McCollister, m. d.

Diphtheria—Twenty-eight cases in Gray, three fatal; three cases in Raymond, none fatal.

Typhoid Fever—Three cases.

Scarlet Fever—Two cases. One death from phthisis in Gray, one in Raymond and two in New Gloucester. There has not been much prevalence of the diarrhœal diseases of children.

There has been no epidemic prevalence of any disease, except of diphtheria last fall and the first of the winter. The first cases were within eight feet of a cow stall. Some other cases were in a house over a very wet cellar, so that everything in the house became very damp. The cellar was filled with back water from a mill pond. The disease was conveyed by infection in the following instances. A lady nursed a case of diphtheria by day, returning nights where two grandchildren lived. In four days one child sickened of diphtheria and died in a week. The other child took the disease about three days later than the first one and lived through a severe sickness. Another lady helped for a single day to take care of the same case and came down with the disease a week afterward.

Greene—Albion Pierce, m. d.

Diphtheria—None observed.

Typhoid Fever—None observed.

One death from phthisis. I have not seen a severe case of summer complaint for the past year.

The following is in brief the history of two cases of phthisis, that of a husband and wife, aged about twenty-five years, in which it is probable that the husband contracted the disease from the wife by infection. The wife, who was sick first, stayed at her mother's and was kept in a close room with the windows closely calked, although it was mild weather. The husband worked at his father's, some two or three miles distant, where he made his home. After working through the day he would go where his wife was to take care of her through the night, and in the morning before eating his breakfast, he would return to his father's place. In about six months the husband began to have a throat and lung trouble, and when I was called to see him later I found evidences of a cavity in the left lung and that his case was hopeless. Just before the husband took his bed, the wife was removed to his home where they both died nearly at the same time.

The wife was a feeble, pale-faced woman at her marriage, two years before the tubercular disease declared itself. She was sick two years. The husband's sickness began about a year after his wife was taken sick. Before this his health had always been sound and there had been no suspicion of tendency to lung disease; neither was there any history of hereditary tendency further than it was said that two maternal aunts had died of consumption. Whether these were cases of tuberculosis or not is very doubtful, for enquiry shows that one had a cancer and that at last she was said to have died of consumption, and that the other was sick with a variety of troubles for twenty years.

Greenville—H. HUNT, JR., M. D.

Diphtheria—None observed.

Typhoid Fever—Four cases.

Scarlet Fever—One case. The diarrhœal diseases of children have been quite prevalent, though not of a serious character.

Guilford—C. B. BENNETT, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

No deaths from phthisis. There has been no unusual prevalence of diseases, excepting summer complaint and whooping cough together.

Harmony—WM. McLAUGHLIN, M. D.

Diphtheria—None observed.

Typhoid Fever—Four cases in Harmony; two in Wellington.

From phthisis one death in Harmony and one in Wellington. There has been quite a prevalence of the diarrhœal diseases of children.

Two families, having two small children each, lived in the same house. The last of August and the first of September all four of these children were attacked with diarrhœa and dysentery. I treated them several days without apparent relief when I discovered that they were using water from a well near the house where it received the drainage from the sink. I ordered them to cease to use the water from this well, and to get the water from a spring and boil that before it was used. The children then began to improve and were well in a few days.

Harpswell—G. A. HARLOW, M. D.

Diphtheria—None observed.

Typhoid Fever—Three cases, none fatal.

Scarlet Fever—Four cases, none fatal. One death from phthisis. The summer complaint of children has been very prevalent, causing two deaths. I think the most potent causes have been the hot weather and improper food.

I had one case of typhoid fever, caused by a putrid cat in the well.

Harrington—G. H. WALLING, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases.

Scarlet Fever—One case. From phthisis, one death in Harrington and one in Cherryfield. The diarrhœal diseases of children have been very prevalent and two deaths resulted in Columbia. Unsuitable food was the most frequent cause.

A student came home sick with typhoid dysentery. He recovered and soon afterward a brother was attacked, followed by two sisters and his mother. All recovered. Evidence pointed to contagion.

Hartland—E. A. Bean, M. D.

Diphtheria—Three cases, no deaths.

Typhoid Fever—None observed.

One death from phthisis. The summer complaint among children has been very prevalent, caused mostly by bad drinking water, improper diet and hot weather.

Hartland—David R. Brown, M. D.

Diphtheria—One case.

Typhoid Fever—None observed.

No deaths from phthisis this year. The diarrhœal diseases of children have been prevalent, the cases caused by the extreme changes in the temperature. There has been no epidemic, except of mumps.

Hiram—C. E. Wilson, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

One death from phthisis. There has been quite a prevalence of children's bowel complaint with one death. Causes, hot weather and low condition of the water. Tonsillitis was prevalent the last of the winter and in the spring. Measles have prevailed quite extensively, but in a rather mild form. Enteric troubles with typhoid symptoms have been somewhat frequent, but the cases terminated suddenly about the fourth day. I have noticed these troubles occur most frequently where the water supply is poor, and where there is unsuitable food and a lack of personal cleanliness.

Houlton—C. E. Williams, M. D.

Diphtheria—Nine cases, two fatal. In New Limerick, two cases, one fatal.

Typhoid Fever—Five cases, one fatal.

From phthisis, one death in Houlton and one in Monticello. The diarrhœal diseases of children have not been so prevalent this season as they were in the fall of 1885. One death in Houlton. Improper food and atmospheric conditions are the more frequent causes.

For the improvement of the sanitary condition of the town a better system of village drainage is sorely needed.

In the spring an influenza prevailed among horses throughout the county. One case of diphtheria was derived at school from a seat-mate. Three cases of the same disease were due to handling a dead child.

Houlton—T. J. Fitzmaurice, M. D.

Diphtheria—One case, fatal.

Typhoid Fever—In Houlton, two cases, recovered; Smyrna, four cases, one fatal.

From phthisis, one death in Houlton, two in Smyrna.

There has been very little of the diarrhœal diseases of children as compared with former years.

Industry—Wm. C. Hatch, M. D.

The year ending October 1st, has been an unusually healthy one in this town. I believe there has not been a case of diphtheria, scarlatina, or typhoid fever during the year. So far as I can learn not more than two or three persons have died from phthisis during the year. The diarrhœal diseases have not been so prevalent as in some years past.

Pneumonia has without question been the most prevalent disease, and among the aged especially, has proved very fatal. Carelessness and insufficient protection against sudden change are the probable causes of many cases of this disease.

I do not believe that over 15 per cent of the population have been successfully vaccinated within the last twenty years. Careful observation has led me to believe that the practice of using humanized vaccine virus cannot be too strongly condemned. Several cases have recently come under my notice where its use has caused serious mischief.

Jonesport—J. A. Walling, M. D.

Diphtheria—None.

Typhoid Fever—None.

Scarlet Fever—One hundred and thirty cases, two fatal.

Two deaths from phthisis. The diarrhœal diseases of children have been quite prevalent, due largely to impure water and unsuitable food. Mumps and whooping cough have also been prevalent.

7

The first case of scarlet fever proved fatal. It was not considered scarlet fever at the time, but the next cases were in the family of those who attended the funeral, which was a public one. A young man went to work for a man whose family had had the scarlet fever a month or two before. He contracted the disease in a mild form.

Kittery—A. W. Johnson, M. D.

Diphtheria—Six cases, none fatal.

Typhoid Fever—One case, recovered.

Scarlet Fever—Four cases, none fatal.

From phthisis, one death. The various diarrhœal diseases of children have not been very prevalent; one death. Dentition and over feeding seem to be the most common causes.

Lewiston—A. M. Foster, M. D.

Diphtheria—Six cases, two fatal.

Typhoid Fever—One case, not fatal.

From pulmonary phthisis, two deaths in this city and one in Auburn. There has been only an average prevalence of the diarrhœal diseases. A frequent cause of these diseases is some radical change in the location, diet or drink, like moving into the city from the country, or from dry and healthy places to damp and unhealthy ones; also eating stale vegetables.

Some of the cases of summer complaint were peculiar in having the nervous system profoundly affected. There was severe abdominal pain that resembled neuralgia, with great prostration and a tendency to daily exacerbations. I think some of the cases were caused by inhaling foul gases from cesspools and neglected privies.

During the autumn and winter months (1885) measles of a severe type prevailed, also several cases of severe neuralgia, seemingly almost epidemic. Several classes of cases have with me assumed a tendency to periodicity and I attribute it to one or two badly drained localities, especially a place between Franklin and Bates streets.

A vast number of the houses in this city are not connected with the city sewers and have the old filthy privies, in many instances complete nuisances. Sufficient care is not taken to properly dispose of the city garbage. It is dumped in close proximity to a quarter where a large part of the foreign population reside.

Lewiston—M. C. Wedgewood, m. d.

Diphtheria—None observed.

Typhoid Fever.—Ten cases.

Scarlet Fever—Six cases. One death from phthisis. The diarrhœal diseases of children have not been very prevalent. The most frequent causes have been bad feeding and poor nursing. Some cases of scarlet fever have been observed which were due to the too early readmission of scholars that have had this disease.

Lewiston—E. W. Russell, m. d.

Diphtheria—Four cases.

Typhoid Fever—Four cases.

Scarlet Fever—Two cases. From phthisis one death. The summer complaint of children has been quite prevalent. The most frequent cause has been imperfect nourishment.

Liberty—E. A. Porter, m. d.

Diphtheria—None observed

Typhoid Fever—Two cases in Liberty and one in Appleton.

From phthisis two deaths in Liberty, one in Searsmont. The diarrhœal diseases of children have not been very prevalent.

The typhoid fever case in Appleton originated at a boarding-house in Warren, and at present I have another case just come home from there. The cases in Liberty, I think, were due to the well water, it being very low and the well located in one corner of the barnyard. At the same place, besides the two cases reported, I am now treating two more, and still another is threatened with the disease.

Limington—S. M. Bradbury, m. d.

Diphtheria—None observed.

Typhoid Fever—One case.

One death from phthisis. Not many cases of the diarrhœal diseases. Among sheep, the disease which the people call the scab has prevailed extensively and has ruined some flocks.

Some years ago small-pox was taken by a man by putting on a pair of gloves that had been worn by a man who died with the small-pox The gloves had been put away in the barn one year when they were put on.

Lincoln Center—W. D. Bullard, m. d.

Diphtheria—Two cases.

Typhoid Fever—Two cases.

Scarlet Fever—Five cases. The summer complaint has not been very prevalent, and there have been but very few fatal cases. As causes I would mention influence of the weather, injudicious diet, defective ventilation and cesspools. For a sanitary improvement, I would suggest doing away with the sink spouts.

Lincoln Center—L. H. White, m. d.

Diphtheria—None observed.

Typhoid Fever—None observed.

Scarlet Fever—Four cases in Chester. This disease was brought from Lewiston by visitors. From phthisis, two deaths in Lincoln, one in Medville Plantation. There have been many cases of summer complaint, but they have been very mild; the most frequent cause is to be referred to the water.

The sanitary condition of our locality is very good, and there have been no cases of the contagious diseases arising from any sanitary defects.

Linneus—Robert Boyd, m. d.

Diphtheria—Eleven cases in Linneus, two fatal, and three cases in Oakfield, and four in Haynesville, none fatal.

Typhoid Fever—Three cases in Linneus, two in Amity, none fatal.

One death from phthisis. Not many cases of the diarrhœal diseases have occurred.

Litchfield—Enoch Adams, m. d.

Diphtheria—Three cases.

Typhoid Fever—One case.

Scarlet Fever—Two cases.

From phthisis, four deaths. The summer complaints of children have not been very prevalent. In the early part of the year I observed about thirty cases of measles. One case of cholera morbus in May resulted from eating fermented canned tomatoes. As a whole, the year has been a healthy one.

Litchfield—Cyrus Kindrick, M. D.

Diphtheria—No cases.

Typhoid Fever—None.

Two deaths from phthisis. The diarrhœal diseases not very prevalent. Causes, teething, improper food and sudden changes in the weather.

Litchfield—I. W. Gilbert, M. D.

Diphtheria—None observed.

Typhoid Fever—Three cases in Wales.

Scarlet Fever—One case.

Livermore Falls—Henry Reynolds, M. D.

Diphtheria. Two cases in East Livermore, one in Jay.

Typhoid Fever—In East Livermore, one case, in Jay one case.

One death from phthisis. The diarrhœal diseases of children not so prevalent as usual.

Lovell—C. P. Hubbard, M. D.

Diphtheria—One case.

Typhoid Fever—None observed.

From phthisis one death. There have been but few cases of the diarrhœal diseases, caused mostly by the eating of unripe fruit. There has not been so little sickness in town for years as there has been this summer.

Lubec—E. H. Bennett, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

Scarlet Fever—Thirty cases; one death from the sequels of the disease. Five deaths from phthisis. The various diarrhœal diseases of children have prevailed much more than usual, with two deaths. Bad drinking water has been the principal cause; bad drainage often pollutes the water in this town.

Scarlet fever was very prevalent, especially through the summer. It was brought into town by a boy who was taken on a visit to Eastport to a house where the disease had been. Imprudence and carelessness has been the prime cause of the disease.

For improving the general sanitary condition of the place, it is important that the people be taught to appreciate cleanliness, to know the importance of drainage, ventilation, pure water, etc.

Scarlet fever was spread more by school children than otherwise. When one scholar was taken it was sent to school unless too sick to go. Several were sent home with well marked rash out.

Lubec—H. S. Delamere, M. D.

Diphtheria—None.

Typhoid Fever—None observed.

Scarlet Fever—Seventeen cases, none fatal.

From phthisis one death. Quite a prevalence of the diarrhœal diseases. The principal cause I would refer to bad drinking water, the season having been unusually dry, and the wells low.

The epidemic of scarlet fever of a mild type was spread by contagion. The isolation of the cases would have prevented the spread of the disease in this locality.

A great deal could be done to improve the sanitary condition of the town, such as attention to the relative positions of wells to privies, sink drains, stables, etc. The wooden underpinnings under many of the houses might be replaced with stone or brick with advantage to health.

Lyman—E. Hurd. M. D.

Diphtheria—None observed.

Typhoid Fever—None observed

No deaths from phthisis. The diarrhœal diseases were quite prevalent. The more common causes were heat, teething, change of diet, bad nutrition, insanitary localities. Whooping cough has prevailed to some extent.

Machias—B. L. Dresser, M. D.

Diphtheria—None observed.

Typhoid Fever—Three mild cases.

Scarlet Fever—One case.

From phthisis six deaths. The diarrhœal diseases have been unusually frequent and severe. I think the principal cause has been the dryness of the season.

Madison—W. G. SAWYER, M. D.

Diphtheria—None observed.

Typhoid Fever—Four cases in Starks.

From phthisis one death in Starks. There has been a very great prevalence of the diarrhœal diseases. The principal causes have appeared to be sudden changes in the temperature and improper articles of diet.

I attended three cases of typhoid fever in one family where I believe the disease originated from polluted water. The soil is mostly gravel to a depth of from two to four feet; then there is what is termed "hard pan," six inches to one foot below which is loose sand. The surface water descends to hard pan, then seeks a level or runs into the well, which is situated within five or six feet of the barnyard and twenty-five or thirty feet from the privy.

Madison (East)—A. E. FARNHAM, M. D.

Diphtheria—Twenty-two cases.

Typhoid Fever—One case in Solon.

Scarlet Fever—Four cases in East Madison, three in Solon. From phthisis there have been five deaths. The diarrhœal diseases have been unusually prevalent, with three deaths. As causes there have been observed, lack of care on the part of mothers, allowing children to remain out of doors evenings and get chilled, unripe fruit, and especially using long tubes in the nursing bottle, in which the milk decomposes and sets up disturbances of the stomach and bowels.

Diphtheria was spread, in two instances, by contagion at public funeral.

The following case of arsenical poisoning came under my observation:

A small boy aged three years was taken suddenly ill, and presented symptoms of arsenical poisoning. I could not obtain any information from the child's parents. I was convinced that the child was poisoned, and I treated him for arsenical poisoning. He was exceedingly ill for three or four days, and his life was despaired of during this time. After a few days he began to get better, and in the course of a week or ten days was in his usual health. I asked so many questions of the parents about what the child had eaten and if there had been Paris green around, etc., etc., that they got nearly out of patience with me. A few weeks after the child recovered, the father brought me a green paste-board box which the little one had played with. One corner of the box was white where the child had sucked the paint off. By moistening the finger and rubbing the box, the green paint would roll up under the finger. This explained the child's sickness.

Mapleton—C. E. Dow, M. D.

Diphtheria—Four cases.

Typhoid Fever—Fourteen cases and one death.

No deaths from phthisis reported. The diarrhœal diseases of children have not been very prevalent. Their cause here is sanitary neglect

To improve the sanitary condition of the place I would suggest the importance of having a board of health for Mapleton. No one seems to take much interest in sanitary matters here. Many of the privy vaults are never looked after once in five years. Two years ago we had typhoid fever in the same house where I have now reported cases. At that time the fever ran forty days and yet the family never seemed to learn to have the privy arrangements looked after. The fever cases here may be credited generally to neglected privy vaults.

Mechanic Falls—C. H. Tobie, M. D.

Diphtheria—None observed.

Typhoid Fever—Thirteen cases, one fatal.

Scarlet Fever—Two cases. The diarrhœal diseases have not been very prevalent. The cases that have occurred have been due to unhygienic conditions.

Mercer—V. K. Perkins, M. D.

Diphtheria—Five cases.

Typhoid Fever—Two cases.

One death from phthisis.

Mexico—H. J. Binford, M. D.

Diphtheria—None observed.

Typhoid Fever—One case in Byron.

Scarlet Fever—One case. No deaths from phthisis. Not many cases of the diarrhœal diseases. It has been exceptionally healthy here this year.

During the latter part of last winter the distemper or strangles prevailed among horses and several valuable young animals died.

Monroe—J. J. SEWALL, M. D.

Diphtheria—None observed.

Typhoid Fever—Seven cases.

Scarlet Fever—Two cases. Three deaths from phthisis. Eight or nine cases of cholera infantum, with two deaths. The more frequent causes have been improper diet and bad water.

Mount Vernon—CYRUS BURBANK, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

No deaths from phthisis. There have been but a few cases of summer complaint, one death in Vienna. We have been remarkably exempt from diseases the past year.

Mount Vernon—H. F. SHAW, M. D.

Diphtheria—Three cases in Vienna.

Typhoid Fever—None observed.

Scarlet Fever—Three cases in Belgrade, one death.

From phthisis three deaths in Mount Vernon, one in Rome.

The three cases of scarlet fever which I report in Belgrade were three children in one family. A few days before the disease broke out, a gentleman, whose children had been sick with scarlet fever before he left home, came to board with the family. At the time of my first visit this man had a severe pharyngitis, with abscess in the throat. The mother of the children, too, had a similar throat trouble, with abscess, which I diagnosed as a mild form of scarlatina.

Newfield—STEPHEN ADAMS, M. D.

Diphtheria—Three cases.

Typhoid Fever—None observed. There has not been a case of typhoid fever in town since 1868, except two or three imported cases in young men who came home sick. From phthisis no deaths. But few cases of summer complaint.

New Portland—S. A. Bennett, M. D.

Diphtheria—None observed.

Typhoid Fever—One case in New Portland, two in New Vineyard. One death from phthisis. The diarrhœal diseases of children have not been very prevalent. I think many of the cases have been caused by the unusually hot weather.

New Sharon—H. R. Corson, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases at the present time.

From phthisis no deaths. There has been no great prevalence of the diarrhœal diseases. The few cases noted seem to be due to changes in the temperature.

Needed sanitary improvements are better ventilation and a supply of pure water. In the houses of many of the families of the poorer class a very strong odor from the privy is perceptible in any part of the house. The members of these families seem to be sickly, without any serious disease.

North Berwick—F. B. Morrill, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

Three deaths from phthisis. The diarrhœal diseases have been quite prevalent, with two deaths. The cases have been caused mostly by an improper dietary. Whooping cough and measles have prevailed in the schools.

North Berwick—J. O. McCorrison, M. D.

Diphtheria—Three cases.

Typhoid Fever—Four cases.

Scarlet Fever—Five cases. From pulmonary phthisis five deaths; seven or eight other deaths, in the hands of other physicians. There have been but very few cases of the diarrhœal diseases of children, but there were two fatal cases that were pronounced cholera infantum. Under my observation these diseases have been due mostly to bad sanitary arrangements, poor food, dampness and imperfect ventilation.

Rheumatism, whooping cough and bronchitis have also occured.

No cases of the long retention of the vitality of contagion have been observed, unless it was in one case of scarlet fever. Some twelve months previously a child had been sick in the family and they had not taken proper precautions in regard to fumigating.

Norway—B. F. Bradbury, M. D.

Diphtheria—One case.

Typhoid Fever—Four cases.

From phthisis, two deaths. The diarrhœal diseases have been very prevalent, with one death. The principal cause, I think, is improper food. Cases of simple continued fever have been especially prevalent, nearly all having been on the line of excavation for the new water works; also, three of my four cases of typhoid fever were on the same line of excavation.

A local board of health and proper sewerage would improve the sanitary condition of the place.

Norway—E. J. Noyes, M. D.

Typhoid fever has been especially prevalent this season, arising, no doubt, from the filthy condition of the almost stagnant stream which flows through our village, receiving the filth from the different branches of manufacturing, and furnishing an odor, on warm evenings, almost unbearable. The only thing or method I could suggest to improve the sanitary condition of the town would be a good system of sewerage.

Oakland—D. E. Parsons, M. D.

Diphtheria—One case. Contracted at a funeral in Waterville.

Typhoid Fever—Two cases.

No deaths from phthisis. There have not been many cases of summer complaint.

A thorough inspection of the sanitary condition of the town is needed, in order to prevent outbreaks of diseases which will result from its present condition.

Oxford—A. L. Hersey, M. D.

Diphtheria—None observed.

Typhoid Fever—Three cases.

Scarlet Fever—Four cases. One death from phthisis. The diarrhœal diseases not very prevalent; the cases caused mostly by improper food. A better water supply will improve the healthfulness of the place.

From the use of bad water the members of a family were affected, annually, for several years with gastric fever. After a change in the water supply was made, no cases occurred.

Paris (*South*)—O. N. Bradbury, m. d.

Diphtheria—One case.

Typhoid Fever—None observed.

From phthisis one death. There have been many cases of the diarrhœal diseases in children, mostly caused by improper feeding. Simple continued fever of a bilious type has been quite common, the cause of which is probably to be referred to the water supply. Whooping cough has prevailed in the schools.

Paris (*South*)—Horatio Woodbury, m. d.

Diphtheria—No cases.

Typhoid Fever—Three cases.

Scarlet Fever—Four cases.

From phthisis no deaths. Cases of summer complaint have been quite frequent, and two deaths have occurred. Our sanitary conditions would be improved by neatness as regards back yards, obscure alleys, sink drains and cellars, and the cleaning out of privy vaults as often at least as once a year would be a great improvement.

Paris (*West*) O. K. Yates, m. d.

Diphtheria—No cases.

Typhoid Fever—Seven cases. Duration of fever from twenty-three to thirty-five days.

Scarlet Fever—One case.

Two deaths from phthisis. The summer complaint of children has been quite prevalent but not of a severe type, and has been caused mostly by indigestion, teething and eating of unripe fruit.

In the case of my scarlet fever patient, a relative came from Massachusetts, whose children six weeks before had recovered from scarlet fever. It was evident that this case was from exposure to infected clothing.

Paris (*West*)—F. H. PACKARD, M. D.

Diphtheria—One case.

Typhoid Fever—Three cases.

Four deaths from phthisis. The diarrhœal diseases have not been very prevalent. These cases have been caused almost entirely by bad feeding.

The wells of many of the families are too near to out-buildings, sink spouts, and other sources of filth of all kinds. The cellars are not looked after carefully enough. Whooping cough and measles were prevalent in the schools.

In the case of a child who, while riding home from a visit to a relative, was furnished with clothing to protect it by a family in which there had been scarlet fever six weeks previously, the child took the disease and died and gave the disease to another child. In the family whence the clothing came the disease assumed a very mild form. In the case of the child mentioned, death occurred on the third day and the next case had the disease in a severe form, but recovered.

Parkman—J. C. BUTTERFIELD, M. D.

Diphtheria—Eight cases, three fatal.

Typhoid Fever—None reported.

The diarrhœal diseases of children quite prevalent, with one fatal case. Most of the cases were caused by teething. Several cases of cholera morbus in adults, one of which was very severe and seemed like Asiatic cholera. When I was called the patient was in a state of collapse, with cramp in legs, black vomit, cold sweat, and with pulse imperceptible. Died in about four hours. Tonsillitis and acute bronchitis have been quite prevalent.

An earlier putting on of flannels would prevent much sickness of this kind.

Diphtheria was brought in clothing from Boston, by a young man and his brother who had been attending him.

Parsonsfield (*East*)—J. A. KENNARD, M. D.

Diphtheria—None reported.

Typhoid Fever—None reported.

The diarrhœal diseases of children have been very prevalent, caused mostly by changes of temperature and improper food.

Patten—F. F. Bigelow, M. D.

Diphtheria—One case in Patten, and one case in Crystal Plantation, traceable probably to the case we had in this town.

Typhoid Fever—Two cases in Patten, and two in Mt. Chase Plantation.

Pemaquid—W. S. Brainerd, M. D.

Diphtheria—One fatal case in Bristol.

Typhoid Fever—None observed.

Six deaths from consumption. The diarrhœal diseases of children were very prevalent during September; one death. Errors in diet have usually been the exciting cause.

Pembroke—J. C. Rogers, M. D.

In December, 1870, I was called to see a child sick with scarlet fever. The rash had disappeared, for the child had been sick a fortnight. The neck and throat were fearfully swollen, the latter in a state of decomposition. While I was engaged in looking down its throat, it strangled and coughed a quantity of matter in my face. I contracted the disease and my three children took it from me, and one of them died, having been sick about thirty hours.

The father of the child was a seaman. On his way home, he stopped at Portland, called on a friend whose family were sick with scarlet fever, and, consequently, carried home the contagion in his clothes to his child. From that one case, I can trace thirty-six cases directly, six of whom died. The child's aunt visited the place frequently, and although she lived four miles from there, her children contracted the disease. All that came in contact with my family, who had not previously had it, took it—even to my aged mother. The physician who attended the aunt's children boarded at the hotel. A little girl of ten years, with whom he used to play, contracted the disease and died. My niece was stopping with me at the time that I and my children were sick. Some weeks afterwards, she went to the neighboring town of Charlotte and in about a week's time it appeared in the family. Since then scarlatina has appeared, at times, in families, but not with such malignity. Last year it broke out in a neighborhood about three miles from the village. The disease was contracted at Eastport, where it prevailed, by a young woman who worked in one of the sardine factories. It went through the family of seven, all of whom recovered. The necessary precautions having been enforced, the disease did not spread beyond this family. Only two cases occurred, no deaths. How it originated, I do not know, but judge it must have been brought by some visitors from Eastport. I am of the opinion that small-pox, measles, and scarlatina are always propagated by infection and never originate of themselves.

Diphtheria has made its appearance occasionally, since that fearful epidemic of 1860-61. It appears in families who live apparently in the most healthful localities, as well as in those who live surrounded by filth and all kinds of impurities. So its cause or origin has been a puzzle to me. Of its contagiousness I have no doubt, after it has once made its appearance, but to trace the origin of the cases that have occurred in my practice to contagion is impossible. Although it has prevailed almost every year since 1861, I cannot trace the origin of a single case to contagion, except perhaps one.

In December, 1876, a boy who lived in the town of Perry visited a family in Eastport, some of whom were sick with diphtheria. He contracted the disease, had a light run and got well. His sister, aged sixteen, took the disease and in three days was dead. The next summer another sister came from Massachusetts, occupied the deceased sister's room, in which she was sick and died. She also took diphtheria, and after five weeks sickness died. She was twenty-two years old.

During the time the Pembroke iron works were in full operation, there was no typhoid fever in this village, although cases occurred outside. Now, since they have suspended work, the most of the cases appear in the village and along the stream. There was a period of about eighteen years during which there was not a single case within a radius of a mile of the iron works, except one, and that was contracted in Massachusetts. I can only account for this in the disinfecting influence of the smoke and cinder. The sanitary condition has not changed. The water is used from the same wells; the soil has undergone no change; in fact, everything is the same, except the buildings are older and dilapidated and many of them are unoccupied.

Within a period of four years, I have had fifty-eight cases of typhoid fever; no deaths. The most of these cases were contracted from some one who had been stricken down with it first.

Of the effects of filthy sink-spouts on the origin or cause of this disease, a good illustration came under my observation last year. The sink and sink-spout were about the same as those in general use. The spout became filled with filthy accumulations, and one of the men cleaned it out. While in the act the stench became so great that it several times drove him away, and permeated the whole house. In a few days he and three others of the inmates were down with typhoid fever. They all recovered after a severe attack.

Penobscot—E. A. Sprague, M. D.

Diphtheria—None reported.

Typhoid Fever—None reported.

The summer complaint of children has been quite prevalent, with two deaths. The principal causes have been heat and bottle feeding. The sanitary condition of the place can be improved by the distribution of sanitary works for the people.

Phillips—H. B. Palmer, M. D.

Diphtheria—None observed.

Typhoid Fever—One case in Phillips, and one in Avon.

One death from phthisis. The diarrhœal diseases of children have been prevalent, with one death in Avon and one in Rangeley. Continued hot weather and improper feeding have acted as causes. We have had quite a thorough epidemic of measles.

Of the diseases of animals there have been a limited number of cases of pinkeye among horses.

Pittsfield—T. M. Griffin, M. D.

Diphtheria—Four cases, one fatal.

Typhoid Fever—Two cases, none fatal.

Two cases of phthisis, with one death. The various diarrhœal diseases of children have been quite prevalent, with one death. The more frequent causes have been the use of nursing bottles, bad hygienic surroundings, and want of care. Bad drainage has also been a great cause. For improving the sanitary condition of our town I would suggest a continuation of the good work now going on in filling up stagnant pools and draining where it can be done. Such matters have received a good deal of attention of late and will doubtless bring about good results in the near future.

Pittsfield—F. J. Taylor, M. D.

Diphtheria—Six cases.

Typhoid Fever—Five cases, two fatal.

One death from phthisis. There have been many obstinate cases of summer complaint amongst the children, with one death from cholera infantum. The heat, improper food, and impure air I think have been the principal causes.

I have been enabled to trace all my cases of typhoid fever to either polluted drinking water or bad drainage and filthy sink spouts. There were three cases of typhoid fever in one family due to a sink drain which ran within six or eight feet of the well. The ground is so level that the water does not drain off and stands and soaks into the ground. The drainage of the hog-pen and privy are also into this shallow drain.

Pittston—A. C. Wright, M. D.

Diphtheria—None reported.

Typhoid Fever—None reported.

Summer complaint among children has been very prevalent. Filthy nursing bottles and teething have been frequent causes.

Portland—Geo. C. Burgess, Sec. Board of Health.

In response to your request, I send for your use a few items of our work during the past season, beginning May 1st, when our present health officer, Mr. J. H. Sayward, took office.

Our method has been to visit various localities suspected to be unsanitary, either from complaint made, or from knowledge obtained otherwise by the health officer.

In the eight months, the officer has made 2,893 such visits.

A prominent cause of complaint has been on account of those intolerable nuisances, even in their best state, the accumulative privies, nearly eight hundred of which were found to be in such a condition as to require immediate attention, by cleaning, disinfecting, &c., &c.

One hundred and forty-six cellars were found in such bad condition as to require action on part of the health officer.

It is perhaps proper to say that many times owners of property are not aware of the foul condition of their premises, until their attention is called to it by the officer.

Swine have been removed from forty-four places, and it is not known to the Board that there is any place within the city limits where swine are kept, except one, and complaint was only made of that yesterday.

Through the efforts of the health officer, one hundred and fifty privy vaults have been abolished, and good and sufficient water closets substituted in their places.

Stagnant pools have been filled, sink drains, cess-pools and such like nuisances have been put into the best condition that such things can be made to assume.

In addition to the above-mentioned work, the officer has made a house-to-house inspection of a limited section of the city, containing two hundred and eighty-one houses, and has returned to the Board a report of the following particulars.

Whether supplied with privy or water closet, and condition of each, state of traps, &c., condition of drains, and whether connected with the public sewer or with a cess-pool; condition of yard, and whether the house is supplied with water from a well, or from the water company's works. If from the former, how near the well is to the privy or cess-pool.

This work I hope to see extended as a basis of more thorough work later on. The particular portion of the city where this inspection was had, was over a loose and coarse gravel, underlaid with a thick bed of bowlder clay.

Almost at random I take from the notes the following entries.

House of Mrs. C. Water closet connected with the sewer, but water for household purposes is obtained from the well, which is situated twelve feet from a privy.

House of Mr. E. has a privy and uses water from a well twenty feet from it, both in gravelly soil, &c., &c., &c.

You know how little law we have to work under, and in view of this I think we have accomplished a great deal of good work this season.

We need a law regulating the plumbing of houses and the laying of private drains connecting houses with the public sewers; this I hope your board will accomplish the coming session.

Portland—C. G. Adams, M. D.

Diphtheria—Three cases.

Typhoid Fever—Two cases.

From phthisis, four deaths. The diarrhœal diseases of children have not been very prevalent. The more frequent causes have been heat, teething and injudicious feeding.

Portland—T. A. Foster, M. D.

Diphtheria—Six cases.

Typhoid Fever—One case.

Three deaths from phthisis. The diarrhœal diseases of children have not been very prevalent. The most common cause is improper feeding.

Cleaner and dryer cellars and better drainage and ventilation would improve the sanitary conditions.

Portland—J. M. Gassaway, M. D.

Diphtheria—None observed.

Typhoid Fever—Four cases in East Deering, one fatal.

From phthisis, four deaths in East Deering. The diarrhœal diseases of children have not been especially prevalent; most common cause improper food, especially of bottle-fed babies.

Three cases of simple facial erysipelas, possibly attributable to a case treated in the same house two years before, though disinfection was thoroughly made with sulphurous acid gas after each case. There was no other assignable cause.

A case of lead poisoning, as follows: An elderly man much troubled with obstinate constipation, intense colic, gingival blue line, and wrist-drop was greatly comforted with sulphate alum, opium, and iodide potash mixture. The drinking water used by this gentleman and his elderly wife was from a rain-water cistern well cemented within, and drawn by a pump through a lead pipe, which had been in position "some years." The woman did not suffer so much as the man. Both recovered.

Portland—F. H. Gerrish, M. D.

Diphtheria—Two cases, one fatal.

Typhoid Fever—None observed.

Scarlet Fever—One case. The various diarrhœal diseases of children have not been very prevalent. Diphtheria has been especially prevalent the past year, and the details will doubtless be furnished by those who had the patients. There was one case in which I think that diphtheria was contracted at a funeral.

Portland—J. L. Horr, M. D.

Diphtheria—None observed.

Typhoid Fever—Six cases, two fatal.

Two deaths from phthisis in Westbrook. The diarrhœal diseases of children have been very prevalent, and four deaths have resulted. Summer heat and improper feeding have been the more frequent causes of these diseases.

Portland—F. P. Scully, M. D.

Diphtheria—Four cases.

Typhoid Fever—Forty cases in Portland, one in Deering.

Scarlet Fever—Five cases. From phthisis, ten cases observed. I have seen but very little of the diarrhœal diseases of children. The principal cause of these diseases is over-nursing and the long rubber tube attachment to the nursing bottle, aptly called the "modern Herod."

As sanitary measures for the city, I would recommend better trapping of sinks and other fixtures with such forms of traps as do not admit of siphonage, and the interdiction of the use of water from wells situated at the foot of hills so that they catch the soakage from privies and stables above.

One point, I believe, should be considered by physicians which seems to be generally overlooked,—that is, the germ theory of phthisis. In these days when we can make the diagnosis of phthisis by means of a microscopical examination of the sputa of patients, even dispensing with the physical examination of the lungs, it seems proper to call attention to the danger of sleeping with phthisical patients and of neglecting the ventilation of the rooms, and to the need of disinfecting precautions.

Portland—Chas. D. Smith, M. D.

Diphtheria—Ten cases.

Typhoid Fever—Seven cases, two fatal.

Scarlet Fever—Six cases in Portland, four in Deering. Twelve deaths observed from phthisis. The diarrhœal diseases of children have been quite prevalent, and I have known of three deaths resulting from them. The most common cause seemed to be the poor quality of the food, and sudden changes of temperature.

Diphtheria has been especially prevalent, and I am satisfied that eighty per cent of all cases have been contracted by direct contagion. Suggestions for lessening the prevalence of this disease are isolation of the patients, disinfection of the discharges, fumigation of infected rooms and clothing, prevention of the mingling of nurses and attendants with other people, and the prohibition of public funerals. These measures are now being carried out in this city, our board of health having succeeded in securing from the city government an ordinance covering these points.

Portland—Geo. B. Swasey, m. d.

Diphtheria—Nine cases.

Typhoid Fever—One case.

I have had twenty cases of the diarrhœal diseases among children, and ten among adults.

While a gentleman, Mr. C., was in a store in the eastern part of the State, a man who had recently lost two children with diphtheria, and at the time had others sick with the disease, came into the store and made some purchases. Mr. C. was taken sick eight days subsequently with a mild form of diphtheria, not having, to his knowledge, suffered other exposure to the infection.

Portland—A. S. Thayer, m. d.

Diphtheria—Five cases.

Typhoid Fever—Six cases.

The diarrhœal diseases have not been especially prevalent. Measles and whooping cough have prevailed.

Portland—A. V. Thompson, m. d.

Diphtheria—Seven cases.

Typhoid Fever—Six cases in Portland, two in Cape Elizabeth.

In my practice, the diarrhœal diseases of children have been quite prevalent.

Portland—F. P. Warren, m. d.

Diphtheria—Six cases, two of which died from diphtheritic croup.

Typhoid Fever—One mild case.

From phthisis, one death observed. The diarrhœal diseases of children have not been very prevalent, according to my observation.

The principal causes have been neglect, milk diet and maternal ignorance.

During my absence I understand that diphtheria was unusually prevalent about the eastern end of the city, and that it has been attended with an unusual fatality. At one place where there were three fatal cases, the plumbing was defective. The soil pipe was disconnected with the sewer, so that the house drainage discharged outside of the sewer pipe instead of within it. To lessen the prevalence of these diseases, I would suggest the enforcing of quarantine.

Princeton—C. Flower, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

One death from phthisis. There have been but very few cases of the summer complaint of children. It has been very healthy the past year. Rheumatism and the rheumatoid affections have been the principal diseases. To lessen their prevalence I would suggest the substitution of woolen clothing for cotton.

For the year September 1, 1885, to September 1, 1886, the mortality has been as follows: in Princeton from chronic spinal disease one death, from leucocythæmia, one; in Waite, one death from consumption; in Topsfield, one from erysipelas and one from prostatitis.

Readfield—W. A. Wright, M. D.

Diphtheria—Two cases, one very severe.

Typhoid Fever—None observed.

Scarlet Fever—One case. Three deaths from phthisis. The diarrhœal diseases have been very prevalent. The principal causes have been dryness of the weather and sudden changes from warm to cold. For the improvement of the public health I would suggest greater cleanliness and the putting on of additional clothing when the weather becomes chilly.

I have seen one case of lead poisoning resulting from handling printers' type for several years. This case was very severe, with a slow recovery. In animals there have been several cases of poisoning from eating Paris green in the potato fields.

Richmond—Abial Libby, M. D.

Diphtheria—Three cases.

Typhoid Fever—Three cases.

Two deaths from phthisis. There have been but very few cases of the diarrhœal diseases. We have had no epidemics and the past year has been unusually healthy.

Rockland—F. H. Boynton, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

Scarlet Fever — In Rockland, six cases; in South Thomaston, seven. Under my observation there have been two deaths from phthisis in Rockland and one in Camden. The diarrhœal diseases of children have been very prevalent. I think the peculiarity of the season has been the main cause. I had a large number of cases of dysentery during the summer,—86 cases in the months of July and August.

I am satisfied that one case of scarlet fever in a child, of four years, was traceable to no other cause than getting into an old garret that was used as a general storehouse and there finding some playthings of children who lived here nearly twenty years ago, getting them out and using them all one day, particularly a woolen rabbit which the child's mother told me belonged to a child nearly twenty years ago, which had malignant scarlet fever and died in the house. I used every means to ascertain if the child had been exposed, and learned that no cases existed at the time in the village, and as the case was most severe in its type of malignancy I was especially desirous of tracing its origin if possible.

Rockland—C. R. Cole, M. D.

Diphtheria—None observed.

Typhoid Fever—Twelve cases, three fatal.

Scarlet Fever—Six cases. Two deaths from phthisis. The diarrhœal diseases of children have been very prevalent.

In one case scarlet fever was undoubtedly transmitted by the books of a teacher, who was herself sick a year previously.

A family from the country came to this city in August, 1885, and took up their abode in a locality known as "The Point." Instead of using water from the city's water service, they drew their supply from an abandoned well. About this well were three privies, all within fifteen feet of it. Oct. 2d, a child of eight years was taken with typhoid fever. Soon after, the remainder of the family, consisting of the parents and five children, fell ill with the same disease. The mother died the second day after taking her bed; one child on the twenty-second day, and another on the twenty-fourth day of the fever. All the rest recovered after a long and severe illness.

Rockport—H. B. Eaton, M. D.

Diphtheria—Nine cases.

Typhoid Fever—Eleven cases.

One death from phthisis. The diarrhœal diseases of children have been very prevalent. Improper diet has been the principal cause.

The sanitary condition of our locality is bad.

Saccarappa—C. W. Bailey, M. D.

Diphtheria—Four cases.

Typhoid Fever—Two cases now on hand, and know of five other cases in town at the present time.

Scarlet Fever—Five cases. The diarrhœal diseases of children have been very prevalent. These cases have been principally among the French population, and insanitary conditions, with overcrowding of families, seemed to enter largely into the causation. Much is needed to improve the sanitary condition of this village. Some of the things that need to be remedied are insufficient drainage, bad arrangements of water closets and privies. We have a water supply drawn from the river directly above the village, and but a few miles farther up there are large manufactories where all the wastes and excreta are dropped into the river, and still farther up a large powder manufactory with all its accompaniments of acids, saltpetre, soda and soot. It seems to me that this must render the water unfit for cooking purposes. One case of scarlet fever was contracted in school from a child which had had this disease four weeks previously.

Saccarappa—T. P. Smith, M. D.

Diphtheria—One case.

Typhoid Fever—Seven cases.

Scarlet Fever—One case. Two deaths from phthisis. The diarrhœal diseases of children have been very prevalent. The most frequent causes have been failure of the child to receive proper food at proper intervals, and unsanitary condition of dwellings. Very much might be done to improve the sanitary condition of this village, in fact, much is being done in the way of caring for sewage. The soil being clayey necessitates much care in draining house lots, but this is not very generally attended to. Sewers are being laid every year as fast as money can be raised.

Saco—R. S. Graves, M. D.

Diphtheria—No cases observed.

Typhoid Fever—None observed.

Measles have been spread in the schools by permitting scholars to attend after the disease had made its appearance.

Saco—S. P. Graves, M. D.

Diphtheria—Five cases.

Typhoid Fever—Two cases.

From phthisis, two deaths have been observed. There have been fewer cases of the diarrhœal diseases than usual. Injudicious feeding is the greatest cause. Measles have been more general than for several former years; whooping cough has been the next most prevalent disease. Most of the cases were among school children, and I would suggest more care not to send children to school when infected with these diseases. To improve the sanitary condition of this city, I would suggest emphatically, *sewerage*. Instead of collecting sewage and turning it out upon the surface in the very centre of the city, conduct it to the water by a very short, feasible plan.

There have been about fifteen or eighteen cases of hog cholera.

One fatal case of typhoid in a child appeared to have originated from the child's playing in the drainage from the sink spout after it had passed four or five rods under ground.

Saco—H. E. Hill, M. D.

Diphtheria—Six cases.

Typhoid Fever—Six or seven cases.

Scarlet Fever—Three cases. Three deaths from phthisis. Diarrhœal diseases have not been very prevalent. Improper feeding is the principal cause.

"Can you suggest any method of improving the sanitary condition of your locality?" Yes; fill up every well in the city and abolish privy vaults and build sewers.

Saco—F. E. Maxcy, M. D.

Diphtheria—None observed.

Typhoid Fever—Six cases.

One death observed from phthisis. There have been many cases of the diarrhœal diseases, caused principally by overfeeding and sudden cold. For improving our sanitary condition we need very much a system of drainage.

Searsmont—G. E. McCurdy, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases.

Two deaths have resulted from phthisis. The diarrhœal diseases of children have not been very prevalent. Impure water is a common cause.

Better school-houses, with better ventilation of them, would be a sanitary improvement.

Shapleigh—F. A. Bragdon, M. D.

Diphtheria—Three cases.

Typhoid Fever—Two cases.

There have been many cases of the summer complaint of children; the principal causes, improper food and sudden weather changes. Whooping cough has been quite prevalent.

Sherman—D. H. Owen, M. D.

Diphtheria—No cases observed since October, 1885.

Typhoid Fever—None observed.

The diarrhœal diseases of children have been very prevalent, with two deaths in August and one in September. Under my observation the disease has been frequently caused by improper diet.

South Berwick—C. P. Gerrish, M. D.

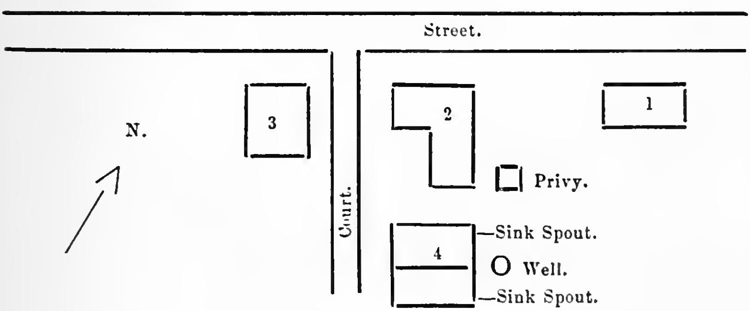
Diphtheria—Fourteen cases, with two deaths.

Typhoid Fever—Three cases.

One death from phthisis. The diarrhœal diseases of children have been quite prevalent. The most common causes are the filthy surroundings.

Diphtheria has not prevailed here as an epidemic, as was reported, but we have had several sporadic cases, due, apparently, to insanitary conditions. For instance, at a point near the river in the southern part of the village two boys, each in separate families, were attacked at the same time. One case was mild in form, the other, in a nine-years-old, thin, pale, and poorly-nourished boy, was severe and complicated. He first complained of sore throat for several days and then when I first saw him I found a dirty, white exudation covering the tonsils and throat generally. At the same time he was very hoarse. After ten days the throat cleared, but croupal symptoms came on and the cervical glands became swollen and a profuse diarrhœa was wasting the little patient until it was checked. Then the nasal passages became involved and in forty-eight hours the nostrils were completely plugged. At the end of three weeks rheumatoid pains required the continued use of morphine for four or five days. During the fourth and fifth weeks there were typhoid symptoms with rose spots and sudamina, flatulence, the characteristic pea soup discharges and delirium at night. By meeting the many complications as they arose and keeping up the nutrition of the patient as well as possible he lived for five weeks.

The sanitary conditions surrounding this case were as follows, and the accompanying diagram will help to explain them.



The house No. 1 had but two rooms below and two attics above, with a shallow, wet cellar. Within twenty-five feet of the house on the south there was a privy used by four families, with a small vault overflowing at every rain. Twenty-five or thirty feet south of the privy, situated between two sink spouts, each of which was not more than ten feet from it, was the well. The well is twelve feet deep, and the bottom is a ledge, and the ledge was dug into about one foot when a water vein was found and then, with bricks and cement, the well was built up around this water vein to the top. Therefore, it is claimed by the owner that the surface water does not affect the well. In house No. 4, there were four cases of typhoid fever two years ago.

In another house there were four severe cases. In this house the sink had no trap; the pipe went down into the cellar, and then horizontally to the outside of the house, where it discharged on the surface of the ground. The house had not been used for a month, and about the last of July the mother moved in with her children. Thinking that the house was not sweet, she poured a wash boiler of hot water into the sink. The result was that the house was filled with the fumes and germs, and in one week the first child was attacked. So in every case the cause appeared to be local.

Southwest Harbor—H. E. Abbott, M. D.

Diphtheria—None observed.

Typhoid Fever—At Southwest Harbor, three cases; Cranberry Isles, one case.

There have not been many cases of the diarrhœal diseases among children. Sanitary improvements which might be suggested are a supply of water from one of the neighboring lakes, and good sewerage.

Springvale—Ivory Brooks, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

The diarrhœal diseases of children have not been very prevalent. The principal causes of these diseases are generally teething and hot weather.

St. Albans—C. A. Moulton, M. D.

Diphtheria—One case in August.

Typhoid Fever—One case in August.

Scarlet Fever—One case in March. Three deaths from phthisis. The diarrhœal diseases of children have been very prevalent. In every case of these diseases the babies have been artificially fed, using the nursing bottle with a long rubber tube. According to my observation this has been the more frequent cause, owing to improper care of the tubes.

When I was called to the case of scarlet fever reported above, on making a careful enquiry I obtained the following points. In May, 1881, Mr. L.'s three children were taken with scarlet fever without any known exposure. The youngest died. The mother states that she washed and aired this child's clothes and put them away in a close trunk, and that she has taken them out at least once a year for the purpose of airing them. In March, 1886, the oldest boy and his four-years-old brother were permitted to open this trunk and take the clothes out and use it as a box in which to keep their playthings. In fourteen days from the first opening of the trunk the four-years-old boy began to show symptoms of scarlet fever, which developed into a typical case of that disease. The clothes in the trunk consisted of ordinary cotton clothes, with one pair of woolen stockings. There has been no other case of this disease in town. The house is situated on the side of a hill above the highway, and no other building within a hundred rods. The highway is a cross road and used for local travel only. The child had not been away from home or exposed in any other known way. Was the trunk the source of the contagion ?

Standish—Wm. B. Cobb, M. D.

Diphtheria—One case in Hollis.

Typhoid Fever—None observed.

Four deaths from phthisis. The diarrhœal diseases of children have not been very prevalent.

There was one case of fever of a decidedly intermittent type, in a young lady who returned from Biddeford, where she had been staying. She came home quite unwell and in a few days the fever developed and she was very sick for about six weeks. She was quite sure she contracted the disease through the water supply at her boarding-house, it being from a well.

Strong—Alfred Hitchcock, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

Three deaths from phthisis. Cases of summer complaint of children have been unusually infrequent.

The sanitary condition of Strong and vicinity is exceptionally good. Situated in the valley of Sandy River, the drainage is all that could be desired. Our population are mostly tillers of the soil who live in well-kept houses, and cleanliness is the rule.

Sumner—C. M. Bisbee, M. D.

Diphtheria—None observed.

Typhoid Fever—In Sumner, five cases; in Paris, three.

From phthisis, four deaths in Sumner, one in Paris, one in Woodstock. The diarrhœal diseases of children have not been very prevalent. The principal causes have been teething, bad milk and injudicious nursing.

Surry—W. E. Emery, M. D.

Diphtheria—Five cases.

Typhoid Fever—Three cases.

One death from phthisis. The diarrhœal diseases of children have been very prevalent. The principal causes have been the dry season, impure water and green apples. We were obliged to close the schools on account of a limited number of mild cases of diphtheria.

I was called to see a child in East Bluehill last spring, suffering from what I supposed at the time to be poisoning from ivory leaves and wild parsnips, as I had one case besides presenting nearly the same symptoms, but on my next visit, looking more closely into the matter found them all passing more or less bloody mucus,—two women, three little girls and one boy. The child first taken sick and seen by myself died from the effect of a poison received, according to my opinion, from impure sanitary surroundings. Last spring was very dry. The water they drank was taken from what would be called during a wet season, a running brook, but which was, at that time, nearly stagnant water. The lady of the house kept a great many hens, and had almost as many hen houses, which were distributed nearly around the house, filling the house and the sleeping apartments with their obnoxious odor, which was constantly being inhaled by them all. But I can say now that their hygienic surroundings are all that could be expected. They are all well, and think they have learned a good lesson.

Swan's Island—A. N. WITHAM, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases this fall.

Three deaths from phthisis. There has been no great prevalence of the diarrhœal diseases of children. The principal cause is improper diet. Of other diseases there has been a prevalence of whooping cough and pneumonia.

For the improvement of the sanitary condition of our locality, the wells should be dug where the drainage of the house and outbuildings shall not flow or soak directly into them.

There were several cases of diarrhœa in certain families, due to stagnant water in wells when the water was very low.

Topsham—I. S. CURTIS, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

Two deaths from phthisis. There has been a considerable prevalence of the diarrhœal diseases of children, with two deaths.

A rather light epidemic of measles in the winter and spring. Two of our schools were closed three weeks on account of it. It is thought that the infection was brought from Bath by a teacher, who imparted it to about half her pupils, and it subsequently spread to the neighboring school.

Tremont—J. B. PHILLIPS, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

The diarrhœal diseases of children have been quite prevalent, caused principally by the impure water due to the drouth.

Tremont—WM. A. SPEAR, M. D.

Diphtheria—Seven cases in Tremont; two in Mount Desert.

Typhoid Fever—Four cases.

Scarlet Fever—Six cases in Tremont; one case in Mount Desert.

The diarrhœal diseases of children have been quite prevalent, but the cases have yielded readily to treatment. The principal causes have been impure water and bad fruit.

In one family where there were three persons susceptible, they were infected with scarlet fever from rags which were infected more than one year before by exposure to the disease and had lain in an unoccupied house all that time.

Troy—M. T. Dodge, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

Four deaths from phthisis. The diarrhœal diseases of children have been quite prevalent, caused largely by the hot weather, bad water, and green fruits and vegetables.

The sanitary condition of the town would be much improved by more care in the location and protection of the wells,—which are the main dependence for the water supply,—from drainage from sink spouts, privies and yards.

Turner—J. T. Cushing, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

There have not been many cases of the summer complaint of children.

Turner—Roscoe Smith, M. D.

Diphtheria—Four cases in Hartford.

Typhoid Fever—Four cases in Turner, and two in Leeds.

From phthisis two deaths. The diarrhœal diseases of children have been very prevalent, caused mostly by errors in diet.

Unity—Austin Thomas, M. D.

Diphtheria—Three cases in Burnham.

Typhoid Fever—None observed.

One death in Troy from phthisis. The few cases of diarrhœal diseases among children have mostly been caused by a bad dietary.

The cases of diphtheria reported above were all in one family and the disease undoubtedly came from a visitor from Massachusetts who had had diphtheria some weeks before.

Some years ago I had a case of malignant scarlet fever which terminated fatally within forty-eight hours. There had been no other cases in the vicinity for a long time and the only way it could be accounted for was the reception of a letter from friends where they were having scarlet fever. This was an isolated case, no other cases occurring.

Van Buren—J. C. Upham, M. D.

Diphtheria—Two cases, one fatal.

Typhoid fever—Twenty-seven cases, three fatal.

Two deaths from phthisis. There have been many cases of the diarrhœal diseases among children, caused mostly by improper feeding. We have had an epidemic of typhoid fever and new cases are still occurring. Proper drainage and new water supply may prevent the disease in the future.

Vanceboro—Wm. Beatty, M. D.

Diphtheria—Two cases.

Typhoid Fever—None observed.

There have been but few cases of summer complaint among children, and no deaths.

Vanceboro—M. L. Young, M. D.

Diphtheria—Nine cases, two fatal.

Typhoid Fever—Two cases.

Scarlet Fever—One case. Two deaths from phthisis. The diarrhœal diseases of children have been very prevalent. According to my observation the causes have been: I. Excessive heat with the atmosphere heavily charged with watery vapor at the same time. II. Improper food. III. During September, I traced many cases directly to the water supply. During September there was a great excess over other years of cases of choleric diarrhœa of adults, largely due, I believe, to the dry season and its consequent effect upon the water supply.

In the family of Mr. A., three years ago, there was diphtheria. Little attention was given to disinfection, but there were no other cases in the village. Some of the clothing used upon the patients was, after washing, cut up for mat-rags and laid away. The following spring, during the home-cleaning season, these rags were overhauled. The result was another outbreak of diphtheria, and the transmission of the disease to a second family, who were supplied by Mr. A. with milk. There was no other probable cause of infection.

A few months afterward Mr. A. removed to another house in which there had never been any cases of this disease. This, of course, necessitated another stirring up of these mat-rags, and another case of diphtheria was the result of it. I depend upon family history for the early part of this. The last two attacks I have personal knowledge of.

Vinalhaven—G. W. Phillips, M. D.

Diphtheria—None observed.

Typhoid Fever—One case in North Haven now under treatment.

Four deaths from phthisis in Vinalhaven, one in North Haven. There has been an average number of cases of the diarrhœal diseases of children.

There have been no other diseases especially prevalent excepting tonsilitis and inflammations of the lymphatics, of which there were seven cases in one family and as many more among the neighbors who were using the same water.

Vinalhaven—F A. Smith, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

There has been a considerable number of cases of the diarrhœal diseases in children, apparently caused by the drouth and poor water.

Waldo—A. C. Ellingwood, M. D.

Diphtheria—Seven cases in Belfast; one in Waldo.

Typhoid Fever—One case in Belfast, two in Waldo, and one in Swanville.

One death from phthisis. The diarrhœal diseases of children have been very prevalent, caused principally by the heat and the drouth and by sudden transitions from heat to cold. The sanitary condition of this locality would be improved by better drainage and a water supply for the city proper.

Waldoboro'—F. M. Eveleth, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases in Waldoboro' and three in Bremen.

Scarlet Fever—Three cases. One death from phthisis in Friendship and two in Cushing. The diarrhœal diseases of children have not been very prevalent. Imprudence in eating has been the most common cause. Measles and whooping cough have been quite prevalent, and in some instances have necessitated the closing of school.

Warren—J. M. Wakefield, M. D.

Diphtheria—None observed.

Typhoid Fever—Eight cases.

Four deaths from phthisis. There have been many cases of summer complaint among children, caused mostly by impure water. The most prevalent diseases have been continued fever and typhoid, due to bad drainage and poor water. A better supply of water, and more care of sink drains and privy vaults would be a sanitary improvement.

Waterville—S. H. Holmes, M. D.

Diphtheria—Five cases, two fatal.

Typhoid Fever—Two cases.

Cases of the diarrhœal diseases of children have been frequent. There is quite a large French population, and with them the well is often within twenty feet of hog-pens and cow-stalls, thus assuring the pollution of the water. I think this the cause of a large prevalence of summer complaint.

One case of chronic lead poisoning occurred, and a chemical analysis of the water used showed that there was quite a large quantity of lead in it

Waterville—M. H. Holmes, M. D.

Diphtheria—None reported.

Typhoid Fever—Two cases. The diarrhœal diseases of children have quite largely prevailed, being caused mostly by improper food and unsanitary conditions. The sanitary condition of the town would be improved by systems of sewerage and drainage, and a purer water supply.

Wayne—A. L. French, M. D.

Diphtheria—None observed.

Typhoid Fever—Three cases in Leeds.

Scarlet Fever—One case in Wayne and one in Leeds. The diarrhœal diseases of children have been quite prevalent.

In the past three years I have not seen a case of typhoid in Wayne, and have heard of but one. Of diphtheria there have been no cases; scarlet fever, one case.

Wells—J. W. Gordon, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases in Wells; one in York.

Scarlet Fever—Four cases in York. There have been four deaths from phthisis in Wells. The diarrhœal diseases of children have been very prevalent: there have been two deaths in Wells. The sanitary condition of our locality is quite good.

Woodford's—C. W. Foster, M. D.

Diphtheria—None observed.

Typhoid Fever—Three cases in Deering.

Three deaths from phthisis in Deering; one in Westbrook. There have not been many cases of "summer complaint." Sewerage would be a sanitary improvement.

Woodstock—C. B. Rankin, M. D.

Diphtheria—Five cases in Milton Pl.

Typhoid Fever—One case in Milton Pl.; four in Greenwood.

One death from phthisis. There has been about the usual number of cases of the diarrhœal diseases, mostly the result of improper food and exposure.

Winterport—C. F. Atwood, M. D.

Diphtheria—None observed

Typhoid Fever—Two cases in Bucksport.

The diarrhœal diseases of children have been very prevalent. The cause has been preeminently bottle feeding. The sanitary conditions would be improved by the ventilation of dwellings, and some method of disposing of sink and water-closet accumulations which now flow into wells prepared for the purpose, or more commonly on the surface of the ground in the vicinity of dwellings.

Arsenical Poisoning—At 3 A. M. on the 7th of August, 1881, I was called to a family consisting of man and wife, their daughter and her husband and two children, aged respectively 67, 63, 38, 41, 5 and 2 years. All had been taken suddenly and violently ill at 12 o'clock, midnight, except the younger man, who became ill one hour later. They were all vomiting freely, had excruciating pain at pit of stomach, and all had profuse diarrhœa. The symptoms were of arsenical poisoning, but close questioning and an examination of the piece of potatoes, location of the well, and kinds of food elicited nothing. When asked when they ate supper, the reply was, "At six o'clock, except the younger man, who was away and ate at seven o'clock." I then felt certain they had been poisoned by arsenic in the food partaken at supper. When I asked what they did with the boxes in which they bought the Paris green they applied to the potatoes, they said they burned them, and when asked when they burned, they said they burned them that night at supper time. The meal consisted of corn-meal pudding and milk. While making the pudding, the older lady, who made it, said she frequently raised the kettle, and while holding it in one hand, stirred the fire with the poker, in the other. She said she stirred the fire frequently, and noticed that the boxes burned very slowly. She was much the sickest of the family. I treated them in the belief that they were all poisoned by arsenic, and they all recovered. I certainly believe, and the family and neighbors are of the same opinion, that they were poisoned by the arsenic from the boxes, introduced into the pudding during the process of making.

Cholera Infantum—Almost my first question on seeing a child suffering from cholera infantum is,—"Is this child bottle fed?" and the answer is usually what I have already assumed to be the case, "Yes."

During the summer of 1882, I was called late one evening to see one of a pair of twin boys about four months old. Found him emaciated to an extreme degree, unconscious and moribund. His brother was in the cradle, fat and in excellent health. On inquiry I found he had been sick but twelve hours, though to judge from appearances I should have said he had been sick a week. On my next visit, twelve hours afterward, I found him dead and his brother looking as bad as he had the night before. Under proper diet and treatment he lived five days, but without any perceptible improvement. I had previously examined the cow from which the child received its milk and found all the usual requirements fulfilled; but I had concluded something more must be done or the child would die. On careful enquiry I found that the water in the pasture was good and abundant, but the grass was closely fed by the large herd in the pasture. Owing to drought, feed was short, and the father thought the cows might be obliged to eat other than fine grass. At my earnest request this cow was put in a field of clover, alone, and watered three times daily from a fine well. Next day the child began to improve, and in four days more I dismissed the case, so far convalescent as not to further need my services.

This year I had very many cases of the disease and complained after some time of the milk. The milkman, who supplied five of my cases, having heard of my complaints, asked me what better he could do in order to provide proper milk. I advised him to tie the "baby" cow in a clover field and water her from a spring, which he did, and every case was off my hands in less than a week, and not one has again required my attention, though children using milk from other cows have been repeatedly sick since. These cases, as all others, are of course put under the best possible conditions aside from the milk, such as daily baths, rides, warm clothing, well-ventilated rooms, and *clean tubes and bottles.*

Winterport—A. R. Fellows, M. D.

Diphtheria—None observed.

Typhoid Fever—Three cases.

Two deaths from phthisis in Winterport and one in Prospect. The diarrhœal diseases were quite prevalent during August, due largely to bad milk and food.

Winthrop—Daniel Driscoll, M. D.

Diphtheria—None observed.

Typhoid Fever—One case.

One death from phthisis. The diarrhœal diseases have been moderately prevalent, most of the cases having been among the Canadian population from eating unripe fruit and from bad sanitary surroundings.

Among swine, hog cholera prevailed to some extent. In one instance twenty-eight out of thirty-four cases were fatal, and in another instance there was nearly as great a mortality.

Winthrop—A. P. Snow, M. D.

Diphtheria—None observed.

Typhoid Fever—One case only and that imported from Augusta.

There has not been a great prevalence of the diarrhœal diseases of children. Two deaths from this cause resulted in the French population, where there was a want of cleanliness about the premises. The general sanitary condition of this town is good.

Wiscasset—C. A. Peaslee, M. D.

Diphtheria—Three cases.

Typhoid Fever—None observed.

Scarlet Fever—One case. Five deaths from phthisis. Three deaths have resulted from the diarrhœal diseases of children, and there has been quite a prevalence of these diseases resulting from bad air and improper feeding.

I think the case of diphtheria arose from causes wholly within the immediate surroundings of the patients, overflowing privies being found where both fatal cases occurred. Our village, as in all villages of its class, is noted for its accumulative privies and foul sink drains, both frequently being in close proximity to wells. Anything which would change this condition of things would greatly improve the health conditions of the people.

Yarmouth—J. C Gannett, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

Scarlet Fever—One case. There has been a very great prevalence of the diarrhœal diseases.

Yarmouth—Wm. Osgood, M. D.

Diphtheria—None observed.

Typhoid Fever—Two cases.

Scarlet Fever—One case. The diarrhœal diseases have been quite prevalent, but more so among adults than among children.

The only case of scarlet fever seen during the year was in a child about eight months old. This child had been dressed in clothing which had been worn by another child during an attack of scarlet fever eighteen months before. I know that the clothing was not disinfected after the sickness. In about ten or twelve days from the date of putting on the clothing, the infant was attacked with the fever.

Yarmouth—W. W. THOMAS, M. D.

Diphtheria—Two cases.

Typhoid Fever—Five cases.

There has been a considerable prevalence of the diarrhœal diseases, but they have generally been of a mild type. The principal causes have been changes in diet, improper food, and high temperature and sudden changes. There is often a general mismanagement, and the disease is sometimes caused by the lack of warm clothing for the abdomen.

There has been a greater prevalence of typhoid fever than I have ever known here in one year. I think much might be done in the prevention of this disease by the proper care of the first cases as regards the discharges from the bowels.

The sanitary condition of the place would be improved by discontinuing the use of water from all the old wells in the village.

York—JOHN C. STEWART, M. D.

Diphtheria—None observed.

Typhoid Fever—None observed.

One death from phthisis. The diarrhœal diseases of children have not been very prevalent. Whooping cough has prevailed to a limited extent.

Various Sanitary Topics.

BY THE SECRETARY.

THE CONTAGIOUSNESS OF CONSUMPTION.

Before the publication of the First Annual Report a series of questions was sent out to the physicians of the State, relating to various subjects which are of sanitary interest. Among them was one as to the contagiousness of pulmonary consumption, which read as follows: "Please communicate any observations which seem to show the infectiousness of phthisis."

To this circular letter of enquiry, there were received answers from 170 physicians. Of these 170 physicians, 91 made no answers to this particular question, and 79 answered it. Of those answering the question, 23 replies indicated that no observations had been made which would show the infectiousness of the disease, and of these, four stated definitely that they did not believe in the infectiousness of the disease. On the other hand, 51 answers indicated either a belief in the contagiousness of the disease or that observations had been made which would seem to show its infectiousness, and of these 25 mentioned or narrated cases which were thought to show this. Beside these 51 answers, there were 3 others which probably should be classed with these as favoring the idea of contagion, but are not put with them on account of a little doubt as regards the meaning which the writers intended to convey.

Tabulating the replies which were received, we have the following results:

Negative observers,	23
Affirmative observers,	51
Doubtful answers,	3

A few years ago a similar enquiry was made under the auspices of the British Medical Association, and in answer to the enquiry sent out 1078 returns to their circular were received Of these returns 673 were simply negative, showing that no case had been observed by the member making the return, but expressing no opinion. Such returns were set aside, as admitting of no further analysis The remaining answers, containing observations of some kind, were classified as follows:

Class 1.	Affirmative observers,	261
Class 2.	Doubtful observers,	39
Class 3.	Negative observers,	105*

The result of the enquiry, both in this State and in England, shows that a majority of the medical practitioners making answers believe in the infectiousness of pulmonary consumption, and that a large number have been led to this belief through their own personal observations. This enquiry, if it had been made a decade ago, probably would have given somewhat different results.

It was not many years ago when, in the prevailing teaching of those days, one would have heard but very rarely any words which would have indicated any decided conviction that contagion or infection played any part in the etiology of the disease. In the light of history, this change in the prevailing medical opinion as regards consumption must be regarded as a reversion to an earlier phase of medical thought. About one hundred years ago the prevailing opinion among the medical profession in the south of Europe was strongly in favor of the infectiousness of consumption, and this belief shaped the sanitary treatment of the unfortunates who were afflicted with this malady. Dr. J. Uffelmann† relates, as the result of his investigations into the medical history of this subject, that in the year 1782, just one century before the discovery of the bacillus tuberculosis by Koch, that the central sanitary bureau of Naples expressed the opinion that tuberculosis should be regarded as infective, and in accordance with these views, rules and regulations were promulgated to guard against the communication of the disease. The decree which they issued in that year provided, among other things, that every practising physician should give immediate notice to the bureau of the appearance of consumption in any of his patients, under penalty of a fine of three hundred ducats, and for a second offense, of an exile of ten years from his native country; for the isolation in

* The Boston Medical and Surgical Journal, Vol. CIX, p. 207.

† Berliner klinische Wochschrift, June 11, 1883.

hospitals of patients affected with the disease: that all articles and effects of the patient not supposed to have been infected were to be thoroughly cleansed, while those which were supposed to be infected were to be burned or disinfected in some other manner; that the directors were to thoroughly disinfect the rooms or wards which had been occupied by the tuberculous patients, and that the doors and windows should be removed and burned and replaced by new. These harsh measures, which were believed to be necessary for the safety of the public health, were rigorously enforced for many years. and the decree was in existence, though somewhat less strictly administered, as late as the year 1848. From that time on until near the present the belief in the communicability of phthisis had declined in that country until but few physicians were found who were on the side of contagion.

There is hardly another disease which has brought out so great an amount of earnest work and discussion with the view of arriving at the truth as regards its etiological. histological and pathological characteristics as has pulmonary tuberculosis, or consumption. The history of these various researches, though an interesting professional study, would be widely out of place in a volume designed for the general reader; therefore, without submitting the various steps which have led up to such conclusions. it will be sufficient to say that it appears to be definitely determined:

1st. That the tuberculosis of cattle and other animals is identical with the tuberculosis of man.

2d. That human consumption is a tuberculosis of the lungs.

3d. That the disease is characterized by the presence of a specific contagion, and may be communicated from animal to animal, from man to animal, or from animal to man by inoculation, by inhalation, or by ingestion.

As illustrating the fact of contagion, the following cases, mostly from quite recent literature, are given:

Dr. C. W. Stevens,* of Charlestown, Massachusetts, contributed some years ago the following case:

Mr R., aged 29, died of phthisis after three years' sickness. The last few months of his life he had a tuberculous diarrhœa. His expectoration was purulent and profuse. He had returned home from abroad only six months before his death. He was nursed chiefly by his young wife, and assisted by his wife's mother. His wife had

*Boston Med. and Surg. Jr., Vol. LXXXVI, p. 168.

a fine constitution, a well-developed body, and had always been healthy. Her mother was likewise a very robust woman of middle age, with no hereditary consumptive tendencies. This young wife was incessant in her devotion to her husband—constantly sitting beside him, breathing his breath, bathing his body, and emptying his sputa and excretions. Near the end of his life she was taken with a slight diarrhœa. After his decease she appeared to go into a decline, and died of acute tuberculosis in about six months. About a year afterwards her mother likewise died of consumption.

Dr. A. Ollivier,* in connection with the question of the contagiousness of tuberculosis, has given an account of a case which came under his observation. A child two years of age, previously strong and vigorous, came to play with another child somewhat older, who died of consumption; the first child rapidly withered away and succumbed to the same disease. Another child four years old, of good appearance and with no hereditary predisposition to consumption, entered a hospital on account of infantile paralysis. In the bed next to his own three children successively died of phthisis; he played with the last occupant, and soon became phthisical like his neighbor.

A physician in St. Petersburg contributes the following history of tuberculous infection † A woman, in whose family there was a marked history of consumptive tendency, developed symptoms of tuberculous infection. There were emaciation, cough, dyspnœa and pulmonary hæmorrhage. From 1872 to 1883 she was married three times, all three of the husbands presenting at first the appearance of health and having no hereditary taint. The first husband, married in 1872, died of phthisis in 1879. The second, married in 1879, died of phthisis in 1883; he lived with his wife from 1879 to 1881. The third, who lived with her from 1881 to 1883, is at the present time in the last stages of phthisis. The woman died of phthisis in 1883.

Towards the end of 1884, a prisoner who had rapid consumption entered a penitentiary composed of eight parallel pavilions exactly alike. He was placed at the extremity of one of these pavilions and remained there until the 26th of March, 1885, coughing and expectorating, and without requesting the attendance of a physician. At this date he decided to have himself cared for and was sent to the hospital, where it was found that there were numerous cavities at the

* "Revue D'Hygiene," Vol. VII, p. 431.
† Ibid., p. 599.

summit of the right lung, and where he died about the second month. A little while after his entrance, in the course of April and May, five other prisoners, all in the same end of the pavilion which had been occupied by him, began to cough and successively entered the hospital on account of pulmonary or pleural tuberculosis. The other part of the same pavilion was spared, and during this time the seven other pavilions presented nothing special as regards their sanitary conditions.*

In spite of the considerable negative testimony which the non-contagionists have been able to adduce, cases like the foregoing have been powerful in forcing the conviction that pulmonary consumption is an infectious disease. Admitting its infectiousness, as we must when aware of the exact experimental methods which have been used to establish this fact, there still remains the question, as regards the degree of infectiousness, that is, whether its acquisition by infection is a quite common occurrence or is an exceptional one. Another closely related enquiry is regarding the circumstances and conditions under which pulmonary tuberculosis is the most likely to be spread by contagion.

From the nature of the case any statistical or other enquiry to settle the question of the degree of infectiousness of this disease seems well nigh impossible. On account of the extremely slow growth of the bacillus tuberculosis, the exact time when the infection occurs is almost always impossible to determine. Unlike the other infective diseases, in which their specific micro-organisms are of much more rapid growth, and, consequently, in which the period of incubation is much briefer, tuberculosis has a period of incubation which varies much in length in different cases, but which relatively is very long. When, therefore, the disease is far enough advanced to be recognized clinically, the reception of the infection must be referred to a date some months and sometimes some years anterior. Adding immensely to the difficulties of enquiries of this kind is the fact that the not too distant past has included so many possibilities of infection known and unknown.

The spores of the bacillus tuberculosis, which in the expectoration of the consumptive may be ejected daily by the million in the street, the home, the church or the public conveyance, retain their vitality a considerable time, and under conditions which would be thought to be destructive of them. Experimentally, Schill and

*Revue D'Hygiene, Vol. VIII, p. 313.

Fischer* have shown that the sputum may be dried and ground into dust, and in this condition of complete desiccation may still retain its infective properties a considerable time. After 95 days, two rabbits, and after 126 days, three, were inoculated with this dried sputum, and in every case the animals became tuberculous. Experiments made from this time on showed that gradually the sputum lost its infective powers, until in about eight months, when inoculated into test animals, it proved wholly inoperative. It is the opinion of Koch that, in the very great majority of cases, the contagion is carried from the sick to the well by means of the inhalation of this dried and finely-powdered sputum. Numerous experiments have shown that the inhalation of tuberculous sputum will with absolute certainty cause animals to become tuberculous, not only those species which have been shown to be very susceptible to tuberculosis, but also those which have greater powers of resistance against this infection. Man is not supposed to have so great a degree of immunity as regards this disease as some of these animals have. Indeed, with a mortality from consumption of one-seventh of all the deaths which occur from all causes, and with the fact before us that only a minority of the cases of phthisis are to be referred to hereditary influence, there are grounds for a very strong suspicion that the human family have long and unwittingly been trying a disastrous inhalation experiment on themselves.

In the same line and confirmatory of the German investigations and reasonings, the French have been actively awake to the grave results which may follow a misapprehension of this question. Before the "Academie des Sciences" and the "Societe de Medicine publique," during the past year, several important papers were read on the transmissibility of consumption, and were very fully and earnestly discussed.

Dr. Alison† has drawn particular attention to the succession of facts which followed the accidental introduction of phthisis into certain, mostly very small, communes, in some of which consumption had appeared only at rare intervals. In some of the villages studied by him, where for thirty years the statistics showed not more than one death in each year from consumption, after the arrival in the community of a person who had contracted tuberculosis in a neighboring city, the disease was spread, became common, and furnished

*Mittheilungen aus dem k. Ges., Vol. II, p. 133.

†Revue D'Hygiene. Vol. III, p. 284.

thereafter three or four deaths a year, usually exclusively in the same families, or the same groups of houses. Generally these events occurred as follows: 1st. Tuberculosis was imported into a locality hitherto free from the disease. 2d. It was communicated to other persons who had had some relations with the imported case. 3d. The disease developed in little foci or groups, composed generally of a certain number of cases related among themselves or to the first case. 4th. Ordinarily there was no interruption in the succession of cases in the little group or family epidemic, provided the necessary time were allowed for the transmission, incubation, and advancement of the disease to a point so its pathological significance was recognizable. 5th. Finally, tuberculosis disappeared completely after some length of time; and in some of the villages, after a considerable period of immunity from the disease, a new importation gave rise to a new outbreak.

As regards the way in which consumption is the most frequently communicated, we find a general concurrence with the views of Koch and other German investigators. M. Richard says that phthisis is chiefly an inhalation disease, and that primary pulmonary tuberculosis, which is by far the most common form of tuberculosis by infection, is due, almost without exception, to the inspiration of dust charged with the bacilli of tuberculosis or their spores. He further says that the great source of these bacilli is constituted by the sputum of persons affected with pulmonary tuberculosis.

Dr. Ollivier says, "The most active agent for the transmission of tuberculosis resides in the sputum. Whether ejected to be trodden under foot, or accidentally upon the clothing or furnishings, it is easily transformed into a dangerous powder." Dr. Martin of the "Comite consultatif d'hygiene de France" gives a similar opinion.

As regards the prevention of consumption, in view of its contagious nature, there should be certain precautions and restrictions observed. Hardly any one now advances the opinion that the unfortunate who becomes attainted with this disease should be immured within a special hospital, or be denied the comfort of his home, if he has one, and the solace of his friends; but, with the fact now well known that the infection of the disease is liberated largely and almost wholly in the sputa of the sick, regard for the welfare of others urgently demands that the infected sputum be rendered harmless. Furthermore, it is to be borne in mind that the sputum which soils a handkerchief or

Revue D'Hygiene, Vol. VIII, p. 305.
Ibid., p. 284.

other fabrics is easily reduced into a dangerous powder in the further use of these articles, and, therefore, care should be observed that the spittoon receives all the expectoration, and that this be effectually disinfected.

The most trustworthy knowledge which we have regarding the behaviour of the bacillus tuberculosis when subjected to the action of disinfecting agents comes from the experiments of Schill and Fischer.* They show that the parasite may be destroyed surely by:

1. Subjection to the action of steam at a temperature of 212 F., for a period of from 30 to 60 minutes.

2. Immersion in boiling water for 20 or 30 minutes.

3. Immersion in a 5 or ten per cent solution of carbolic acid for as long as twenty-four hours. The quantity of the solution used must equal that of the sputum to be disinfected.

According to their testimony the corrosive sublimate solution, so effective for most other disinfecting purposes, is not suited to the disinfection of tuberculous sputum on account of its coagulating action.

SANITARY SIGNIFICANCE OF MILD CASES OF THE INFECTIOUS DISEASES.

Though mild cases of the infectious diseases may bring no serious danger to the individual who is the subject of them, it should not be thought that their presence is a matter of no concern for those whose desire it is to see the preventable mortality of our State diminished as much as possible. In these light forms the movement of the disease is frequently not evidenced by any marked symptoms, and it is exactly for this reason that, as regards the community, the very mildest forms of a disease may be the most dangerous; for, though those symptoms on which we are dependent to enable us to recognize the nature of the disease may be so far absent as to make a certain diagnosis difficult and sometimes impossible, the pathogenic agent has been multiplying itself within the system, and is ready to exhibit the same infective qualities as though its genesis had been in a more malignant case.

Again and again during the comparatively short time covered by the work of this Board, cases have come under its observation in which these unrecognized or doubtful cases have given rise to serious and fatal extensions of the infectious diseases.

*Mittheilungen a. d. kaiserl. Gesundheitsamte, Vol. II, p. 139-146.

Some of these outbreaks must be classed with the "unavoidable accidents," but a large part of them, it is believed, might be avoided by greater care in coming to the conclusion that a given case is not a dangerous contagious disease. A large part of the mischief comes from the default of duty on the part of the general public in not appreciating the fact, and shaping their actions in accordance with it, that contagion is dangerous, and whether generated in mild or severe forms of disease, is to be, as far as possible, restricted and destroyed. Very often, in spite of the warning of the physician, the general public will refuse to be convinced and to take the proper precautions due to the disease indicated, because they do not perceive the same symptoms and appearances which they have been accustomed to see in the more severe cases of the same disease. At the same time, while we lay this to the charge of the general public, we must admit that, with some members of the medical profession, there is a tendency, which from a sanitary point of view is a dangerous one, reluctantly and often deferredly to give these light cases their true diagnostic names. There is thereby often done a manifest wrong to the public, and one which is recognized sometimes by this same public when it is too late. For these members of the profession, I claim that their action comes in most cases from honorable motives. In the first place, it comes from a desire for exactitude in diagnosis and the wish not to unnecessarily alarm the public by making a diagnosis of a dangerous disease, when there is a possibility that such a judgment may be in error on account of the want of well-marked symptoms. It must be remembered, however, that the demands of exact pathological science and sanitation must be sometimes somewhat at variance. While the former demands abundant time to make an exact diagnosis, the demands of the public health are that every suspicious case shall be regarded and treated as dangerous, until the contrary is proved. Let, then, the plea for the common safety be heard, and let the public always have the benefit of the doubt. Again, physicians are sometimes influenced by their desire not to do as some unprincipled charlatans do, who give every disease which comes under their care a dangerous name, and thus seek to make capital out of the fears of the people.

The disastrous results of unrecognized and uncared-for mild cases of the contagious diseases are seen very often in diphtheria. The English medical health officers have quite frequently had to refer the origin of outbreaks of diphtheria to cases which were supposed to have been nothing more than simple sore throat. For instance, in 1884, Dr. Blaxhall made report to the Local Government Board regarding an epidemic of diphtheria at Ashford Hill, which appeared to have been due to a sore throat of the teacher. It seems that the teacher was taken ill about the 22d of June. On the 23d, she drove into Newbury to consult a medical man, who asked her whether there was any sore throat in her neighborhood. She remained at home two days, and resumed her duties at the school on the 26th. "Evidently this was not a common sore throat, for it rendered her incapable of reading to her class, some of the elder children being employed to read for her: she suffered somewhat from regurgitation of fluids when attempting to swallow, and her vision was affected, thus justifying the conclusion that this was a case of diphtheria. The entry in the school log on the 4th of July further records: 'Considerable number of children absent with mumps and sore throat.' On the 5th of July, Mr. Maples was summoned to five other families, all of which he found invaded with diphtheria. The sufferers were pupils of the Ashford Hill school, and to this channel most of the mothers ascribed the origin of the disease."

Seventeen families were invaded and it is noteworthy that of fifteen out of the seventeen primary attacks, the sufferers were in attendance upon the school.

Referring only to the principal outbreaks of diphtheria which have occurred in our own State the past year, we shall find that the most of them have apparently sprung from mild or doubtful cases. In Bar Harbor the first case was a mild, unrecognized case, which was unreported. The second case, which came from the first by contagion, though called diphtheria by one physician, was followed by a public funeral and all its unfortunate results. The little one from Allen's Corner who died in Boston was reported to have died of diphtheritic croup. In Canton, on account of the rash which accompanied the cases in the first family, many of the general public would not believe that diphtheria was present. In East Madison diphtheritic sore throat was prevalent before any malignant cases occurred. In some other places not here reported in detail unquestionable diphtheria resulted from questionable cases.

As there are slight cases of all the other forms of disease, so there are of diphtheria cases which fail to put on any marked or characteristic symptoms. Observations which are sometimes made would seem to show that cases of sore throat in which no trace of diphtheritic false membrane is discoverable may, nevertheless, give rise to true diphtheria. So lax a diagnosis as calling these diphtheria is not at all justifiable, but when these cases show an epidemic or endemic tendency, especially if accompanied with cases of diphtheria, they should be regarded with suspicion. One step farther on this debatable ground, we have cases which present "white patches" on the tonsil or other parts of the throat. For the non-professional reader it is necessary to say that diphtheria is characterized by the presence in the throat of a false membrane which, first at least, is of a white or whitish color. It may be discovered in its incipient stage as quite small patches which may rapidly or slowly enlarge and coalesce until an extensive formation of the false membrane results, with usually severe general symptoms. On the other hand, with an almost entire absence, it may be, of general symptoms, in mild cases the first discovered small patches may slowly or more rapidly disappear. It is as regards these latter cases that the element of doubt often comes in.

It is the belief of the writer that almost all these cases of "diphtheritic sore throat" are mild cases of true diphtheria, and as such are dangerous to the public. In the interest of public health these cases, as long as there exists any doubt as to their nature, should be regarded as diphtheria.

They may be confounded with simple inflammation of the throat in which there are muco-purulent streaks or patches. If a simple ocular inspection does not show that these are loose and easily removable, a touch with any object will prove that they lack the firmness and close connection with the underlying tissues which is characteristic of diphtheritic false membrane. Or these mild cases of diphtheria may be confounded with follicular tonsillitis. In the latter there may be seen issuing from the depths of the follicles or crypts of the tonsil gray or whitish spots, drops or little accumulations of secretion, sometimes of a cheesy consistency, sometimes semi-fluid. If it exudes from the follicles and by its weight sinks downward, it may be seen by touching or lifting it with a probe that its origin is from the natural openings of the crypts of the tonsils. It also lacks entirely the characteristics of the superficial but somewhat firmly adherent diphtheritic false membrane. Finally, there rarely occurs a *herpetic pharyngitis*, which may be left ont of account for its rarity.

The diagnosis of diphtheria should almost always be a very easy matter; but cases do occur in which a prompt and positive decision on the part of the physician cannot conscientiously be made. The practitioner must then claim a little delay, and at the same time give a caution against possible contagiousness. This is due to the public. From the public is due a little charity to the physician now and then for a diagnosis with an interrogation mark put in for the safety of the community. The mistake of calling a non-infectious sore throat diphtheria, or calling chicken-pox small-pox, may cause temporary inconvenience to a few individuals, but the converse error may needlessly fill a dozen graves.

COMPARATIVE VALUE OF NEGATIVE EVIDENCE AS TO THE NON-CONTAGIOUSNESS OF DISEASES.

Physicians and others in cautioning the public against the danger of the spreading of certain diseases, regarding whose infectious nature there should be at the present day no question in the minds of common, intelligent people, are nevertheless met and opposed quite frequently in their humane work by those who show the spirit of Thomas, the doubtful. It is not wrong to demand of him who teaches dogmatically, to show the proofs of the truth of that which he teaches; but when, as regards those diseases the infectiousness of which is attested by a long line of positive facts extending over many years, some person opposes to it all a single observation or a few observations of his own, which he tells you disprove the contagiousness of the disease, it is time to call his attention to the value of such negative observations as his, as compared with the value of such positive testimony as may exist bearing upon the same question.

For instance, there came to the knowledge of the writer the two following histories of scarlet fever. 1st. At a time when there were no other cases of the disease to account for this one, a child in a family of three children, of susceptible ages and unprotected by previous attacks, had scarlet fever and died. The other two, though in the same house, and sometimes in the same room, did not take the disease. This would be negative evidence that scarlet fever is not infectious. 2nd. A mother of a family of seven children took her youngest with her on a distant visit, and while away this child had scarlet fever. She delayed her return several weeks after the complete recovery of the child, to avoid conveying the contagion to her other children. In spite of this precaution and a careful washing-up, her other children all had the disease soon after her return. All these were light cases; but the neighbors knowing what the disease was, the family had no visitors and made no visits. Three weeks after the complete recovery of the last case, some of these children joined other children at play in a field. One of the children, who met these convalescents, took the disease and died in thirty-six hours after the first symptom. His sister, who worked two miles distant where there were children, attended the funeral. Returning, she gave the disease to her employer's children, who all recovered; and she called at a neighbor's house where there were four children, all of whom took the disease, and two of whom died within forty-eight hours of their first sickness. This seems to be positive evidence that scarlet fever *is* infectious.

We thus, as is illustrated by these two histories, have negative evidence which seems to indicate that scarlet fever is not infectious, and positive evidence which seems to show that the same disease is infectious; and this is true of every other disease which passes as contagious, not excepting small-pox; for even this disease for many years was not thought to be infectious, but was supposed to be due to atmospheric influences. Sydenham, although giving much attention to small-pox, did not discover this characteristic of the disease.

Exact science is far enough advanced to justify us in regarding the causes of all infectious diseases as microscopic germs, which, in producing the disease, grow and multiply within the animal or human organism. On the part of these germs, when they have been introduced into the system, there is an aggressive power which differs with each specific form. To illustrate: The aggressive power of the bacillus of anthrax is such that it can successfully and promptly attack and produce disease in mammals generally, regardless of species. Tuberculosis, experimentally at least, can be made tardily to attack almost all of the warm-blooded animals, but some of them it attacks much more readily and easily than others. Pleuro-pneumonia affects cattle but not horses; and glanders, horses but not cattle. Typhoid fever is a disease of man, and until lately, at least, experimenters have failed to produce its characteristic pathology in the lower animals. Thus it will be seen that the parasitic power of these germs varies with the species of the animal that receives them.

On the part of the organism which is invaded by these germs there is a power of resistance which varies, not only with the species of animals, but with individuals of the same species. For instance, that equine scourge, glanders, attacks only forty or fifty per cent of horses which have been fully exposed to the natural infection. Small-pox attacks a large majority of unprotected human beings who are exposed to it; yet there are a few persons who, without vaccination, can fully expose themselves to it repeatedly with impunity. With diphtheria there is a larger proportion of persons, even within the more susceptible period of life, who will not take this disease.

Not only does the power of resistance vary with the individual, but it varies with the same individual at different times. Sir Thomas Watson tells of an old woman who for years without vaccination had acted as a nurse for small-pox patients, but who at the age of 84 died of this disease. In the First Annual Report of the Board, Dr. Adams of Litchfield narrates an interesting case of varying individual susceptibility.

"Scarlet fever visited a family three times, taking one or two at a time, passing by a pair of twin sisters, and one of them afterwards nursed in a family where it prevailed. Years after, when she had a family of small children and seemingly had no possible chance for contagion, she was taken down and died with the disease in two or three days, and all of her children had it in about three days, and one of three died. The other twin sister was with her when she died, and attended the funeral, and the children were then sick too. Two years later, with no source of the disease possible but the use of some clothing from the other sister's home, which had been in her house for two years past, she was taken sick and died before the rash had time to appear. Her three children also became affected from her."

This personal element must never be lost sight of in weighing the evidence as to whether a given disease is contagious or not. It should be remembered that whether a person shall take an infectious disease depends in the first place upon whether he shall be exposed to the infection, and secondly upon his individual susceptibility or predisposition to the disease.

We will suppose one hundred children without vaccination, and at the most susceptible ages, to be fully exposed to the infection of small-pox. Of these one hundred so exposed, eighty or ninety per cent at least would contract the disease. If, instead of small-pox, they were exposed to diphtheria fully and freely, perhaps not more than twenty-five or twenty, and possibly not so great a per cent, would take the disease. Are we therefore, in diphtheria, to let the seventy-five or eighty pieces of negative testimony obscure or set aside the twenty-five or twenty cases which give positive evidence that it is contagious? If the proportion of cases attacked were even not greater than five per cent, they still with their accompanying history might outweigh in the scale of reason the ninety-five cases which failed to take this disease.

What has been said, it seems, may explain the meaning of the fact that with many infectious diseases it may be observed that very often persons who have been exposed nevertheless escape the disease; and it seems that it should be a caution to the public against too hasty generalizations drawn from their negative observations.

NOTES ON DISINFECTANTS.

Until recently, the true germicidal value of the various agents used as disinfectants has been a matter of belief rather than something demonstrable by strictly scientific methods. We used a substance as a disinfectant without having positive proof that it possesses the disinfecting power that we ascribed to it, and, on the other hand, without any one else being able to prove that the agent which we used is worthless or otherwise. Lately, some series of careful and exact experiments, made for the purpose of determining the germicidal power of the various disinfectants, have given us valuable information in a much-needed direction, notably, in this country the experiments by Sternberg and the Committee on Disinfectants, and in Germany those by Koch and others connected with the Imperial Board of Health. The following notes are based principally upon the contributions from these sources.

Carbolic Acid, though valuable as an antiseptic, is found not to be a trustworthy disinfectant. The bacilli of anthrax, containing spores,* when subjected to a two per cent aqueous solution of car-

*For the general reader an explanation of the meaning of "spores," as used in these "Notes," will probably be necessary. In the experiments to which reference is made, the germ-destroying power of the various agents which have been used as disinfectants was determined by subjecting to their action certain disease-germs and other micro-organisms, which are closely related to the disease-producing germs, and noting the result It will be noticed that these are sometimes spoken of as "containing spores," and at other times as "not containing spores." For instance, under carbolic acid, "the bacilli of anthrax containing spores" were not destroyed by a two per cent solution in seven days, but "the same kind of bacilli when not containing spores were killed in from two to twenty-five minutes" by even a one or two per cent solution.

The common method of multiplication of these "germs" is by fission, that is, an individual is divided into two, the two into four, and so on. A second method of multiplication possessed by some of these organisms, for instance, the bacilli, is by sporification. Under the microscope the individual bacillus cell, or "rod," is seen to contain a number of small, round, and highly refractive spores. If we might compare the parent bacillus cell to a microscopic pod, perhaps we might call the spores the peas in the pod. Under the microscope with a magnification of about 500 diameters, our ingenious printer says the bacilli of anthrax look like these — — —, and that he has nothing in his case more nearly like their spores than these . . . . These spores are very tenacious of life, resisting the destructive agencies of nature, such as cold, heat, dryness, and the lapse of time, while the germs not containing spores are much more easily destroyed.

bolic acid, were not destroyed at the end of seven days, and in a five per cent solution they were not surely killed in less than forty-eight hours. On the other hand, the same kind of bacilli when not containing spores were killed in from two to twenty-five minutes when exposed to the action of even a one or two per cent solution. Against some particular kinds of contagion, carbolic acid may be safely used. Thus, it is found that solutions of only one or two per cent will destroy the virulence of certain septic and purulent matters and the micrococci of fowl cholera, and, according to the showing of Schill and Fischer, a five per cent solution may be relied upon to destroy the bacillus of tuberculosis even when containing spores, if permitted to act twenty-four hours.

Carbolic acid in oil or alcohol is deprived of all its value as a disinfectant. A five per cent solution in oil did not affect the virulence of the spores of the bacillus anthracis in one hundred and ten days, but the bacilli free from spores were killed in six days; yet the same results in the same length of time were attained with pure olive oil.

Sulphate of Iron. This salt, which has been extensively used as a disinfectant, has shown, in the experiments which have been made with it, no power of destroying disease germs. It is worth something as a deodorizer of offensive substances and will retard the putrefactive processes in such material, but when a germicide is needed some other agent should be used.

Sulphate of Zinc has but feeble disinfecting power. A twenty per cent solution, with Sternberg, failed to destroy the micrococcus of pus in two hours, and with Koch, a five per cent solution was not fatal to anthrax spores in ten days.

Chloride of Zinc. Koch pronounces it utterly worthless as a disinfectant. A five per cent solution did not affect the vitality of the spores of the bacillus of anthrax in a month. The later experiments of Sternberg indicate that zinc chloride in the proportion of five per cent solution may be relied upon to destroy micro-organisms in the absence of spores, but when the solution is added to an equal quantity of liquids to be disinfected a ten per cent solution should be used. In a given infectious disease, without positive knowledge of the character of the micro-organism to be acted upon, this salt must be considered as having doubtful germicidal value.

Sulphate of Copper. In the German experiments a five per cent solution was ineffective to destroy anthrax spores in ten days, though the rapidity of their development was somewhat delayed. Sternberg found that a solution of the same strength would destroy the micrococcus of swine plague and that from an acute abscess. He calls it a valuable germicide, and says that it may be safely recommended for the destruction of material not containing spores, but further says that none of the metallic sulphates can be relied upon to destroy spore-bearing pathogenic organisms.

Sulphites, Hyposulphites and Bisulphites. The first two classes of substances have no value as germicides and the last has only feeble powers.

Potassium Permanganate. In the experiments of Koch, a five per cent solution destroyed the vitality of anthrax spores in twenty-four hours, but a one per cent solution failed to injure them in twice as long. In the presence of a large amount of organic matter the permanganate is quickly decomposed before it can exert its germicidal powers. Sternberg says: "It is evident that while potassium permanganate has decided germicide and antiseptic power, it is not generally applicable for purposes of disinfection, because of the readiness with which it is decomposed by organic matter. It is, however, a prompt and valuable deodorizer."

Chloride of Lime. This is popularly known as "bleaching powder," and is a very efficient disinfectant, and, moreover, is very cheap. Germs of all kinds, including those containing spores, are quickly destroyed by it. Dr. Duggan, of the Committee on Disinfectants, says: "There are very few purposes to which disinfectants are applied, that are not fulfilled by this solution of one to one hundred of bleaching-powder. It is not poisonous, does not injure clothing, bedding, etc., and is almost without cost, since bleaching-powder is worth only about five cents a pound." Chloride of lime should be kept in air-tight cases, and for most purposes should be used in solution made as it is wanted. (See Sol. A.)

Solution of Chlorinated Soda (Liquor Sodæ Chlorinatæ, Labarraque's Solution). In solutions of the same strength as those of the chloride of lime, it is of equal efficiency as a disinfectant. As a disinfectant and deodorizer, it is less disagreeable than the chloride of lime solution for various purposes in the sick-room. Preparations of Labarraque's Solution do not keep well, consequently much of that which is on the market is not to be depended upon.

Mercuric Chloride (Corrosive Sublimate). This is a universal destroyer of disease germs and germ spores, and is the most efficient chemical disinfectant known.

Koch found that an aqueous solution of 1 : 1,600,000 had an appreciable effect in retarding the growth of anthrax bacilli, and that 1 : 330,000 would cause a complete arrest of development. The vitality of the spores of the same bacilli, dried on silk threads, was destroyed in ten minutes by the action of a 1 : 20,000 solution. For practical use upon larger masses of infected material, a solution of 1 : 1,000, or, in the absence of spores, 1 : 5,000 is recommended.

Sternberg's estimate of the value of this agent as a germicide is in accord with that of Koch, though his experiments seem to show the need, in practical disinfection, of somewhat stronger solutions. The following are his conclusions:

"Mercuric chloride, in aqueous solution, in the proportion of 1 : 10,000, is a reliable agent for the destruction of micrococci and bacilli in active growth, not containing spores; and in the proportion of 1 : 1,000 it destroys the spores of bacilli, provided that the micro-organisms to be destroyed are fairly exposed to its action for a sufficient length of time.

A standard solution of 1 : 1,000 may be safely recommended for the disinfection of bedding and clothing which can be washed; for washing the floors and walls of infected apartments; for disinfecting the hands and instruments of surgeons and gynecologists; and as a disinfecting wash for superficial wounds or mucous surfaces. For continuous application to wounds, etc., a solution of 1 : 10,000, or less, should be effective.

A standard solution of 1 : 500, with the same quantity of potassium permanganate, may be safely recommended for the disinfection of liquid fecal discharges, and other fluid material supposed to contain 'disease germs,' provided the time of exposure is not less than two hours, and the quantity of material to be disinfected is not in excess of that of the standard solution used."

The only drawbacks to the general use of corrosive sublimate as a disinfectant are its coagulating action on albuminous matter and its well-known poisonous nature. On account of the former quality, when it is added to albuminous masses, as in the case of tuberculous sputum to be disinfected, the outside coagulated coating sometimes protects the inner portions from the action of the disinfectant. On account of its poisonous qualities, the Board of Health does not feel justified in recommending its popular use. When used it should be under the direction of a physician, health officer, or other intelligent and responsible person; and yet when in the form of Solution B. it would be only by gross carelessness that a dangerous accident could occur. On account of its disagreeable metallic taste a quantity great enough to produce a dangerously poisonous effect would not be likely to be swallowed. One ounce of Solution B. contains not quite one grain of the sublimate, and one drachm contains a little less than $\frac{1}{8}$ grain. Solution B. mixed half and half with water, may always be used freely with safety to wash down the woodwork of rooms and furniture; and clothing which has been disinfected in a solution of 1 : 1000 is perfectly safe to the wearer after a subsequent washing, or rinsing, and drying. Experiments made by Dr. Vaughan show that a small quantity of earth or soil of any kind fixes and removes all the corrosive sublimate in a solution filtering through it, therefore, the fear is groundless that wells may be poisoned by the use of this disinfectant in neighboring vaults. Solutions of corrosive sublimate should be kept in earthen-ware or wood, and not put into metallic vessels of any kind, or poured through lead pipes, as the mercurial salt rapidly corrodes and destroys them.

Dry Heat. The value of hot air for disinfection and its applicability to these purposes is summed up in the following conclusions of Koch and Wolffhuegel:

"1. A temperature of 100° C. (212° F., dry heat), maintained for one hour and a half, will destroy bacteria which do not contain spores.

2. Spores of mould-fungi require for their destruction in hot air a temperature of from 110°-115° C. (230°-239° F.) maintained for one hour and a half.

3. Bacillus spores require for their destruction in hot air a temperature of 140° C. (284° F.) maintained three hours.

4. In dry air the heat penetrates objects so slowly that small packages, such as a pillow or small bundle of clothing, are not disinfected after an exposure of from three to four hours to a temperature of 140° C. (284° F.)

5. Exposure to a temperature of 140° C. (284° F.) in dry air for a period of three hours, injures most objects requiring disinfection (clothing, bedding, etc.) to a greater or less degree."

Moist Heat. The experimental work which has been done shows, that for disinfecting purposes, moist heat has very great advantages over dry heat, in that the disinfection can be accomplished with a lower temperature and with not nearly so much danger of injuring infected fabrics, which are subjected to disinfection.

In the absence of spores, all known micro-organisms are quickly killed in boiling water, and, though the spores of certain harmless organisms will withstand prolonged boiling, it may safely be said that the spores of all disease germs are infallibly killed by boiling for half an hour.

Koch, Gaffky, and Lœfler found that the most refractory of spores when subjected to the action of steam at a temperature of 105° C. (221° F.) for ten minutes were destroyed, and Sternberg gives testimony confirmatory of the above, and further says, when speaking of the disinfecting power of steam under pressure, that "at twenty pounds pressure the temperature is about 230° Fahr. (105° C.); at twenty-five pounds, it is about 240° Fahr.; at thirty pounds, it is 250° Fahr. Moist heat at the lowest temperature named destroys the most resistant spores in twenty minutes, while a temperature of 240° Fahr. is effective almost immediately."

Sulphur Fumigation. Both the American and the German experimenters have shown that we cannot depend upon sulphurous acid to destroy spore-bearing germs, and therefore the latter are disposed to abandon its use entirely as a disinfectant. Sternberg says, in reference to this, and in view of his own experiments: "I am not ready to go to this length, and to recommend the abandonment of an agent which enjoys the confidence of practical sanitarians for the destruction of the infection of small-pox, of scarlet fever, of diphtheria, of cholera, and of yellow fever, upon the ground that it fails to destroy the spores of the anthrax bacillus, or of B. subtilis; for the truth of the germ theory has not yet been definitely established for any one of the diseases named, and Wernitz has shown the power of this agent to neutralize non-living ferments. Admitting, however, as I do, the great probability that the infectious agent in these diseases is a living germ, we have good reason for believing that spores are not formed in any one of these diseases. We must not, then, be too exacting with reference to this agent until we are able to recommend something better in its place for the purposes to which it is commonly applied, viz., for the disinfection of apartments and ships."

One thing we may be assured of, and that is that the slight fumigation which is so often given to rooms in which there have been cases of the infectious diseases is entirely harmless to all forms of disease germs, even those which do not produce spores. That we may have any assurance of success with this form of disinfection, the room to be disinfected must have a truly massive dose of the sulphurous acid gas. Three pounds of sulphur at least to the 1000 cubic feet of space, instead of the lesser quantities hitherto recommended, should be burned and care taken that the room to be disinfected is made as tight as possible by closing all openings and pasting strips of paper around doors and windows. The wood-work, furniture, and, when possible, the walls of the room should be washed with a solution of corrosive sublimate or other liquid disinfectant either before or after the fumigation, and all bedding and other articles that can be subjected to liquid disinfection should be immersed (in the sick-room) in a plentiful supply of Solution A. or Solution B, one half strength. Bedding and all clothing which can be treated only with the gaseous disinfection must be spread out or hung out so as to expose all parts as thoroughly as possible, for the sulphurous acid gas has only a feeble power of penetrating masses of fabrics.

The sulphur should be put into an iron pan or other vessel, supported on bricks placed in a wash-tub containing a little water, and set on fire with a few live coals, or by pouring over it a little alcohol, which may be fired with a match.

Solution A.

Chloride of Lime,	4 ounces.
Water,	1 gallon.

Mix. Cost about two cents, or fifty cents a barrel. This is about a three per cent solution.

Solution B. "*Purple Solution.*"

Corrosive Sublimate,	2 drachms.
Permanganate of Potash,	2 drachms.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!* Cost, two or three cents a gallon, when the chemicals are bought by the pound.

The permanganate of potassium in this solution is used to give it color as a precaution against mistakes. It also, in this quantity, increases the deodorizing qualities of the solution. This is approximately a 1 : 500 solution of the sublimate; therefore, mixed with an equal quantity of water or liquids to be disinfected it gives us a

1 : 1000 mixture. One ounce of this solution contains very nearly one grain of the corrosive sublimate.

Solution C. "*Blue Solution.*"

Corrosive Sublimate,	4 ounces.
Sulphate of Copper,	1 pound.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!*

This is sixteen times stronger than Solution B. and is intended as a standard solution, from which, by dilution with water, a solution of the same strength as Solution B may be made. To make from it a solution of the proportion of

1 : 500, add 8 ozs. to 1 gallon of water,
1 : 1000, add 4 ozs. to 1 gallon of water,
1 : 2000, add 2 ozs. to 1 gallon of water,
1 : 4000, add 1 oz. to 1 gallon of water.

Solution D.

Labarraque's Solution,	1 pint,
Water,	1 gallon.

Mix. Cost, about twenty-five cents.

Solution E.

Carbolic acid,	7 ounces,*
Water,	1 gallon.

Mix. This is approximately a five per cent solution, or in the proportion of 1 : 21.

In 1884, the American Public Health Association appointed a committee to investigate the subject of disinfectants, and to give the results of their work in the form of a report. A series of experiments were carried on by the committee to test the value of the various disinfectants. Their report is very valuable, but is too lengthy to be given in this connection; but their conclusions, given

*Seven ounces of the 90 per cent carbolic acid.

on its last pages, are presented below, with the addition of notes enclosed in parentheses, which refer to the preceding formulæ.

The most useful agents for the destruction of spore-containing infectious material are,—

1. *Fire.* Complete destruction by burning.
2. *Steam under pressure.* 110° C. (230° Fahr.) for ten minutes.
3. *Boiling in water* for one hour.
4. *Chloride of lime.* A four per cent solution (about five ounces to one gallon of water).
5. *Mercuric chloride.* A solution of 1 : 500 (Solution B).

For the destruction of infectious material which owes its infecting power to the presence of micro-organisms *not containing spores*, the committee recommends,—

1. *Fire.* Complete destruction by burning.
2. *Boiling in water* for half an hour.
3. *Dry heat.* 110° C. (230° Fahr.) for two hours.
4. *Chloride of lime.* One to four per cent solution. (Solution A.)
5. *Solution of chlorinated soda.* Five to twenty per cent solution.
6. *Mercuric chloride.* A solution of 1 : 1000 to 1 : 4000. (Solution B, 1 part to one of water=1 : 1000; 1 part to 3=1 : 2000; 1 part to 7=1 : 4000.)
7. *Sulphur dioxide.* Exposure for twelve hours to an atmosphere containing at least four volumes per cent of this gas, preferably in presence of moisture.
8. *Carbolic acid.* Two to five per cent solution. (Solution E.)
9. *Sulphate of copper.* Two to five per cent solution.
10. *Chloride of zinc.* Four to ten per cent solution.

The committee would make the following recommendations with reference to the practical application of these agents for disinfecting purposes.

FOR EXCRETA.

(*a*) In the sick room. For spore-containing material:

1. Chloride of lime in solution, four per cent (about five ounces to one gallon of water, or use Solution A).
2. Mercuric chloride in solution, 1 : 500 (Solution B). In the absence of spores:
3. Carbolic acid in solution, five per cent.
4. Sulphate of copper in solution, five per cent.
5. Chloride of zinc in solution, ten per cent.

(*b*) In privy vaults:

Mercuric chloride in solution, 1 : 500. (Solution B.)

(*c*) For the disinfection and deodorization of the surface of masses of organic material in privy vaults, etc.:

Chloride of lime in powder.

FOR CLOTHING, BEDDING, ETC.

(*a*) Soiled under-clothing, bed linen, etc.:

1. Destruction by fire, if of little value.

2. Boiling for at least half an hour.

3. Immersion in a solution of mercuric chloride of the strength of 1 : 2,000 for four hours. (Solution B, one part to three of water =1 : 2,000.)

4. Immersion in a two per cent solution of carbolic acid for four hours (two and one-half ounces to one gallon of water).

(*b*) Outer garments of wool or silk, and similar articles, which would be injured by immersion in boiling water or in a disinfecting solution:

(1) Exposure to dry heat at a temperature of 110° C. (230° Fahr.) for two hours.

(2) Fumigation with sulphurous acid gas for at least twelve hours, the clothing being freely exposed, and the gas present in the disinfecting chamber in the proportion of four volumes per cent.

(*c*) Mattresses and blankets soiled by the discharges of the sick:

1. Destruction by fire.

2. Exposure to super-heated steam—25 lbs. pressure—for one hour. [Mattresses to have the cover removed or freely opened.]

3. Immersion in boiling water for one hour.

4. Immersion in the "blue solution," two fluid ounces to the gallon of water. (Solution C.)

FURNITURE, AND ARTICLES OF WOOD, LEATHER AND PORCELAIN.

Washing several times repeated, with,—

1. Solution of mercuric chloride 1 : 1,000 (Solution C, four ounces to one gallon of water).

2. Solution of chloride of lime, one per cent (Solution A one part, water two parts).

3. Solution of carbolic acid, two per cent (two and one-half ounces to one gallon of water).

FOR THE PERSON.

The hands and general surface of the bodies of attendants. of the sick, and of convalescents at the time of their discharge from hospital:

1. Solution of chlorinated soda diluted with nine parts of water—1 : 10—. (or Solution D=1 : 9).

2. Carbolic acid, two per cent solution. (Two and one-half ounces to one gallon of water).

3. Mercuric chloride, 1 : 1000; recommended only for the hands, or for washing away infectious material from a limited area, not as a bath for the entire surface of the body. (Solution B one part, water one part).

FOR THE DEAD.

Envelop the body in a sheet thoroughly saturated with,—

1. Chloride of lime in solution, four per cent (or Solution A).
2. Mercuric chloride in solution, 1 : 500. (Solution B.)
3. Carbolic acid in solution, five per cent (or Solution E).

FOR THE SICK-ROOM AND HOSPITAL WARDS.

(*a*) While occupied, wash all the surfaces with,—

1. Mercuric chloride in solution, 1 : 1000. (Solution B with water half and half, or Solution C, four ounces to one gallon of water.)

2. Chloride of lime in solution, one per cent. (Solution A one part, water two parts.)

3. Carbolic acid in solution, two per cent. (Two and one-half ounces to one gallon of water.)

(*b*) When vacated, fumigate with sulphur dioxide for twelve hours, burning three pounds of sulphur for every one thousand cubic feet of air space in the room; then wash all surfaces with one of the above-mentioned disinfecting solutions, and afterwards with soap and hot water; finally throw open doors and windows, and ventilate freely.

FOR MERCHANDISE AND THE MAILS.

The disinfection of merchandise and the mails will only be required under exceptional circumstances; free aeration will usually be sufficient. If disinfection seems necessary, fumigation with sulphur dioxide, as recommended for woolen clothing, etc., will be the only practicable method of accomplishing it.

RAGS.

(*a*) Rags which have been used for wiping away infectious discharges should at once be burned.

(*b*) Rags collecting for the paper-makers during the prevalence of an epidemic should be disinfected before they are compressed in bales, by—

1. Exposure to super-heated steam—twenty-five pounds pressure —for ten minutes.

2. Immersion in boiling water for half an hour.

(*c*) Rags in bales can only be disinfected by injecting superheated steam—fifty pounds pressure—into the interior of the bale. The apparatus used must insure the penetration of the steam to every portion of the bale.

SHIPS.

(*a*) Infected ships at sea should be washed in every accessible place, and especially the localities occupied by the sick, with—

1. Solution of mercuric chloride 1 : 1000. (Solution C four ounces to one gallon of water.)

2. Solution of chloride of lime, 1 per cent. (Solution A one part, water two parts.)

3. Solution of carbolic acid, two per cent. (Two and one-half ounces to one gallon of water.)

The bilge should be disinfected by the liberal use of a strong solution of mercuric chloride; the concentrated solution—"blue solution"— of this salt with cupric sulphate may be used. (Solution C.)

(*b*) Upon arrival at quarantine station, an infected ship should at once be fumigated with sulphurous acid gas, using three pounds of sulphur for every 1000 cubic feet of air space; the cargo should then be discharged on lighters; a liberal supply of the concentrated solution of mercuric chloride (Solution C) should be thrown into the bilge, and at the end of twenty-four hours the bilge water should be pumped out and replaced with pure sea water; this should be repeated. A second fumigation, after the removal of the cargo, is to be recommended; all accessible surfaces should be washed with one of the disinfecting solutions heretofore recommended, and subsequently with soap and hot water.

CHEESE, MILK AND ICE CREAM POISONING.

During the past year several cases of poisoning from milk and its products have come to the attention of the Board.

Poisoning on a small scale occurred in Bangor from the use of milk. It seems that four children in one family and one in another made their breakfast chiefly of milk purchased of a grocer. The milk was said to have been brought in from the country that same morning. Three hours after their breakfast, at different schools, the children were attacked with vomiting and later with diarrhœa. The grocer took one quart, which was used in coffee, and had an attack of vomiting an hour or two afterward. Another family, who had the fourth quart out of this gallon-can, used it in coffee and was not affected by it. The Board received a very small quantity of this milk, three or four drachms only being obtainable, but, as there was doubt in regard to the genuineness of this small specimen, a series of biological tests which was begun was discontinued after yielding only negative results.

Another instance of poisoning on a much larger scale occurred at Eastport. July 23, 1886, at a church sociable in that town, many persons partook of ice cream. The company dispersed about half past ten in the evening, and in an hour afterwards some of them became very sick, and by midnight all of the physicians in the place were on active duty. About sixty persons were made sick, and the condition of many of them became alarming. The symptoms usually began with nausea and vomiting, and the vomiting in many cases was very severe and prolonged. Diarrhœa came on later, and the purging was severe in some cases. Other symptoms were abdominal pains, a burning sensation in the stomach, pain and cramps in the muscles of the arms and legs, anxious countenance, coldness of the extremities, and a pulse feeble and, in some cases, almost imperceptible.

Those only who partook of the ice cream which was flavored with vanilla became sick. Those who ate of the lemon-flavored cream were spared.

Cases of poisoning of the kinds which have been indicated have for a long time been known, and their occurrence is somewhat frequent. The close similarity of the symptoms to those produced by some of the mineral poisons, notably arsenic, has often created suspicions of the accidental or intentional addition of these non-organic poisons. Chemical analysis in many of these suspicious cases has given only negative results. In the absence of any detectable mineral poison, the symptoms have variously been ascribed to the flavoring extracts, particularly to the vanilla; and, in the case of milk and its products, to poisonous plants eaten by the cows, and to certain changes in the milk, curd or cheese due to the early stages of fermentation or decomposition. As regards the first, the observation has often been made that, in ice cream poisoning, it is usually the vanilla flavoring which bears the weight of suspicion, for the reason that those who had eaten of only the cream which was flavored with extracts other than the vanilla were not made sick. On the other hand, experiments on man and animals with the suspected vanilla extract have usually been followed with no symptoms of poisoning. Neither have the attempts to fix the blame upon the cows been successful. In regard to the third suggestion, that relating to a supposed change in the milk after it leaves the cow, there is more to support it. Twenty years ago it was discovered that in animal and human tissues after death there occurred an alkaloidal substance apparently generated by the retrograde metamorphosis of the elements of the dead animal tissues. In subsequent years it became apparent that there are many of these *ptomaines*, as they are called, and their isolation and experiments with them show that some of them are capable of producing symptoms similar to the more poisonous vegetable alkaloids.

It was said by a leading German toxicologist in 1882, that of the ptomaines then known none produced symptoms, when tested upon animals, which closely resemble those of cholera morbus, as we see in a marked form in some cases of cheese and fish poisoning. It was reserved for Dr. Vaughan, of Ann Arbor, Mich., to discover an alkaloid which produces these choleraic symptoms, and which undoubtedly is the noxious agent in most of the cases of cheese, milk and ice-cream poisoning. Two years ago, after a long and close investigation, he succeeded in isolating from some samples of cheese which had produced alarming symptoms in many persons, a highly poisonous ptomaine, to which he gave the name *tyrotoxicon*, (cheese poison). The effects of this poison were repeatedly demonstrated upon some of his students, who offered themselves as subjects of experimentation, and upon himself. The symptoms produced were found to agree closely with those which were produced in the persons who had eaten the poisonous cheese, and were dryness and constriction of the fauces, nausea, retching, vomiting and purging.

For an account of further investigations and experiments in this direction, I quote at considerable length from a contribution by Dr. Vaughan to the Sanitary News of July 24, 1886.

"Last November, a student brought to me a four ounce bottle partly filled with milk, which had stood tightly closed with a glass stopper for about six months. From this I succeeded in isolating the same poison. It was recognized by its crystalline appearance, and by its effect upon myself. It was presumed that this milk was normal in composition when first obtained, but of this we could not be certain.

"I then put several gallons of normal milk in perfectly clean bottles with glass stoppers, and allowed these to stand in my work room. From time to time a bottle was opened, and the test for tyrotoxicon was made. These tests were followed by negative results, until about three months after the experiment was begun. I then succeeded in getting the poison from one of the bottles. The method of testing for it was as follows: The coagulated milk was filtered through heavy Swedish filter paper. The filtrate was colorless, and decidedly acid in reaction. It was rendered feebly alkaline by the addition of potassium hydrate, then agitated with ether. After separation, the ethereal layer was removed with a pipette, allowed to run through a dry filter paper to remove a flocculent, white substance which floated in it, and then allowed to evaporate spontaneously. If necessary, this residue was dissolved in water and again extracted with ether. On the evaporation of the ether, the tyrotoxicon was recognized by its crystalline appearance, by its odor, and by placing a small bit on the tongue. As the ether takes up some water, there is usually enough of the latter left after the spontaneous evaporation of the ether to hold the poison in solution, and in order to obtain the crystals, this aqueous solution must be allowed to stand for some hours in vacuo over sulphuric acid.

"From one-half gallon of the milk, there was obtained quite a concentrated aqueous solution of the poison, after the spontaneous evaporation of the ether. Ten drops of this solution placed in the mouth of a small dog three weeks old caused, within a few minutes, frothing, retching, the vomiting of frothy fluid, muscular spasm over the abdomen, and after some hours watery stools. The next day the dog seemed to have partially recovered, but was unable to retain any food. This condition continuing for two or three days, the animal was killed with chloroform. No examination of the stomach was made.

"It may be remarked here that I have elsewhere pointed out the necessity of using pure ether for these extractions, as some samples of ether contain an irritating, ptomaine-like substance.

"June 13, 1886, I received from Dr. Henry B. Baker, Secretary of the Michigan State Board of Health, a pint bottle about two-thirds full of melted ice cream, with the request that I analyze it, as some eighteen persons had been seriously affected by eating it. Dr. Baker also sent some of the vanilla which had been used as flavoring. It was thought that the poison would be found in the vanilla, because some lemon ice cream furnished at the same gathering had not affected those who ate it. As the readiest means of deciding this, my assistant, Mr. Novie, and myself took at first thirty drops each of the vanilla extract. No ill effects following this, Mr. Novie took two teaspoonfuls more, with no results. This settled the question of the poisonous nature of the vanilla more satisfactorily than could have been done by a chemical analysis.

"We then added some distilled water to the cream and, after thorough agitation, filtered it. The filtrate was tested for tyrotoxicon by the method already given. The aqueous solution, after the spontaneous evaporation of the ether, was given to a cat. Within ten minutes the cat began to retch, and soon it vomited. This retching and vomiting continued for two hours, during which time the animal was under observation, and the next morning it was observed that it had passed watery stools. After this, although the cat could walk about the room, it was unable to retain any food. Several times it was observed to lap a little milk, but on doing so it would immediately begin to retch and vomit. Even cold water produced this effect. This condition continuing, after three days the animal was placed under ether and its abdominal organs examined. We certainly expected to find marked inflammation of the stomach. But we really did find the stomach and small intestines filled with a frothy, serous fluid, such as had formed the vomited matter, and the mucous membrane very white and soft. There was not the slightest redness anywhere. The liver and other abdominal organs seemed to be normal."

OTHER KINDS OF POISONING.

Other kinds of poisoning, the symptoms of which are similar to those of cheese, milk and ice cream poisoning, and which are supposed to depend upon incipient putrefactive changes, are poisoning from meat, sausage, fish, and "shell-fish." Each of these different kinds of poisoning has a set of symptoms which distinguishes it somewhat from the other forms, and still there is a general similarity of phenomena which would suggest a relationship of causes.

The similarity of symptoms in some of these cases to the choleraic symptoms which follow cheese, milk and ice cream poisoning will be seen in the description of some cases of meat-poisoning which occurred last summer in Augusta.

A family had a meat soup for dinner. A neighbor who lives in another part of the house had a bowl of the soup sent in to her. About twenty minutes after dinner three visitors from a neighboring town came in. These three ate of the soup. In about two hours the mistress of the house, the maker of the soup, was suddenly taken with intense burning in her throat, thirst, a "deathly feeling at the stomach," vomiting, coldness of the extremities and, later, purging. A little later the others were attacked with similar symptoms, all except a little one who did not like soup and ate none. Moreover, the doctor who attended them said that two cats that had received their post-prandial portion of the soup were attacked with vomiting and diarrhœa, and were reeling about. All recovered, cats included.

Disregarding the cases of poisoning which result from meat which has been rendered unwholesome by disease before the death of the animal, and those which occur on account of poisons, principally vegetable, which may have been eaten with impunity by the animal, but which, stored up in the tissues, may injuriously affect man, there is, in a narrower sense, a class of cases of meat-poisoning of which the cases given may serve as a type.

Sausage poisoning occurs occasionally in this country, but is of much more frequent occurrence in Germany, where the quantity of meat consumed in this shape and the variety of sausages are much greater than with us. Certain kinds of sausages have more frequently than others acted poisonously, and quite often it has been those which are of immense size, or those which are made with blood and liver. In these, the process of drying and curing with smoke goes on slowly and the interior of the mass is penetrated only incompletely. It has repeatedly been found after poisoning with these sausages that while the central portion is very poisonous the peripheral portions are less so or entirely harmless. It is somewhat characteristic of sausage poisoning that the symptoms occur late; while they may come on in an hour or two, in the great majority of cases they do not appear until after from twelve to twenty-four hours. Sausage-poisoning is also characterized by a greater mortality than in the preceding forms of poisoning. In the cases of meat, cheese, milk and ice cream poisoning, which are thought to be due to an alkaloid of decomposition, death is rare; but, in the German statistics, a death rate of from 23 to 43 per cent is given for the earlier records, and a somewhat lower mortality for the later cases.*

The most of our knowledge of fish-poisoning has come from Russian observers. In their country, this kind of poisoning seems to have occurred with exceptional frequency, and to have been followed by a high rate of mortality.

Poisoning from "shell-fish"—oysters, clams, lobsters, etc. —is not so very rare, in its lighter forms, with us. It may occur in an exanthematous form, in which the cutaneous rash is the most marked symptom, or may take principally the form of gastro-intestinal irritation. Exceptionally the poisoning assumes the paralytic or apoplectic form and may rapidly lead to a fatal termination.

PTOMAINES AND LEUCOMAINES.

For our knowledge on these subjects we have to turn mostly to the Italian, French and German literature, for in our own language there is but little to be learned. The name "Ptomaines" has been used to designate certain basic substances which arise during the decay of animal matters. This name was applied to these bodies first by Selmi, the Italian toxicologist, in 1872, but as early at least as 1866, these bodies had been recognized by chemists. In their chemical reactions, as well as in their physiological actions, they bear a strong resemblance to the vegetable alkaloids. For instance, atropin, hyoscyamin, digitalin, nicotin, morphine, curarin, coniin, and others, all have their analogues among the ptomaines. The fact that some of these alkaloids of animal extraction resemble somewhat closely, both chemically and physiologically, some of the

*Husemann. Real-Encyclopaedie der gessammten Heilkunde. Vol. XV, p. 7.

vegetable alkaloids was early recognized as having an important bearing upon medical jurisprudence, and since then the records of criminal courts have contributed quite a collection of cases in which an alkaloid found in the cadaver, supposed to be of vegetable origin and administered with criminal intent, has been shown to be a ptomaine originating in post-mortem changes. The first case of this kind* was the criminal process which followed the death of Gen. Gibbone, in which an alkaloid supposed to be delphinin was found, but which Selmi showed to be a ptomaine. In a second Italian case, the chemical experts believed they had discovered morphine, but Selmi and Casali were able to prove that it was nothing more than a ptomaine. In a third and a fourth case, the alkaloids which were detected were supposed to be respectively strychnin and coniin, but they were shown to be ptomaines.

The chemical peculiarities of the ptomaines which have been described by different chemists are so various that we may regard it as established that there is a pretty large number of these bodies. A few of them have been isolated as well-defined chemical individuals, but more of them have been recognized by their chemical or physiological action in probably an impure state. It is thought that many of them are very unstable and fleeting in their nature, so that they easily elude the efforts of the chemist to detect them. The late works of Brieger have shown that in the different stages of decomposition different basic products are constituted, that many ptomaines in time completely disappear and others take their places, and that certain ptomaines, at first present in only sparing quantities, increase rapidly after the disappearance of certain others which seemed to have stood in the way of the first. The instability of these substances would serve to explain certain facts which have been observed in connection with some cases of supposed ptomaine-poisoning. For instance, in the cases of milk-poisoning in Bangor, of the four families who used from the poisonous can, those who took the milk unheated suffered, while, of the two families who used the milk in coffee, only one person was affected, and he only slightly. Sausages which were intensely poisonous before cooking have been found to lose in large part their dangerous qualities after boiling.

Of the ptomaines which are actively poisonous, some are developed only in the earliest stages of decomposition, before foul smells or other

*Husemann. Real-Encyclopædie der gesammten Heilkunde. Vol. XI, p. 160.

marked evidence gives indication of the change, while others arise only in the advanced stage of decomposition. In the decomposition of fish the poisonous qualities are most marked in the earliest stages.* In poisonous sausages, too, the poison seems to be developed during an early stage of decomposition, and, while advanced decomposition does not destroy their toxic qualities, it appears to set aside their specifically poisonous character.† On the other hand, though Brieger, in human cadavers, discovered ptomaines early in the period of decomposition, it was not until the seventh day that he was able to isolate a ptomaine having markedly poisonous qualities.

Of the conditions which seem to favor the formation of poisonous ptomaines the limited access of air, or rather of oxygen, to the article in question is repeatedly referred to by authors. This has been remarked in connection with corpses that have been buried and subsequently disinterred for forensic purposes; with poisonous sausages in which the peripheral portions, to which the air has freer access, are sometimes found not to be injurious; with poisoning from canned meats as occasionally occurs; and with the experiments of Prof. Vaughan with the two jars of milk, in one only of which was tyrotoxicon found, and that the one which had been closely corked.

Regarding the more essential cause of the changes which give rise to the formation of the ptomaines, it is now pretty generally conceded that it must be referred to the activity of micro-organisms. In the science of the present day the bacteria play not only an important part in the etiology of diseases, but we have come to recognize something of their activity in many of the other processes of life and of death. Back of the physiological activities of the plant or of the animal and essential to them, is the work of the microscopical world. Partly through these smallest of all organisms the soil is made fit for the plant, and the ammonia and other chemical compounds are changed into a form assimilable by the vegetable world. And hand in hand with the building up, there goes on in the economy of nature the process of tearing down and removing the dead and effete material. As was first made clear to us by Pasteur, the fermentation processes, as we see in the alcoholic, the acetic, the butyric, and the ammonia fermentations, are rendered possible only by the presence of specific micro-organisms. Dead organized matter, with the favoring condi-

* Brieger, Untersuchungen ueber Ptomaine. Berlin; 1886, page 64.

† Huseman, Real-Encyclopaedie der gesammten Heilkunde. Vol. XV, p. 5.

tions of temperature and moisture, is sure to go into rapid decay, and its preservation can only be accomplished by the exclusion of bacteria by hermetical sealing or by the addition of chemicals or other antiseptic agents which are inimical to the development of the bacteria. As in the exercise of its function of growing and multiplying, the yeast plant changes sugar into alcohol and carbonic acid, so in the decomposition of albuminoids, the functional activity of the bacteria, probably sometimes by building up the elements into new combinations, and sometimes by removing an element from old combinations, gives us new forms of matter. It is in this way and by these agencies that the basic substances which we call ptomaines are thought to arise; and as the *saccharomyces vini* by its vital activities produces a poison which puts an end to its life after a while, so it is quite sure that in the decomposition of the albuminoids each bacterial form puts an end to its existence by drowning itself out in its own poisonous excretions. In coming to these conclusions we have been helped more by the chemist than by the bacteriologist. From a chemical point of view Brieger* has of late made some additions to our knowledge on this subject. He has not only shown the fact that in the process of decomposition a variety of ptomaines successively arise, but he has sought to determine the nature of the changes which are induced in culture-mediums by pure cultures of certain bacteria. From the culture of the Eberth bacillus of typhoid fever and also from the reputed bacterium of tetanus he succeeded in isolating a ptomaine in crystals, which, tried upon animals, showed toxic qualities. The ptomaine from the bacterium of tetanus when tested upon mice, frogs and guinea-pigs, caused tetanoid spasms both tonic and clonic which, after a time, ended in death.

The term *leucomaines* has been applied by Gautier to alkaloids resembling the ptomaines, but which are found in living instead of in dead bodies. They are thought to be a necessary concomitant of the callular activity in the living organism. Some of the leucomaines which have been isolated are found to be very poisonous.

GARBAGE FURNACES.

One of the questions which is always before all our villages and cities, and one which, when they have tried to do anything, has hitherto been an endless source of trouble to the authorities. is the

*Untersuchungen ueber Ptomaine. Berlin, 1886.

disposal of the wastes which are a necessary accompaniment of our domestic, mercantile and manufacturing activities. Even around the solitary farmhouse, or the isolated suburban residence, the proper disposal of the solid rubbish and wastes of various kinds causes a deal of trouble, and, unless a proper disposition is made of them, they become a nuisance, offensive to the senses and dangerous to health. If garbage may become a nuisance in these isolated homes, as we cannot help seeing in far too many instances, how many more times are the difficulty of disposal and the evil consequences of faulty disposal magnified when house is added to house and the village or city arises. In this case not only is the individual or the family a nuisance to itself, but every household is within the noxious circle which surrounds other households. There are, moreover, greater obstacles in the way of each householder's officiating as his own scavenger. Under these circumstances it is necessary, in the sanitarian's mind, that individuals operate with each other to devise and to carry out some common plan of ridding themselves of the offensive materials which collect about their homes or places of business, or that the town or village act in its corporate capacity to do this work.

Though this work is desirable, and, if healthfulness is to be attained, indispensable, it must be confessed that it has been pretty generally neglected. Some of the causes of this perhaps are to be sought in a hereditary deficiency of the sense of the sanitary fitness of things. Other causes for this neglect are not so far to seek, but are due to the want of some practicable and not too expensive method of disposing of or destroying the garbage.

Of the several methods which have hitherto been in use, it may be said that none of them are free from serious objections. If the garbage is carried any considerable distance into the country its transportation is attended with considerable cost. If buried, it still often remains a nuisance by contaminating the air or polluting the water in the neighborhood. If utilized in part as food for swine or cows, there is sometimes inflicted upon the community which sends it forth a retributive penalty in the shape of an unwholesome milk and meat supply.

In the case of a sea-board town, if it is sent seaward, the garbage may depart from the place of its origin never to return, but in large part it is strewn along other coasts.

The great desideratum has seemed to be some method which would not require a costly transportation of the garbage, or necessitate the defilement of our sea-shores, but which would radically and ultimately destroy it near the place where it is produced.

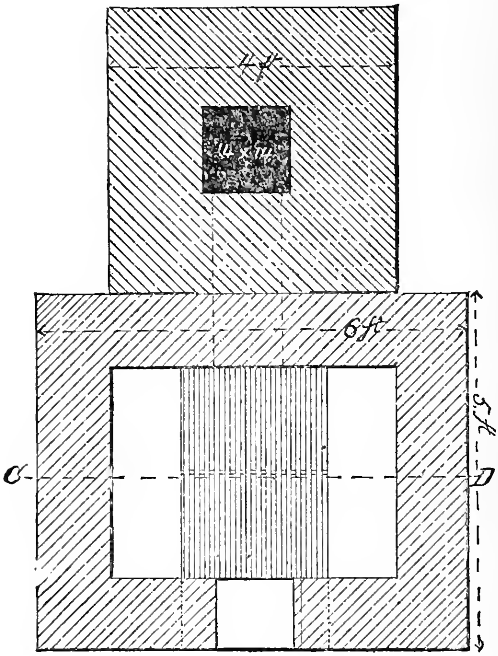
Within the last few years, a new method of disposing of garbage has been written about and talked about, and, to a considerable extent, put into operation and practically tested. It is the method of destroying or cremating garbage by means of furnaces specially constructed for that purpose. Where these garbage furnaces have been put into use, there is a pretty uniform consensus of testimony as to their success. When rightly built, they have done their work satisfactorily, and generally at considerably less expense than had hitherto been incurred in disposing of the garbage otherwise. But little or no cost is incurred for fuel to run the furnace, as the garbage is dried more or less before it is burned, and is made to consume itself. The cost of labor in attending the furnace is not great, and generally there are no unpleasant odors given off in the process of burning.

This method has not been much used in this country, but in Europe, and particularly in England, it has been extensively employed. Dr. O. A. Horr, a member of this Board, who has lately returned from Europe, made special enquiry in regard to garbage cremation in England, and all he could learn convinced him that this system is a success in that country. The garbage furnaces in many of their towns have been in operation many years, and, in conversation with the Health Officer of the City of London, he learned that there are now forty-five of the English towns which make use of this method of garbage destruction.

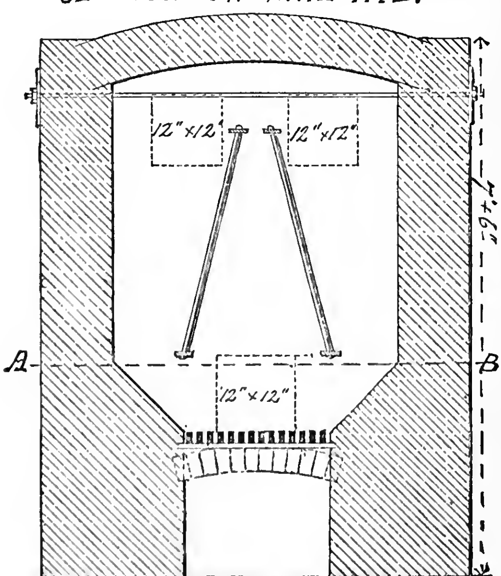
In this country, as far as I know, the experiment of destroying garbage by means of a furnace constructed especially for that purpose was first tried on Governor's Island, New York Harbor. A description of this garbage-cremator was given in the Sanitary Engineer of August 13, 1885, by Lieutenant Reilly, at that time Acting Assistant Quartermaster, U. S. A., at that post, and through the courtesy of that journal we are permitted to produce here the communication and its accompanying illustrations.

OFFICE OF POST QUARTERMASTER,
GOVERNOR'S ISLAND, N. Y. H., July 29, 1885.

SIR: I enclose a sketch, to scale, of the garbage furnace which is in use here, as it may interest your readers. The garbage, varying in daily quantity from ten to thirty cubic feet, used to be buried, but the small extent of ground available for the purpose became so saturated that, in summer time, especially, the odor was distinctly perceptible and not agreeable. For this reason it was finally decided to burn the garbage,



SECTION ON LINE A.B.



SECTION ON LINE C.D.
(Scale 3/8" to 1 ft.)

and I made many unsuccessful attempts to get some information as to the proper construction of a furnace for the purpose. I finally applied to you, and it was on information derived entirely from your valuable paper that the furnace now in successful operation was built. An experimental one, which gave excellent results, was first tried by obtaining an old brick oven so as to get something similar to "Fryer's Destructor," which was described in your paper.

The one now in use consists essentially of a chamber, A, 4x5x3 feet, lined with fire brick and divided into three spaces by two gratings, B, composed of 3-4-inch round iron bars with inch openings between them, and the necessary doors, grate-bars (surface six square feet), and ash-pit. The gratings are for the purpose of supporting the garbage so the heat can get through and dry it, and to prevent it from stopping the draught or putting out the fire.

Its operation was commenced by making a coal fire and putting the garbage in on the right side to dry; the next day's garbage was put in on the left side, and the dry garbage was then raked over the fire. By placing the garbage on the right and left alternately, dry garbage is supplied and the fire kept constantly burning.

The chimney, owing to its location, had to be built fifty feet high, although it was originally intended to have it only thirty feet, which would have given ample draught. The total cost was about $350. There is a slight, inoffensive odor from the chimney which is perceptible in certain conditions of the atmosphere; it is very similar to that given off by burning letter paper. No fuel of any kind other than the garbage is used or needed, unless the fire is allowed to burn out, when, of course, some fuel is necessary to start the new fire. One man has charge, and after putting in the day's garbage generally limits his attention to raking dry garbage over the fire at noon and again at sunset.

Very respectfully,

H. I. Reilly.

Further information regarding this cremator, after its continued trial for a year and a half, is contained in the following letter, kindly written by Lieutenant Reilly in answer to enquiries sent from this office:

Fort Hamilton, N. Y. H.,
20, Jan'y, 1887.

A. G. Young, M. D., Sect'y Board of Health, Augusta, Me.

Dear Sir: Yours of the 15th was forwarded to me and was received yesterday.

The garbage cremator was in successful and uninterrupted use, from the time it was first started until I left Governor's Island last August, and I believe still continues so.

No repairs were made, nor were any necessary up to the time of my departure; the only expense incurred for its operation is the value of the unskilled labor of one man, who puts in the garbage, rakes down the fire, and removes the ashes; the actual time required for this is less than four hours daily.

The quantity of garbage consumed is limited by the daily collections and is only sufficient to keep the fire going continuously. I never had enough to test the capacity of the furnace; if the draughts were opened, one day's dried garbage would not last an hour; and this was the amount collected from 250 to 300 inhabitants of the quarters on the Island.

I found that after the garbage was subjected to the moderate heat of furnace, it lost 50 per cent of its bulk, and, in its dried state, made a very good fuel.

The combustion of the garbage at your summer resorts seems to me to be a very simple problem; it only requires an interior space sufficiently large to accommodate the garbage to be consumed; this space lined with fire brick, and divided so that the fresh garbage can be subjected to the action of the heat for sufficient time to dry it, and sufficient grate and flue surface to consume this, is all that is necessary.

The ashes and cinders make a very good fertilizer, which can be exposed to rain or sun without giving forth any perceptible odor.

I am sorry I did not have the necessary time while I was at Governor's Island to make any experiments as to the rate of combustion, say per cubic foot, so as to give you definite information on this point.

Hoping that there may be some information in this that may be of use to you and regretting that there is so little,

I am, very respectfully,

H. I. Reilly,

1st Lieut., 5th Artillery.

The garbage furnaces, to which reference has been made, are designed to dispose of only those waste substances which cannot be taken care of through a sewerage system. They need very little or no other fuel than what is contained in the garbage itself, after it has been dried in the furnace. Still a further extension of this radical destruction of offensive matter by fire is the application of this system to the burning of night soil. When, with the other garbage, the contents of the privy vaults is included in the furnaces, the cost of destruction is increased, for fuel of some kind, other than the garbage itself, has to be supplied.

A series of experiments in this direction, which were made last year by the health authorities of Wheeling, W. Va., were detailed in an interesting paper by Dr. George Baird, of that place, and read at the last meeting of the American Public Health Association, at Toronto, in October. The summary of the paper, as given in The Sanitarian, is as follows:

"The relative situations of Wheeling, W. Va., and Bellair, O., is such that the drinking water of the latter place is polluted by the night soil of the former, showing the folly of the claim that a running stream of water will purify itself in a few score feet. Opposite the extreme southern limit of Wheeling, on the west side of the river, is the north limit of Bellair. The latter town takes its water supply from the river into which the former place pours its night soil. The consequence is that Bellair is made a hot-bed of disease. For the purpose of doing away with the evils caused in this way, the Wheeling Health Department, last spring, made a series of experiments in the destruction of night soil and garbage by fire, and they claimed that, as a result, they had found a means of entirely destroying these substances and their power to do evil. Two facts about the burning of night soil impressed them. One was that the odor was not such a one as all thought it would be. It was something akin to the smell of burned leather. Another was the intense heat required to burn it. The first experiments were made in a bench of five retorts, at the city gas works. The night soil was mixed with fifty per cent of fine slack, and three retorts charged with this mixture. The other two retorts were charged with a mixture of equal parts of night soil and 'breeze' (fine coke siftings). The retorts were charged at 11 P. M., and it was not until seven o'clock next morning that the contents were reduced to a fine, odorless powder. Another experiment of the same kind showed that retorts were not the proper things for successful combustion, owing to the want of a full supply of oxygen. It was then determined to find a furnace with a strong draft, capable of producing a greater heat than could be obtained in the retorts. The boiling furnace of a nail mill was then prepared for a third experiment.

"After twenty-four hours' heating a charge of twenty per cent fine slack, and eighty per cent night soil was made, and it was burned in one hour and twenty minutes. A second charge of 'breeze' and night soil was made, and it was burned in a little more than one hour. A third charge of night soil alone was made, and it was burned in about the same time as the first charge. Application was then made for the use of a Smith gas furnace, for the heating of steel slabs, preparatory to being rolled into nail plate. This furnace is much larger than the boiling furnace, and capable of generating a more intense heat than any other furnace known. The use of one of these furnaces was given. The result was as follows: A barrel of ordinary garbage, or slop, was burned in four minutes; a barrel of butchers' offal (bones and animal matter) was burned in seven minutes; a barrel of fluid night soil, thrown into the furnace with buckets, was almost instantly evaporated, and a barrel of solid fæces was burned in fifteen minutes. Convinced that this furnace had every requisite for fulfilling the design of destroying night soil and garbage, the Committee reported the result of the above experiments to the Council, and recommended the making of a contract for the building of such a furnace, capable of destroying daily sixty tons of night soil and garbage, and also for burning dead animals of all kinds which might die within the city limits, as well as the refuse matter from the butcher-shops. This furnace is to be constructed for using natural gas as a fuel. Of its success the writer maintains that there could be no doubt. The heating capacity of natural gas is more than four times greater than that of coal, which was used in destroying night soil in a boiling furnace in one and one-quarter hours. With artificial gas generated from fine slack, the night soil was burned in fifteen minutes. With natural gas better work could be done.

"Notwithstanding the great difficulty of destroying this substance by fire, there is in the use of natural gas, as a fuel, more risk of destroying the furnace than of not entirely consuming the night soil. It must not be understood, the writer continued, that this furnace can only be used in cities and towns where natural gas has been introduced as a fuel. Mr. Smith has gas generators built with his furnace in cities where there is no natural gas, and claims that he can produce a heat of greater intensity and with more economy than by any other method or from any other source outside of natural gas, and as cheap as natural gas can be supplied by a private company. The fine coal or slack is not the only substance from which artificial gas can be generated. Tan-bark, peat, and many other substances can be used. Mr. Smith's faith in the success of the furnace is so strong that he has agreed with the Wheeling corporation to ask no compensation until, by a series of successful experiments, he has shown its capacity to destroy all substances proper to be offered as tests of its powers.

"In reply to a question, Dr. Reeves stated that the cost of the furnace does not exceed $2,500."

The furnace which was building by Mr. Smith has recently been completed, and I am under obligations to Dr. Baird for information received at an early date regarding the results of the preliminary testing of the furnace. The first test was deemed very satisfactory, and consisted in the destruction of the carcass of a horse in one hour. A peck measure, it was said, would have held all that remained of the bones and from these the animal matter was completely burned out. An enclosed newspaper clipping gave the results of the second test, as follows:

"The second test of the power of the Wheeling crematory furnace took place yesterday and was an unqualified success, fully sustaining the high opinions formed by M. V. Smith, its builder and inventor. The bad road prevented the securing of more than twenty barrels of night soil. and this was almost entirely the contents of dry vaults, being mixed with ashes, cinders, clay and other debris. It was fully one o'clock before the work of charging the furnace with the contents of the barrels and a quantity of miscellaneous offal was begun, and nearly two o'clock before it was finished.

"The gas was then turned on, and in a few moments all the volatile matter was decomposed by the intense heat and driven off in the form of vapor and gas, leaving the earthy matters and cinders as a residuum. Much of this stuff, having already been passed through fire, would not burn, but the steady application of heat to the mass soon reduced it to the consistency of tar, it much resembling an impure article of glass or furnace slag, having about it no sign or symptom of impurity.

"The nature of the stuff used made the test very severe, but highly satisfactory. There was little or no smoke and no odor except from the stuff spilled on the outside from the imperfect mode of charging the furnace."

Last year an appropriation was made by the city of Toronto, Canada, for the purpose of building several garbage furnaces, and Montreal has a furnace for the destruction of night soil which has been in operation since the summer of 1885.

Public and municipal attention is turning to the favorable results which have accompanied garbage cremation in England, and it is safe to predict that in the immediate future there will be a much larger number of examples in this country to which we can point, as illustrating this system of dealing with the garbage question. This method seems particularly applicable to the needs of our summer resorts, whether consisting of a single hotel or of a considerable town, as in the case of Bar Harbor or Old Orchard, and, both in the interest of public health and as a matter of business, it would undoubtedly pay some of these places to examine this question.

Third Annual Meeting of the National Conference of State Boards of Health.

BY E. C. JORDAN, C. E.

As delegate to the National Conference of State Boards of Health, I beg leave to submit the following report of such parts of the proceedings as, it is thought, may be of public interest in our State:

The third annual meeting of the Conference was held in the parlors of the Queen's Hotel, Toronto, Ont., October 4, 1886. The meeting was called to order by Dr. G. P. Conn, Secretary. The President, Dr J. N. McCormack, not being present, Dr. H. B. Baker, of Michigan, was chosen *pro tem.*

After the minutes of the last meeting were read and accepted, Dr. William Oldright, chairman of the local sub-committee, was introduced and in a very happy manner welcomed the members to the city.

At this opening session, upon calling the roll of the States, there were delegates from twenty-one of the States who answered, and also from the District of Columbia, Dominion of Canada and the Provinces of Ontario, Quebec and Manitoba.

The first paper presented to the Conference was "A Comparative View of Sanitary Laws, and what Changes are Needed in those of Maine," by the Secretary of the State Board of Health of Maine. In the absence of Dr. Young, it was read by your delegate, and will be found in full in other pages of the second annual report. A brief discussion followed the reading of the paper and a committee consisting of Dr. A. G. Young, of Maine, Dr. H. B. Baker, of Michigan, and Dr. William Oldright, of Toronto, was appointed to report a codification of the health laws of the several States and Provinces at the next meeting of the Conference.

The following resolutions were then taken up:

From Pennsylvania—

"What precautions should be taken to prevent the bodies of deceased persons from becoming a source of injury to the public health during transportation on lines of public travel?"

From Michigan—

"1. *Resolved*, That the bodies of persons dead from the following-named diseases should not be transported outside the jurisdiction of the health authorities in which the deaths occur: Diphtheria, scarlet fever, small-pox, cholera, yellow fever and typhus fever.

"2. *Resolved*, That persons sick with diphtheria, scarlet fever, small-pox, cholera, yellow fever, typhus fever, measles or whooping cough should not be transported outside the jurisdiction of the health authorities in which the sickness occurs.

"3. *Resolved*, That the bodies of persons dead from diseases other than those mentioned in Resolution No. 1 should not be transported except by the permission of the health officer of the locality in which the deaths occur; and in case of communicable diseases other than those named in Resolution No. 1, notice should be given to, and whenever practicable permission should be received from, the health officer of the locality to which it is desired to take the body.

"4. *Resolved*, That a permit for the removal of a dead body should be given only on assurance of its having been properly embalmed, suitably prepared, by being surrounded with disinfectants, or enclosed in a hermetically sealed metallic case."

The following are extracts from the remarks of Dr. Benj. Lee, Secretary of the State Board of Health of Pennsylvania:

"Very soon after the establishment of our State Board of Health, I was waited upon by a lawyer from one of the towns in the interior of the State to know whether the board would sanction the exhumation and removal of the body of a man who had died of small-pox. The local board of health had forbidden the exhumation, but the widow was extremely anxious for the removal, and he had come on her behalf to inquire whether we could not reverse their decision. I replied that the object of the State board in its relation to local boards would always be to uphold them in all their efforts to protect the public against infectious diseases, and not to weaken their authority, and that in this instance we should certainly deem it our duty to sustain their ruling. I subsequently learned the history of this case and felt happy in having decided as I had done. It appeared that the deceased was a lawyer of some prominence who was thoroughly imbued with the anti-vaccination heresy. In public and in private, on the street, in the social circle and through the public press, all his efforts were concentrated, both by denunciation and ridicule, to the end of discouraging his fellow citizens from subjecting themselves or their children to this operation. Finally he was taken sick and his physician announced to him that he had small-pox. The case proved to be confluent, of the worst type, and he died in great agony. Fortunately his reason was spared him long enough to enable him to understand and repent of his long course of crime. Who knows how many lives he may have indirectly sacrificed by his wicked presumption before he committed suicide himself? And it was this horribly infected body of a man who had spent his best energies in exposing his fellow beings to infection, which his widow now wished, in order to gratify a mere sickly sentimentality, to render a new center of contagion, and thus add still other victims to his list. I was thus deeply impressed with the importance of placing this matter under strict control; but I felt that unless other States were willing to co-operate, but little could be accomplished for the protection of the people of my own. It was with this object in view that I requested the Secretary of the Conference to give the subject a place on the programme for discussion.

"The plan authorized by the Board of Health of the city of Philadelphia commends itself at once as being effective and inexpensive. The coffin, of whatever kind, unless it be an absolutely secure metallic coffin or casket, is placed in a tight wooden box lined with felt, which has been recently smeared with pitch. The cover of this box is provided with a flange near the edge which sits in a groove on the edges of the box. This groove contains a strip of India rubber. When the cover is screwed tightly down upon this rubber strip the box is sealed as hermetically as a preserve jar. The object in framing all regulations of this kind should be to protect the public health with the least possible interference with private rights and the least possible involvement of expense. I cannot but regard the absolute prohibition of the disinterment or transportation of the bodies of those who have died of the first four named intensely infectious and malignant diseases as eminently wise. When I remember that I have held in my hand a grain of wheat taken from an Egyptian mummy, three thousand years old, and that a similar grain to that has been planted and has germinated, and when I remember that we are still in ignorance as to the length of time that the germ of any of these infections may retain its vitality, I feel that it is not wise to run the risk of saving these germs in half a dozen different States for the sake of gratifying a sentiment which is, after all, but a survival of the pagan worship of the dead. The importance of uniformity in such regulations can not for a moment be questioned. When all the States have adopted a uniform system, and a uniform permit, the transportation of a body from State to State, if it has been properly prepared at the place of death for such transportation, will take place with perfect ease and all possible celerity, all the vexations, delays and expensive details which are now so apt to occur at the terminus of every road and the border of every State being done away with. And at the same time, it being thoroughly understood that certain requirements must be met, proper precautions will be taken at the point of departure, so that there will be no risk of bodies arriving, as they have arrived in the past in the city of Philadelphia, coming from the extreme southern confines of our country in a state of such advanced decomposition that the lid of the coffin or box has been burst open by the expansion of the gases of decomposition.

"In order to bring the subject properly before the Conference, I would move the adoption of the rules proposed by the delegation from Michigan, as they appear on the programme."

After considerable discussion and the expression of some adverse views as to the expediency of adopting the resolutions as introduced, the whole subject was referred to a committee consisting of Dr. Benjamin Lee, of Pennsylvania, Dr. Charles H. Fisher, of Rhode Island, and Dr. Samuel W. Abbott, of Massachusetts.

The Secretary read the following subjects and points of discussion presented by the State Board of Health of Missouri:

"1. How shall County Boards of Health be organized, managed and directed, in order to secure to the State Board, if such exists, the most efficient help and co-operation in general sanitary work, the reporting and proper registration of vital and mortuary statistics, and the enforcement of laws regulating medical practice in States where such enactments exist?"

Dr. Chas. N. Hewitt, Secretary State Board of Health of Minnesota, stated that a county board of health stands in the same relation to the State Board that the family does to society. He said they had 1,050 efficiently organized local boards of health in Minnesota. The local boards have charge of the sanitary inspection of their districts, both in respect to men and animals. He explained the perfect system of communication between the State and local boards by stating that small-pox appeared in a distant township and within twenty-four hours he had a list of every man, woman and child who had been exposed, and within forty-eight hours after he received the first telegram every one was vaccinated or quarantined and the disease did not go beyond the family in which it first appeared. The work was done by two local health officers, and the expense to the State was $10.50. Contagious diseases of animals are controlled in the same prompt manner. A little treatise upon glanders was distributed to the local boards of health. He found that in proportion to the efficiency of the local board organization, with the co-operation of the State Board, was the efficient sanitary work of the State performed. Local boards should understand that they stand shoulder to shoulder. When the local officers have any trouble, then it becomes necessary for him to visit the locality, and the people are so well satisfied with the rulings of the State Board, that its decisions have never been disputed. He thought that the organization of local boards lay at the foundation of all sanitary work. Local boards look to the State Board for assistance. He enlisted the services of young physicians and found many competent men who liked the work. In the matter of expenses incurred, if the local board cannot pay, the State Board does; but the local boards have to pay if they can. The expenses incurred by the health officers in an epidemic in Minnesota is so small that the people do not realize it. The appropriation for the year for the State Board of Health is $5,000, $2,500 of which is the salary of the Secretary and the balance used at the discretion of the board. They had organized the laboratory, and young men from the State University were glad to work in it for the experience it affords. One student obtained a scholarship in consequence of the advantages of his laboratory work.

Dr. Lee said he had listened to Dr. Hewitt's remarks with much interest. There had been in Pennsylvania a very strong pressure brought to bear for the establishment of county boards. He was glad to have the benefit of Dr. Hewitt's experience. There are no local boards outside of the incorporated cities and boroughs.

Dr. Oldright said he would like to hear from Dr. Hewitt in regard to nuisances. In these matters they needed men who were trained for the work, but boards of supervisors were not elected with special reference to their qualification as health officers. In times of epidemics the financial interests of the town are in danger, and the authorities are very glad to co-operate with the board.

Dr. Hewitt stated that none of the supervisors professed to be sanitary men, but it was surprising to see how much they knew about the work, and some of their best inspections had been made by these men.

Dr. J. N. McCormack, Secretary State Board of Health of Kentucky, said they had no township supervisors in his State. They had great difficulty in organizing county boards of health in any considerable number of counties, but that some five or six years ago the law was amended so as to leave the appointment of county boards of health to the State Board. He could not go so far as Dr. Hewitt did in speaking of the general efficiency of the local boards. He found no difficulty in times of epidemics, but in typhoid fever and diphtheria, which cause a far greater mortality, it was difficult to get them to take any very active steps. Another difficulty was in the collection of facts. It was to be hoped that they might be able by modern methods of sanitation to remove the causes of these diseases. In this they had not been able to get the active co-operation of the county boards of health. In very many instances they had secured efficient co-operation, and latterly, since the election of new health officers, the State Board had been able to get a fair sanitary survey of most of the counties of Kentucky, and he felt very much encouraged with the condition of health affairs in the State.

Dr. C. A. Lindsley, Secretary of the State Board of Health of Connecticut, said he was much interested in the report of Dr. Hewitt. In Connecticut, they were, perhaps, far behind the Western States in the matter of sanitary work, and chiefly for reasons which had been mentioned, and the aid and assistance which they ought to have from the local boards of health. In Connecticut there was a nominal board of health in every town, consisting of the selectmen and the justices of the peace. A provision was made which authorized them to add such physician as they might choose, so that the board properly consists at present of the selectmen, justices of the peace, and such physician as they may elect. It was provided that this body may delegate their duty and powers to a committee, and he considered that a very wise provision. At the last session of the Legislature a provision was made that on the Wednesday following the first Monday in October, these boards of health shall organize. They were satisfied with the honor of being called the board of health, but in nine cases out of ten, except in an epidemic of small-pox, they have never taken any action as a board of heath; now they are required to organize and elect officers. In Minnesota and other States there seemed to be mandatory power lodged in the State Board which his board knew nothing of. They can not require anything of anybody; they simply give advice. If it were possible to have more power he thought it might be expended with advantage, but he thought they had made a gain in regard to organization and in securing reports from local boards of health.

Dr. J. F. Hibberd, of Indiana, inquired of Dr. Hewitt whether he had reason to believe that there had been outbreaks of disease of which he had gained no knowledge. Whether the local boards gave their attention to cases of typhoid fever and diphtheria?

Dr. Hewitt said that typhoid fever sometimes prevailed of which they did not hear. The report of infectious diseases in his State is compulsory. Some communities would not call for a physician, and they had to compel the poorer classes to receive the attention of the physician. They sometimes absolutely refused medical attendance. Diphtheria was one of the most difficult diseases to corral. He said there were many outbreaks of which they never heard, but in the majority of cases they were glad of the help of the State Board. He said: "We preach and pray and exhort; we keep up the talk and are making headway. I tell you sanitary workers have got to work with the brake on. I have to run it with the brake on, and expect to wear the brake out." They distribute information in the form of circulars and publish a paper devoted entirely to the interests of sanitation.

Dr. Hunt, of New Jersey, said that in his State they were able to accomplish a great deal with the aid of the local boards. In addition to the local boards they appoint inspectors.

In the afternoon the Conference met according to adjournment.

The following propositions from Kentucky:

"What have been the actual practical results secured, outside of large cities and towns, in preventing the spread of scarlet fever, measles, diphtheria and typhoid fever? and how is the co-operation of the medical profession and general public best secured in such work?"

The discussion of the three questions embraced therein was opened by Henry B. Baker, M. D., Secretary of the Michigan State Board of Health.

"The Michigan State Board of Health was established in 1873. Late in that year the Board issued a circular to physicians, stating the duties of physicians and others under the law in dealing with 'small-pox, and other diseases dangerous to the public health;' also showing the relative danger to the public, from the various communicable diseases. The circular showed that scarlet fever caused more deaths by far than small-pox, and it was urged that if scarlet fever was properly restricted, the deaths from this disease might be greatly lessened. The circulars were distributed to the physicians throughout the State. From that time forward, scarlet fever in Michigan has been treated by the State Board of Health as a dangerous communicable disease, and at present isolation and disinfection are generally enforced by local boards."

Tables were exhibited which showed that there had been in Michigan a decided lowering of the death-rates from small-pox and scarlet fever, since the State Board adopted the practice of distributing its preventive circulars for these diseases. The tables made a comparison of the number of deaths from these diseases, for a series of years, before and since the distribution of these documents was begun.

The following subject was considered:

"Investigation of the causes of disease. How can State boards of health secure the best results?"

Dr. Fisher opened the discussion by saying that the question to be considered by the Conference was the advisability of planning some method of utilizing the great mass of material that might be obtained through the physicians of the various States. He thought the subject should be taken into consideration by a committee during the year and a report made at the next meeting of the Conference. If it seemed advisable, they might report plans and methods of procedure, even, perhaps, to the circulars of enquiry, the questions to be submitted and the manner of recording the facts. He thought that by distributing proper circulars and blanks to the great mass of physicians they would be able to return a great deal of valuable information upon some one line of inquiry. At any rate, it would be of advantage to the physicians in inducing them to observe and record their observations, and by this means there would be an advance in the qualifications of those engaged in the work. From the circulars distributed facts could be recorded and returned to the board, and the facts thus presented could be classified and some really logical conclusions might be drawn therefrom. He desired the opinion of the Conference on this subject.

At the evening session, after the discussion and disposal of other subjects, the following was taken up:

"Inter-state notification in regard to infectious diseases and inter-state co-operation in regard to inspections, and other work for the prevention of the same."

Dr. Bryce, of Ontario, read a paper upon this subject.

At the afternoon session, on the second day, the following resolutions were offered and adopted:

"WHEREAS, It is necessary for the protection and preservation of the public health that prompt information should be given of the existence of cholera, yellow fever and small-pox; be it

"1. *Resolved*, That it is the sense of the National Conference of State Boards of Health that it is the duty of each State, provincial and local board of health in any locality in which said diseases may at any time occur, to furnish immediately information of the existence of such diseases to boards of health of neighboring and provincial States, and to the local board in such States as have no State board.

"2. *Resolved*, That upon rumor or report of the existence of pestilential diseases, and positive, definite information thereon not being obtainable from the proper health authorities, this Conference recommends that the health officials of one State shall be privileged and justified to go into another State, for the purpose of investigating and establishing the truth or falsity of such reports.

"3. *Resolved*, That, whenever practicable, the investigations made under the preceding section shall be done with the co-operation of the State or local health authorities.

"4. *Resolved*, That any case which presents symptoms seriously suspicious of one of the aforenamed diseases shall be treated as suspicious, and reported as provided for in cases announced as actual.

"5. *Resolved*, That any case respecting which reputable and experienced physicians disagree as to whether the disease is or is not pestilential shall be reported as suspicious.

"6. *Resolved*, That any case respecting which efforts are made to conceal its existence, full history and true nature shall be deemed suspicious, and so acted upon.

"7. *Resolved*, That in accordance with the provisions of the foregoing resolutions, the Boards of Health of the United States and Canada represented at this Conference do pledge themselves to an interchange of information as herein provided."

At the morning session of the second day, the first subject taken up was "The Plumbing of the New Capitol of Indiana." Upon this subject the following paper was read by Dr. Metcalf:

Mr. Chairman and Gentlemen:—The subject to which I desire to call your attention is one which may not be of much moment to you individually or collectively, but it is one of paramount importance to the board which I represent and the people of the State. This importance is heightened by the fact that it will, in all probability, be the subject of legislative investigation. If the positions we take are correct we ask your approval. If otherwise, we wish an expression to that effect.

There is now in process of construction and nearing completion, a Capitol building at Indianapolis, Indiana, which in many respects will be a credit to its projectors and tax-payers.

This structure, as provided by law, is under the supervision of four commissioners, of which the Governor is a member ex-officio.

They began the erection of this building in 1877, some four years prior to the organization of the State Board of Health. Rumors of defective plumbing and house drainage were afloat, and charges having been made to the same effect, at a meeting of the county health officers held at Indianapolis, February 18, 1886, Dr. J. F. Hibberd, health officer for Wayne County, introduced the following resolution, which was unanimously adopted:

"*Resolved*, That it is the sense of this convention that the Board of Health should institute such inquiry as shall determine with certainty whether or not there is anything defective in the sanitary arrangements of the State House now under construction, and if anything defective be found in the ventilation, plumbing and drainage of the building or grounds, advise the State House Commissioners of the nature, extent and consequences of the defect, and what should be done to remedy it."

In conformity with this resolution, the Board of Health directed its Secretary to make an investigation of the matters referred to and report to the board.

In obedience to this instruction, investigations were made from time to time, which resulted in revealing what we consider serious defects, which are as follows:

First—A brick sewer, four feet in diameter, which is a part of the city's sewerage system, passes beneath the building.

Second—Earthenware drain pipes with which the waste pipes from urinals and wash-stands connect, and also the soil pipes from the water closets, enter the sewer beneath the building. These pipes are buried beneath the basement floor and are inaccessible.

Third—In the cellar, iron waste pipes enter earthenware pipes, the joints of which are made with hydraulic cement.

Fourth—A soil pipe on the first floor vents into a brick flue which opens into the attic.

Fifth—At the north end of the building a soil pipe vents into the main chimney.

Sixth—The soil pipes are five inches in diameter, and their branches four inches.

Seventh—The waste pipes from urinals are four inches in diameter, and can not be thoroughly flushed by means ordinarily used.

Eighth—No provision has been made for venting the traps to urinals and wash stands.

Ninth—The soil pipes are not provided with fresh air inlets.

We pointed out these defects in a communication addressed to the commissioners April 23, 1886, stating that in our judgment, unless these defects were remedied, the building in the near future would become disease breeding and endanger the health and lives of its occupants.

We object to the sewer because it is a part of the city's sewerage system, draining twenty squares before passing beneath the building. We maintain that the passage of a sewer beneath a building that is to be occupied by human beings is unsanitary, and not in keeping with modern sanitary teachings.

The commissioners, in a reply dated May 20, 1886, defending the system of plumbing and house drainage which they have adopted, embody a letter written by one Levi R. Green, whom they had employed to examine the work and report the result of his investigations.

They say that this gentleman has a national reputation as a sanitary engineer, and that he has made plans and specifications for plumbing State houses, hospitals, penal institutions and hotels in various parts of the country.

This sanitarian approves of a sewer passing beneath a building that is to be occupied by human beings, and particularly approves of the one that runs under our Capitol building, as he says, because "it is built of brick laid in cement and lined with cement," and that the "basement floor is made of concrete or broken stone laid in cement." This design, in his judgment, "will be altogether satisfactory and successful, and will never be the cause of any evil effects from a sanitary point of view."

He also ventures the opinion "that if the State Board of Health is assigned quarters in the basement of the building, and are permitted to live until they are injured by the gas therefrom they will die a good old age."

In contradiction I will say that the sewer is not cement lined. The sewer and drains of the building are not provided with any means of ventilation, and a standard authority says "unventilated sewers are far more dangerous than steam engines without safety valves."

Neither is it provided with means for flushing except by rain falls which occur in the spring, summer and fall, and flushing in this way can not be thoroughly accomplished.

If this sewer or house drain (which it becomes as soon as it passes beneath the building, as it receives all the sewage of the building within the foundation walls) will not be flushed only as the rain may fall semi-annually as above stated (and that is what the city engineer says in a letter to the commissioners) what will be the result? Simply this, that the excrement and other filth that is deposited in it during the winter season must lie there to rot, decompose, generate sewer gas and breed disease germs to enter the building through the unventilated house drain and opening which may occur in the same.

This engineer with a "national reputation" (?) says that the basement floor is made of "broken stone laid in cement," but at the same time he fails to mention the fact that many apertures have been made in it for the passage of soil and other drain pipes, thereby leaving convenient breathing places for the foul sewer.

We will state, without fear of successful contradiction, that house drains to be used within a building should never be made of earthenware, cement or brick; and that the only material from which such drains should be constructed is iron. In support of this position, we will quote from standard authorities on sanitary engineering and also part of section four (4) of an ordinance for the regulation of plumbing now in force in the city of Boston, the home of Mr. Green. It is as follows: "Drain and soil pipes through which water and sewage is used and carried shall be of iron when within a building, and for a distance of not less than five feet outside of the foundation wall thereof. They shall be sound, free from holes and other defects."

William Paul Gerhard, Chief Engineer of Philadelphia, a member of the American Public Health Association, in a work on house drainage and plumbing, says: "Fortunately, however, we can with pefect safety run the drains across the basement floor of a dwelling provided we choose the only safe material, *i. e.*, *heavy iron pipe*."

Baldwin Latham, Past President of the Society of Engineers, London, England, in his work on sewerage and house drainage, says: "It is imperative that all sewers and drains should, throughout their entire length, be constructed so as to be pefectly impermeable," also that all ventilating pipes and drains should, as far as practicable, be kept out of the interior of a house and should be so arranged as to be easily examined at any time.

James C. Bayles, Editor of "*The Iron Age and Metal Worker*," in his work on house drainage and water service, says: "I have never seen a house drain built of stone, brick or wood, and rarely one built of earthen pipes with cement joints, which I should be willing to live over. Stone drains having rough inside surfaces can not be effectually flushed, and become coated throughout with foul deposits, offensive and dangerous in their rapid decomposition. Brick drains as usually built have this objection, together with the liability of all but exceptionally good bricks to disintegrate when buried and kept constantly wet. Even when highly vitrified and laid with hydraulic cement, their rough surfaces and perviousness of their joints to water are objections which should exclude them from use for this purpose. *Earthen pipes, even when well glazed, can not be depended upon when laid in cellars, for the reason that the best cement joints are pervious to water, which carries with it organic matter to lodge and decompose in the pores of the pipe and its joints;*" also that "iron is so much better than any substitute yet found for it, that it should, I think, always be exclusively used in the drainage of city houses."

Waring, Helyer and Davis, recognized authorities on house drainage and plumbing, state unequivocally that all sewage should be carried outside the building in iron pipes.

The *Sanitary Engineer*, published in New York and London, and extensively read in the United States, in its issue of January 28, 1886, says: "A brick sewer in a building is out of place. It is a relic of an ignorant age in matters of house drainage and sewerage."

The *Sanitary News*, in its issue of May 29, 1886, in speaking of this sewer, says: "It is shown that in addition to receiving the sewage of the State House, this sewer drains twenty squares of land, and is in fact a portion of the regular system of the city's sewerage, a fact which makes its position under a great building all the more reprehensible."

The system of house drainage and plumbing adopted by the Government engineers is probably the latest and most improved, and they do not use brick sewers or earthen drain pipes in buildings. In the post office of our city they abandoned the brick sewer formerly in use and substituted iron pipe.

The engines that are to be used in running the machinery of the building (such as ventilating fans, elevators, etc.) are to be exhausted into the sewer. This will cause sudden changes in the temperature of the air, producing unequal air pressure in the drain, which will seek relief at the points most easily forced, which points will be the water-sealed traps and any defects existing in the house drains. The same effects will be produced by the sudden flushing of the sewer by a heavy rainfall.

Another objection which our Board has to the system of plumbing and house draining employed, is that in the cellar, iron waste-pipes from urinals and wash-stands enter earthenware pipes, the joints of which are made with cement. The change of temperature, or the alternate passage of hot and cold water through the pipes, will produce sufficient contraction and expansion of the iron to break the seal and render the joints defective.

The reply of the commissioners contains a report submitted to them by the architect and superintendent of the building, in which they say "the plumbing has been arranged in accordance with the cardinal requirements of perfect house drainage; cast-iron pipes for urinals, four inches in diameter, enter vitrified stoneware pipes, eighteen to twenty inches below the basement floor line. The temperature at this level is constant, and in no case will expansion or contraction of a four-inch cast-iron pipe cause a leak at this point." This statement that the connections are buried beneath the basement floor line is not true. The facts are, the connections are above the grade level, where they are liable to be broken at any time by having rubbish thrown against them, and even if they were buried at the depth mentioned, we hold that it is not admissible.

These gentlemen admit that the earthenware pipes are buried from eighteen to twenty inches beneath the basement floor line, and claim this to be in accordance with the "cardinal requirements of perfect house drainage."

We find that leading authors on sanitary engineering lay down principles diametrically opposed to the plan they praise so highly. Sanitary engineers with experience say "the best course of drain in the house is along the ceiling of the cellar, or along the foundation walls." In other words, whenever practicable, the drain should be kept in sight in order to enable anybody to detect a leaky joint at occasional inspections.

Circumstances sometimes "make it necessary to lay the drain pipes below the cellar floor. In such cases it may be laid with proper fall in a trench, the sides of which are walled with brick work, and the base of which should consist of a layer of from four to six inches of concrete, thoroughly rammed and properly graded. The trench should be made accessible by closing it with covers of iron or wood. In no case should a drain that is below the cellar floor be left inaccessible." The drains in the Indiana State House are not laid in accordance with the above, but on the contrary are laid in a crooked and irregular manner, with brick walls frequently built across them.

No attention has been given to sanitary methods, either in laying the pipes or making the joints, as in many instances the cement has been simply plastered around the edges of the hubs and has cracked and fallen off. It is admitted by the commissioners, architect and superintendent that a soil pipe on the first floor vents into a brick flue, and maintained that this is in keeping with the latest and most improved methods employed by sanitary engineers.

We hold that this is not admissible and in no instance should a brick flue or chimney be used as a ventilator for soil or waste pipes, on account of the liability of the noxious gases arising from the pipes permeating their walls and contaminating the atmosphere of the rooms. Rules for regulating plumbing, as far as we have been able to examine them, require that "sewer, soil and waste pipe ventilators shall not be constructed of brick, sheet metal or earthenware, and chimney flues shall not be used as such ventilators."

We have objected to the five-inch soil pipes used because we believe that four-inch pipes are sufficiently large for a building with any number of water closets. The smaller pipes can be more thoroughly flushed and do the work of larger ones. We object to the four-inch urinal waste pipes on account of their size, believing that half the size is large enough.

No provision has been made for venting the traps to urinals and washstands. We claim that it is as essential that they should be vented as the traps to the water-closets, because they are as liable to become unsealed from syphonage, and if at any time this occurs the unsealed traps will allow a free escape of foul air in the waste-pipes.

The commissioners say "all soil and waste-pipes are trapped at the bottom; fresh air inlets are not provided for, as it is not believed best to do so under existing circumstances. In this latitude cold-air inlets would freeze the traps in the winter time." In the plumbing in the public building at Indianapolis the government evidently has no fear of such an accident, as fresh-air inlets are used.

We are reliably informed that the pure-air inlet is used in all of the best plumbing done in Boston, New York and Philadelphia, in which cities the winters are more severe than in the capital of Indiana.

Wm. Paul Gerhard, in his work on house drainage and sanitary plumbing, says: "Fresh-air inlets are no less important than the extension of the soil pipes through the roof." In order to effect a constant movement and change of air in the pipes, two openings are required, an outlet and an inlet. The extension of the soil pipe through the roof provides only an escape for the foul air generated in the soil and waste pipes through the decomposition of foul organic matter clinging to the interior and lodging in traps under water-closets and fixtures. But in order to oxidize and render harmless this organic matter undergoing putrefaction within the pipes, a constant introduction of fresh air from the outside atmosphere is necessary. There is a second and almost equally important reason for providing a fresh-air inlet whenever the third requirement, the trapping of the drain, has been complied with.

If a water closet is used or a pail emptied into a slop sink, the water discharged into the soil pipes acts like a piston, and carries the air on its course downward with it by friction. Thus the descending water drives the air before it, and out through the fresh air pipe. If this had not been provided it would very likely force the nearest traps, which are under the fixtures, and send a puff of sewer gas into the rooms.

We might quote from the works of Waring, Helyer and others in support of the fresh-air inlet, but we do not deem it necessary.

In conclusion, I desire to propound the following interrogatories:

First.—Should the passage of a sewer under a building for human habitation be approved?

Second.—Should earthenware drain pipes be used within the foundation walls of a building for the purpose of conveying sewage?

Third.—Should iron waste pipes from urinals and washstands connect with earthen pipes within a building?

Fourth.—Is the venting of soil pipes into brick flues and chimneys admissible?

Fifth.—Is it not as necessary for traps to urinals and washstands to be vented as those of water closets?

Sixth.—Should soil pipes be provided with fresh-air inlets?

Seventh.—Should the sewage of a building be deposited in the sewer within its foundation walls?

I have asked these questions for the purpose of obtaining an expression from you, as these are the points on which our board and the commissioners have joined issue.

A committee consisting of E. C. Jordan, C. E., of Maine; Dr. Wm. Canniff, Canada; and Dr. G. B. Thornton, Tennessee, was appointed to report upon the subject of the paper, and at the session on the fourth day E. C. Jordan, C. E., presented the following report:

The committee to whom the interrogatories from the State Board of Health of Indiana in relation to the plumbing of their State House were referred, beg leave to report as follows:

Your committee would state that it feels it unnecessary to answer the questions categorically. There are certain principles in house plumbing that we believe to be upon a solid basis and dangerous to depart from. The foremost of them is that in the removal of the sewage, it shall be done through the medium of heavy iron pipes proportioned to the work to be done, starting from a point at least five (5) feet exterior to the walls of the house, and extending from that point through the house and out of the top to a height determined by surrounding circumstances. Its course should be as direct as possible, and its position where its inspection would at all times be a matter of observation; in other words, as much in sight as possible.

The question of any trap upon the outfall may be debatable, but your committee think it desirable and especially so from the fact that certain advantages claimed for its absence are much more fully realized by the fresh-air inlet. Your committee consider the fresh-air inlet an essential. Its action is two-fold. The current of air which it stimulates is a preventive to the formation of gases, and is a medium of safe removal of such as may form. The arrangement of the inlet to prevent freezing is easily provided for, and such a difficulty is in no sense a valid objection to its use. In regard to the large sewer, a part of the city system, we are at a loss to understand the necessity of its location within the walls of the State House building, but if such is the case it undoubtedly should be of heavy iron pipe. Bricks and cement mortar furnish but an imperfect opposition to the passage of sewer gas, and their use within the walls of a habitation as a container, as is the case in a large unventilated sewer, or as both container and conductor, as when the soil pipe is entered into a chimney flue, is of the most reprehensible character.

The data in the fifth question, for its specific application in this case, are insufficient. In general terms it would be answered in the affirmative. We have not thought it necessary to discuss to any considerable degree the reasons for our condemnation of the methods pursued in the Indiana State House, or for those recommended, because it is common knowledge to those who have made themselves competent to judge that the principles in the first case are known to be and found to be vitally defective, while on the other hand those recommended may be considered to have passed through the speculative and experimental period and become fairly fundamental.

We commend the action of the State Board of Health of Indiana in its endeavors to bring about a correction of the errors so manifest in the principles that appear to have guided the plumbing of their new State House, and upon its insistence that the plumbing of its State buildings should always conform to and keep pace with the advances made in sanitary science.

All of which is respectfully submitted.

E. C. JORDAN, C. E.
WM. CANNIFF, M. D.
G. B. THORNTON, M. D.

Water Supply, Public and Domestic.

By J. O. Webster, M. D., of Augusta, Member of the Board.

The importance of the purity of a town's water supply, to the health of its inhabitants, is shown by the fact that from 70 to 100 ounces of water are required daily by an adult, of which from 20 to 30 ounces are contained in solid food, leaving about 60 ounces to be supplied by some form of liquid.

Besides its dietetic use, a large amount of water must be employed daily in the various mechanical operations of the household, so that the whole quantity needed for a family supply, exclusive of baths or water closets, is about 12 gallons a day to each person. The amount actually used, wherever there is a free supply by aqueduct, is greatly in excess of this. For all purposes there should be allowed, in a large, manufacturing city, 60 gallons a day to an inhabitant; in smaller towns, 35 or 40 gallons.

Pure water is a chemical compound of hydrogen and oxygen, two parts of the former to one of the latter, but this is a theoretical substance and does not exist in nature. All natural waters, however pure, contain a large amount of atmospheric air, some free oxygen, carbonic acid, and more or less salts of various kinds.

The kinds of water available for domestic use may be variously classified, but for our present purpose it seems most convenient to designate them as *rain*, *spring*, *well*, *lake*, and *river* water. In one sense all could be classified under the first head, since all are derived from the rain, but under such different conditions as to cause a great variation in their qualities. That this is the case is not fully realized by many persons, and a recent lecturer in England, John Evans, Esq., has well said:

"I have heard people speak of vast and inexhaustible stores of water, which have been laid up in the body of the earth for untold ages, and which have merely to be tapped to meet all the necessities of a crowded population, or of *springs*, as if there were some spontaneous process in nature by which water was produced in unlimited quantities, but all the water derives its existence from no other source than the heaven above."

RAIN WATER.

Rain water is usually pure as collected. It becomes well aërated by the absorption of air in falling through it, but its supply of carbonic acid is small, being only the amount derived from the atmosphere, for which reason it is flat and devoid of the sparkling quality of spring or well water. In cities it may contain carbon from smoke, and other impurities washed out of the air. Unless care be taken that the roof is well washed by rain before the conductors are connected with the cistern, the water may be soiled by dust from the streets which has collected upon the roof, containing organic matter that will soon spoil it. Water stored in a cistern may be contaminated by impure air, by foul ground-water entering through leaks, or by other kinds of filth accidentally gaining access to it. A frequent cause of impurity is the connection of the overflow pipe with a drain, permitting the entrance of sewer gas. Such connection should never be permitted.

Cistern water is unfit for domestic use unless the cistern be often cleaned; and considering its great liability to contamination, it is not to be recommended as a source of domestic water supply save in exceptional cases.

Rain water is often collected from the surface of the ground of a natural water-shed and stored in an artificial pond, formed by damming a valley or water-course. If the water-shed be uninhabited and devoid of sources of filth, and if all vegetable matter, loam and peat be removed from the storage basin before it is filled, such a source of water supply is unexceptionable. If the vegetable matter be left to decay, the water will be colored and uninviting, perhaps for several years, but it is not proved unhealthy.

The water collected from natural water-sheds may be contaminated by any source of filth that exists there, or by sewage or refuse from manufactories flowing into its storage basin. The recent epidemic of typhoid fever at Plymouth, Pa., is only one of many instances of the poisoning of a water supply by the excreta of the sick.

SPRING WATER.

When the rain falling upon somewhat elevated ground is absorbed and finds its way into an underground channel through which it is carried, perhaps a long distance, until it emerges upon the surface of the earth, a spring is the result. It is easy to see, therefore, that spring water is not necessarily pure;—it may acquire impurity at its source or its place of exit, or it may have absorbed deleterious chemicals in its transit. We do not usually know the source of our springs, but fortunately it is apt to be in some uninhabited region where no filth exists.

Spring water is highly charged with carbonic acid derived from the ground air, which contains many times as much as the air we breathe, and this gives it its sparkling appearance and refreshing taste. It is usually hard, from minerals dissolved during its course through the ground, mainly salts of lime, but many kinds of salts are found in the water of mineral springs.

Spring water, if not too hard, and if found to be free from contamination, is a reliable source of water supply for one or a few families; but however large the amount of water furnished by springs at first, it cannot be depended upon as a constant supply for a city or village.

WELL WATER—GROUND-WATER.

At a varying distance below the surface of the earth, there is found everywhere a body of water occupying the interstices between the particles of soil or gravel, the same as the ground-air does above this level, and flowing slowly towards the sea or the nearest water-course. This is called the ground-water, and it constitutes about forty per cent of the strata of soil which it occupies. Its surface is not level but slopes towards its natural drainage outlet, from two to eight feet in a mile. Its inclination results mainly from friction,—though the underlying stratum somewhat influences its slope,—and this inclination is fully as great as that of the stream flowing through the same valley.

The rain-water sinks through the soil until it comes to an impermeable stratum of rock or clay, above which it collects and the stratum forms the bottom of this subterranean river. Lower still there may be another stratum, with another collection of ground-water which has got access to the space between the two at some point where the upper stratum is deficient, and is steadily flowing on in the same direction.

A well, whether dug, bored, or driven, is simply a cylindrical shaft extending down into the ground-water, and the water in the well stands at the same level as that in the soil. Were the water in a well wholly undisturbed, there would be a constant but imperceptible current in it in the direction of the flow of the ground-water, and there would be no flow into the well save from one direction; but when water is drawn, the level is lowered below that of the water in the soil and inflow takes place from all directions. If a well is freely used, this inflow is liable to occur from a distance of one hundred feet laterally, but in the direction from which the ground-water flows, the inflow to the well will come from a much greater distance. This limit of one hundred feet applies only to ordinary cases. An experiment performed in Germany showed that if the water in the well was kept eight feet below its normal level, by pumping, the height of the ground-water was affected, in every direction, for a distance of about two hundred feet.

Hence, ordinarily, a source of filth, in order to contaminate a well, must be within one hundred feet, or in extreme cases two hundred feet, except in the direction from which the ground-water flows naturally. In this direction it may be at a great distance, especially if the subterranean river flows through quicksand. But this is not the whole truth, for the original source of filth may be much further removed and have gradually defiled the soil in the direction of the well until it has extended within its influence. Cess-pool filth has been known to permeate through the soil for a distance of two hundred yards and poison wells. There is also danger of contamination from surface drainage, especially in a gravelly soil. To avoid this, the upper part of a well should be made water-tight and the ground should always be kept scrupulously clean within one hundred feet. No drain, unless water-tight, no cess-pool, sink-drain, privy, or other source of filth, should be allowed within this distance.

The general characteristics of well water are similar to those of spring water, but from sandy soils it is deficient in carbonic acid and is not sparkling and refreshing. It contains a variable amount of mineral matter, principally the salts of lime, soda and magnesia. Unless too hard, it is more palatable and is thought by some, if pure, to be healthier for drinking than pond or river water, but its liability to pollution renders its use often hazardous.

In a small, rural village, the supply of water from wells may have been of unexceptionable quality for an indefinite time ; but the place grows, population becomes more dense, the ground-water is drawn upon in excess of its supply, the drainage area of the wells is increased, and the water becomes less pure, both from this cause and from the increased amount of sewage returned to the soil, which is sure to become saturated with organic matter beyond its powers of oxidation, and pollution of wells is inevitable. They should be entirely abandoned as a source of water supply for household use, wherever there are over two houses to an acre of land. Even on isolated farms the well may be polluted, but only from the grossest carelessness in regard to its location and its relation to buildings and other sources of filth.

It has been often proposed to supply large villages or even cities with water from numerous wells located in the neighboring country. The supply from such a source may be ample at first, but it will constantly grow smaller, the level of the ground-water will fall, and the supply may fail. The supply of water in the soil is not inexhaustible and cannot be drawn upon indefinitely. It all comes from the rain-fall, and this cannot be depended upon for more than four or five inches a year to supply the wells and rivers of a district. That taken from the wells is so much taken from the sources of the neighboring streams, though it may be returned to them after using. When the plane of saturation falls, so as to be flatter than the inclination of a valley, the stream flowing through it dries up.

Sometimes, however, the rain-fall of a natural water-shed, instead of forming a stream or pond, is absorbed by the porous soil of a valley, forming an underground pond which can be depended upon for a definite amount of water, depending upon the extent of its water-shed. If the latter be large enough and clean, wells sunk in such a location will form an excellent source of public water-supply.

Filter-galleries have been constructed in several places,—a large trench near a river, with the idea that the river water would filter through the intervening soil into it. As a matter of fact, most of the water in these galleries is derived from the ground-water, the flow of which is towards the river. The water is usually harder than that of the river, is of more uniform temperature—warmer in winter and colder in summer—and its level is higher if pumping has been interrupted for a considerable length of time. It is subject to the same risks of contamination as well water.

Some writers have undertaken to make a distinction between ordinary wells and "deep wells." The latter extend through an impermeable stratum into a water-bearing stratum below, which is, however, connected with the upper ground-water stratum at a locality more or less remote. Their water is ground-water and they have not *necessarily* any advantage over shallow wells; but as a matter of fact, their water is usually very pure, but hard.

An *artesian* well, properly so-called, belongs however to a different class. It is an artificial opening into a pervious stratum between two impermeable strata, where the water exists under pressure, having its source at an elevation. If the water found its way to the surface through a natural opening, it would form a spring; hence it may be pure or impure, under the same conditions as spring water. The water of artesian wells is of very uncertain character, being often worthless from the large amount of mineral matter. It is generally free from organic contamination.

LAKE OR POND WATER.

The water of lakes and ponds is derived directly from the rainfall, collected from natural water-sheds. It is generally of great purity, from their usually secluded position and the cleanliness of their water-sheds, and from their action as settling-basins for all suspended matter.

"There is no instance of a populous town having grown up on the banks of any one of these lakes in Massachusetts." [Mass. S. B. H. Rep. Vol. 4.] Hence lakes or large ponds are regarded, as a rule, as the safest source of public water supply for cities and large towns.

Their water is soft, well aërated, but apt to be flat from its small amount of carbonic acid. The water of ponds, whether natural or artificial, is liable to be affected by the growth of fresh-water sponges, or of the class of plants called Algæ. The former, by their decay, may give the water a disagreeable appearance and odor, but this is not proved injurious to health. The latter are often so fine as not to be distinguished in a glass of water, but to larger quantities they impart a greenish hue, and the use of the water so affected is apt to cause diarrhœa. They can be removed by filtration, but will quickly clog the filter, and are speedily reproduced in the filtered water.

RIVER WATER.

River water is more complicated than the kinds hitherto mentioned, since it is derived partly from the surface drainage of its water-shed, and that of its tributaries, and partly from the rain water that is absorbed by the soil and flows as ground-water into the river-channel, which is the natural drain of a large tract of land. It is better aërated than pond water, from its prolonged contact with air while in rapid motion, and better carbonated from the absorption of carbonic acid by that portion of it which soaks through the ground. It is not so soft as pond water, but is more palatable, though less so than that of springs and wells.

It is liable to contamination to a greater degree than the water of ponds, since cities or villages and manufactories are oftener situated upon the banks of rivers than upon the shores of ponds.

It was long thought that running water would purify itself, that any sewage flowing into a river was destroyed by oxidation in the course of 20 miles' flow, and many facts tend to support this supposition. Instance, the Blackstone River in Mass.; after receiving sewage equal to 5 per cent of its volume, and flowing 20 miles, the analysis failed to show much difference between the water of the river at this point and its head waters. [Mass. S. B. H. Rep. Vol. 7, p. 146.] The river Seine becomes, about 55 miles below Paris, as pure as before reaching that city. [Annales d'Hygiene, Jan., 1887.]

Several factors seem to be concerned in this apparent purification. Oxidation does occur to some extent, and the experiments of the English Rivers Commission indicate that, in flowing twenty miles, from twenty to thirty per cent of sewage matter might, in summer, be destroyed by oxidation. Then, precipitation is constantly going on and suspended matters are rapidly removed by this means. But most of the apparent purification of running streams results from the great dilution of the sewage by the constant increase in the volume of a river, both from tributary streams and from the inflowing ground-water. In this way the poisonous matters may be so diluted as to be beyond the powers of chemical analysis to detect, and yet, should the germs of disease have been present, they are still there and as powerful for evil as ever. Dr. Frankland, the highest authority on this subject, says:

"There is no process practicable on the large scale by which that noxious material (sewage-matter) can be removed from water once so contaminated, and therefore I am of the opinion that water which has once been contaminated by sewage or manure matter is thenceforth unsuitable for domestic use."

"If a stream has received much filth in its course, its waters should be considered objectionable and to be avoided for human use; unless indeed the volume should be so great compared with the filth-pollution as practically to be independent of such reasoning. If sewage contain the germs of disease, whatever they may be, no agency at present known, except a sufficiently high temperature, will efficiently destroy them." [Mass. S. B. H. Rep. Vol. VIII, p. 283.]

Rivers are such convenient sources of water supply for the cities lying upon their banks, that there is great danger that they may be drawn upon for that purpose, without sufficient regard being paid to their possible sources of pollution; so that it has been thought best to dwell, at considerable length, upon this part of our subject. The immense volume of the Kennebec, Penobscot and Androscoggin rivers probably secures them practically against danger; but it would be much better to bring water a long distance from a pond, than to risk taking it from any other river of the State after it has passed a city or large town.

DISTRIBUTION.

The carriage of water,—that is, its distribution by pipes,—is an important element in its healthfulness. Iron pipes do not injure the water, but the reverse is not true, as the pipes themselves are filled with rust and rendered useless in a few years unless protected. The best protection for cast-iron pipes is a coating of coal-tar, which is applied at a temperature of about 500°. The most convenient substance for house water-pipes is lead, but it is unfortunately dissolved by some—mostly soft and very pure—waters. Carbonic acid and the carbonates in water protect lead pipes. With sufficient care in always letting as much water as the pipes hold run to waste in the morning, there is little danger in using lead for service pipes. A gallon of water should be thrown away for each twenty feet of one-inch or eight feet of one and one-half inch pipe.

For street mains, iron pipe alone is suitable.

FILTRATION OF WATER.

With a view to the removal of any impurities that may be present in a water supply, filtering is often resorted to. Cistern water should always be filtered, and for this purpose the commonly-used brick partition is efficient for a time, but it soon becomes covered with a deposit that injures rather than benefits the water; it should be frequently cleaned. The filtration of a general water supply may be either central—before distribution, or peripheral—at the houses of consumers. For *central filtration* we use filter-material of sand and gravel, freed from loam by washing, and screened into lots of uniform-sized particles. A water-tight filter-basin is built and the material is arranged in it in layers, the coarsest at the bottom. A pipe brings the water to the top of the filter, and another at the bottom conducts away the filtered water. Water is brought to the filter either immediately from the source, or after first standing in a settling-basin.

An ordinary arrangement of the filter material is the following, from the top downward:

12	inches	fine sand,
12	"	coarse sand,
6	"	fine gravel,
6	"	medium gravel,
6	"	coarse gravel,
12	"	broken stone,
54	inches in all.	

Its action upon matters in suspension is two-fold; large particles are arrested at the surface,—with regard to finer particles the process is one of sedimentation and adhesion; and some action takes place upon dissolved matters by oxidation.

It cannot, however, be depended upon to remove the turbidity from finely-divided clay, or the brownish-yellow color of water from peaty meadows or artificial ponds; and it is not proved that filtering removes organic germs to any extent.

The filtration of the Thames water "not merely removes the sediment which may be in suspension, but it removes a large portion of the organic matter,—forty per cent, Dr. Frankland says,—which finds place in the natural water of the river." [Mass. S. B. H. Rep., Vol. VIII, p. 29.]

Water should not be stored after filtration, but should be delivered at once to consumers.

Dr. Frankland has found ferruginous sand more efficient for filtering than sand that is free from iron.

"For the purification of general water-supply, simple filters of ferruginous sand, combined with means for agitation and thorough aëration, will probably be satisfactory." [San. Eng. 7, October '86.]

The expense of filtering a general water supply has been so great in England, that American cities have been slow to adopt it,—the cost being from $2.50 to $3.00 a million gallons for sand filtration as ordinarily conducted, and as described above.

Filters containing "spongy iron" have been used very effectively at Antwerp since 1881. Simple straining through sand is all that is needed to remove sawdust, as at Bangor. As most of the matters removed in filtering are retained by the upper one or two inches of fine sand, the surface requires frequent removal and, after a time, a supply of fresh sand. To avoid this necessity, filters have been constructed with an arrangement for forcing filtered water up through the filter-bed, at the same time stirring the surface mechanically and pumping out the water until it is perfectly clean. Such a filter is in successful use at Cumberland Mills, and one has been built at Augusta, which is figured and described at the end of this paper.

For *peripheral*—or household—filtration, a great number of apparatus have been devised, using an almost endless variety of filter-material.

It is impossible that any of the small filters made to be attached to water-faucets can act otherwise than as simple strainers; and a cotton-flannel bag tied to the faucet, although not so ornamental, is quite as useful.

A sand-filter can be readily made from a large flower-pot, by putting a layer of coarse gravel in the bottom, then finer gravel, then fine sand. All the particles in a layer must be of a size, or the filtering will not be efficient.

Animal charcoal (bone-coal) has been regarded as the best material for domestic filters, though the so-called spongy iron has some claims to preëminence. A well-constructed filter containing either of these substances will, undoubtedly, accomplish much towards purifying water, both mechanically and chemically. The *filtre rapide*, used by Gen. Wolseley in Africa, seems to be a good example of the former kind; but no patent filter should be used without knowing what the filtering material is, as many of them are worthless. Whatever material is used, it must be occasionally renewed or it will injure the water instead of improving it.

Dr. Smart's filter is as good as many patented articles. It is of tin, funnel-shaped, the upper end of the tube projecting half-an-inch into the body of the funnel (tunnel). A cloth is tied over the bottom of the tube, which is three-fourths filled with granulated bone charcoal and the upper fourth with sand ; and a cloth is tied over the top of the tube. The upper cloth must be occasionally removed and washed and half an inch of the sand replaced by new. After a time, the whole contents of the tube must be renewed.

Much of the interest that attaches to the filtration of water has of late concentrated itself upon the possibility of filtering out organic germs. While the water of springs and deep wells is comparatively free from these organisms, surface-water contains great numbers. Most of them are harmless, but there is always the possibility that the specific germs of disease may be present.

For two forms of filter—Chamberland's, of unglazed porcelain, and the Micro-membrane Asbestos Filter—strong claims are made of their ability to completely remove organic germs. They are both very efficient forms of filter, but their claims in this respect are still *sub judice.* Many experiments have been made with numerous forms of filter to ascertain their efficiency in removing these organisms, but the results are so contradictory that no conclusions are justified. It seems probable, however, that many substances can accomplish this when first put in use, but that the power is very soon lost.

CHEMICAL PURIFICATION.

The removal of suspended matters, from a somewhat hard water, may be accomplished by adding a small amount of alum or perchloride of iron. Hydrate of alum or iron is formed, which is insoluble and, in settling, carries down the other substances with it. The Hyatt system of filtering uses this process, followed by sand filtration. On the small scale, organic matter may be removed by the addition of permanganate of potash, which oxidizes it.

HARD WATER.

There are two kinds of hardness of water—temporary and permanent. The first is so called because it is removed by boiling, and is owing to the presence of bi-carbonate of lime. By boiling, carbonic acid is driven off, leaving the carbonate of lime, which is insoluble and forms the scale upon tea-kettles. The hardness may be cheaply removed by adding lime-water, the lime in which unites with the extra carbonic acid and forms carbonate of lime, which settles. Soap or washing soda will soften such water, but quite expensively. Permanent hardness is mostly caused by the presence of sulphate of lime. Such water may be softened by adding carbonate of soda (washing soda), which reäcts with the sulphate, forming carbonate of lime, which settles, and sulphate of soda, which remains dissolved. This process is too expensive for any but domestic use; but the removal of temporary hardness is practicable for a public water supply.

Boiling not only removes temporary hardness, but also has considerable effect in purifying water. Organic germs are, in large part, removed by this means; and although some forms of bacteria resist the boiling temperature, disease-germs are probably nearly or quite all destroyed by it.

IMPURE ICE.

The well-known fact that water in freezing excludes some of its dissolved constituents has led to the supposition that it accomplishes a complete purification in this way. Such is not the case, for organic matter,—and especially its most dangerous form, the germs of disease,—is not wholly removed by freezing. Dangerous epidemics have been caused by the use of impure ice, notably those at Rye Beach, N. H., in 1875,—[Mass. S. B. H. Rep., VII, p. 465,]—and at Washington, Conn. in 1879,—[Conn. S. B. H. Rep. II, p. 90th]. Ice for domestic use should not be cut from a pond which is unfit for a source of water-supply.

James T. Gardiner, Consulting Engineer to the N. Y. State Board of Health, after a thorough examination of the subject, arrived at these conclusions:

"*First.* Ice frozen from impure water has caused illness.

"*Second.* Ice may contain from eight to ten per cent of the organic matter *dissolved* in the water from which it was frozen.

"*Third.* Ice may contain, in addition to the dissolved impurities, a very large amount of organic matter which had been *suspended* or floating in the water before freezing.

"*Fourth.* Ice may contain living animals and plants from the size of a visible worm down to the minutest spores of bacteria and the vitality of these organisms be unaffected by freezing."

EFFECTS OF IMPURE WATER.

Impure water may act in either of three ways to produce disease: First, the digestive organs may be affected by the direct contact of the contained impurities; second, after absorption, it may occasion impairment of the general health, or, third, it may convey disease germs which gain entrance to the system and set up specific diseases.

1st. Many very hard waters, and some containing iron, cause dyspepsia and, especially those impregnated with sulphates of soda and magnesia, diarrhœa. The latter is a well-known effect upon strangers, of the water in some parts of the west.

Diarrhœa is frequently caused by organic matter in water, as the leachings from vaults, drains, cesspools, or other sources of filth. This is also a common cause, if not the commonest, of dysentery, besides which the water may probably carry the specific cause of the disease derived from sewage. Sewer gas absorbed by water, as in a cistern whose overflow pipe connects with a drain, may cause diarrhœa.

2d. Either directly, or as a result of derangement of the digestive system, the use of bad water is apt to occasion a condition of *malaise*, and a feverish state without the signs of a specific fever. It also makes its user more vulnerable to any acute disease.

A small amount of sewage contamination, in drinking water, may not show any sensible effects upon the health of its users in ordinary times; but at the approach of an epidemic—like cholera—there is a wide difference against those places supplied by the impure water. This has been shown unmistakably by a careful analysis of the London cholera epidemics of 1849, 1853, and 1866.

3d. In malarial regions, the water of marshes—as well as the air passing over them—conveys the malarial poison. This is well established, although the poison is oftener carried by the air.

Probably much the most frequent way in which the germ of *typhoid fever* gains access to the body is by the medium of drinking water contaminated with the discharges from a previous case of the disease. The epidemic at Plymouth, Pa., is fresh in our remembrance, but many as striking instances were previously well known. Dr. E. D. Mapother, of Dublin, reported an instance, where forty cases of typhoid fever occurred in a hospital which received its water supply from a river. The cause was traced to some barracks, *twenty-five* *miles* higher up, from which typhoidal dejections had been emptied through drains into the river.

Whether water contaminated by sewage can *originate* typhoid fever, if the poison from a previous case of the disease be absent, is a question still unsettled, with strong arguments on both sides; but it is certain that this disease is connected, in a large proportion of cases, with the use of water impregnated with excrementitious matter, and this is the practical point, while the presence or absence of a specific germ is theoretical. It is a safe rule to avoid the use of such water. In cases of typhoid fever, the dejections should be carefully disinfected and so disposed of that it is impossible for them to be washed into any source of water supply.

It seems well established that *cholera* may be propagated by the defilement of water with the discharges from subjects of the disease; besides which, as already stated, persons who are using an impure water, especially that tainted with sewage, are more liable to the disease when it is prevalent. The epidemics of cholera appear to take their rise in India, from the defilement of the water that takes place every twelve years at Hurdwar, on the occasions of the pilgrimages.

Diphtheria and *scarlet fever* may be spread by means of water which has become, in some way, impregnated with their germs; but the more common way in which impure water is connected with the prevalence of these diseases is probably by making the system less able to withstand the specific poison, and rendering the attack more malignant. And this is an important point, that will bear repeating, that impure water renders the system more vulnerable to almost any form of disease.

TESTS.

If water looks, smells, or tastes badly, any one is likely to suspect it of impurity and desist from its use; but sometimes the water that appears unusually good, to the senses, contains a large amount of organic matter, and perhaps the germs of disease. The latter cannot be detected by any means at present known, but there are some simple tests, that can be used by any person of intelligence, for the detection of organic matter in water.

1st. To a half pint of water, in a perfectly clean bottle, add a half teaspoonful of pure granulated sugar, cork tightly, and keep at a temperature of 70° F. If the water becomes turbid and offensive within forty-eight hours, it contains a dangerous amount of organic matter.

2d. Dissolve 8 grains of pure potassium permanganate in 1 ounce of distilled water. To a half pint of the suspected water, in a tumbler, add one drop of this solution. If the red tinge disappears in half an hour, add another drop, and so on until a slight tint is left. For every drop that loses color the water contains from 1½ to 2 grains of organic matter to the gallon. If the loss of color is rapid, the organic matter is probably animal, if slow, vegetable.

These tests, however, are crude and imperfect, and a positive result will only furnish a strong indication for the necessity of a thorough analysis by a competent chemist; while a negative result wlll only show that the water is *probably* pure.

CONCLUSIONS.

First Cistern water, owing to its liability to pollution, is not desirable for a domestic supply; but with proper care and precautions, it may be safely used when nothing better is available Under many circumstances, it is to be preferred to well water.

Second. Spring water is usually pure but necessarily so. Its purity should be established by suitable tests. When pure and not too hard, it is the best water possible for domestic use, but is rarely furnished in sufficient abundance for public supply.

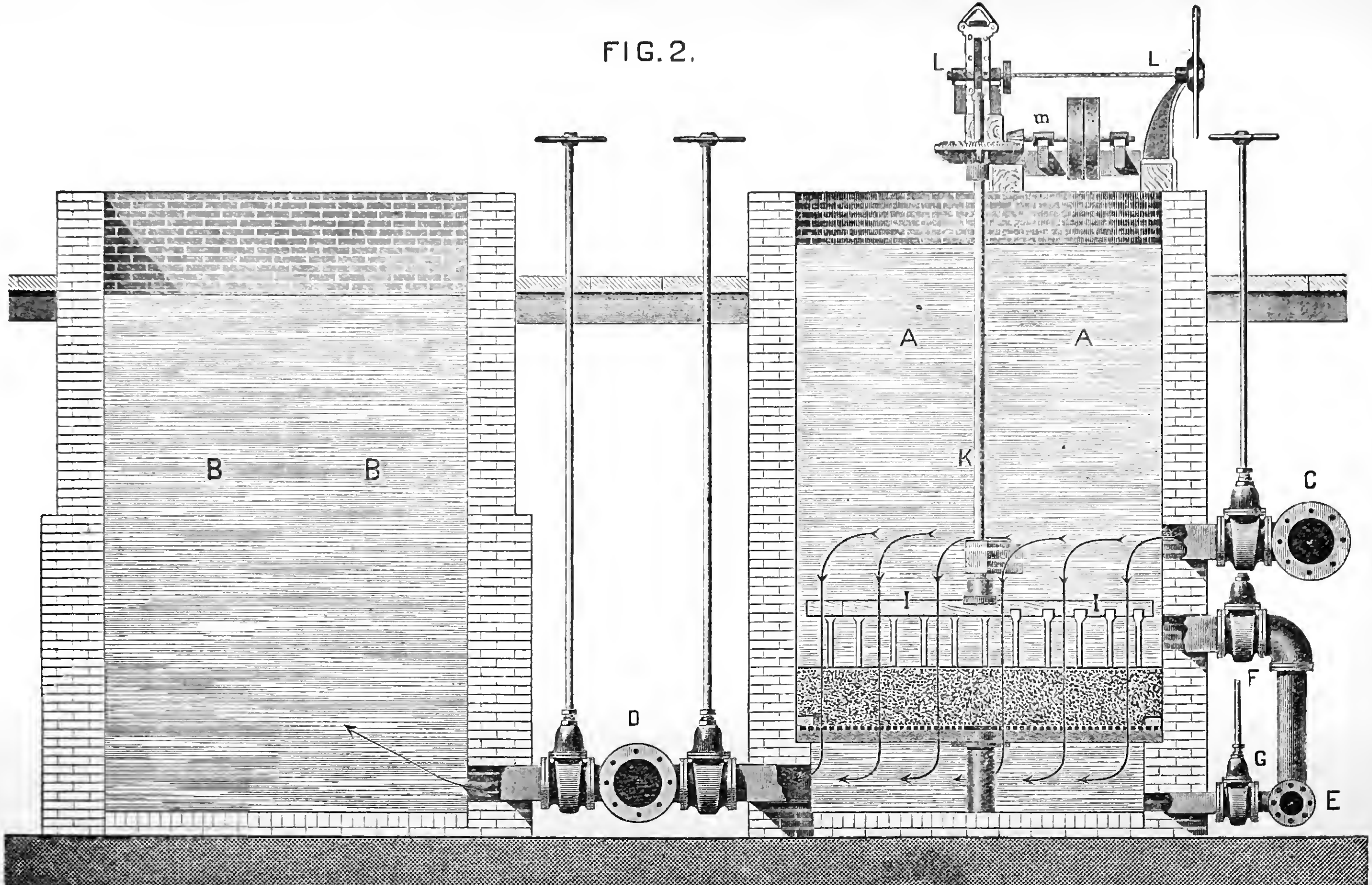
Third. Well water, in a thinly settled neighborhood, and with proper care in the location of the well and the exclusion of surface drainage, and unless the water be very hard, is well suited for domestic use. It should never be used in a city or village. Ground-water from "filtering galleries" or from large wells, if the conformation of the ground be such as to insure an abundance, and freedom from contamination be secured, forms an excellent public supply; but the necessary conditions are rarely found.

Deep wells often furnish good water when that from shallow wells in the same locality is bad.

Fourth. Pond or lake water, when the water-shed from which it is collected is known to be free from any source of filth, is the most desirable for public water supply.

Fifth. River water, from the fact that a river constitutes the natural drainage-channel for a large territory, and that cities or large villages are commonly situated upon its banks, is usually a very questionable source from which to draw the water supply of a town or city. Unless the volume of the river be very large, and the villages upon its banks small, it should be unhesitatingly condemned.

FIG. 2.



THE WARREN FILTER.

This is the filter already mentioned, as being in use at Cumberland Mills and Augusta. Its construction and method of operation will be well understood from the following plates and description.

Fig. 2. Filter in Operation and Reservoir.

A, Filter tank filled with water.

B, Storage reservoir.

C, Inlet or supply pipe.

D, Outlet or filtered water pipe.

E, Waste pipe to waste pump or sewer.

F, Upper waste gate to empty tank above filter bed.

G, Lower waste gate to space below filter bed.

H, Filter bed—fine gravel, 15 inches thick.

I, Agitator—slightly harrowing surface of filter bed.

K, Agitator shaft, revolves 6 revolutions per minute.

L, Sleeve with rack and pinions and hand wheel for raising and lowering agitator.

M, Gears and pulleys for rotating shaft.

FIG 3.

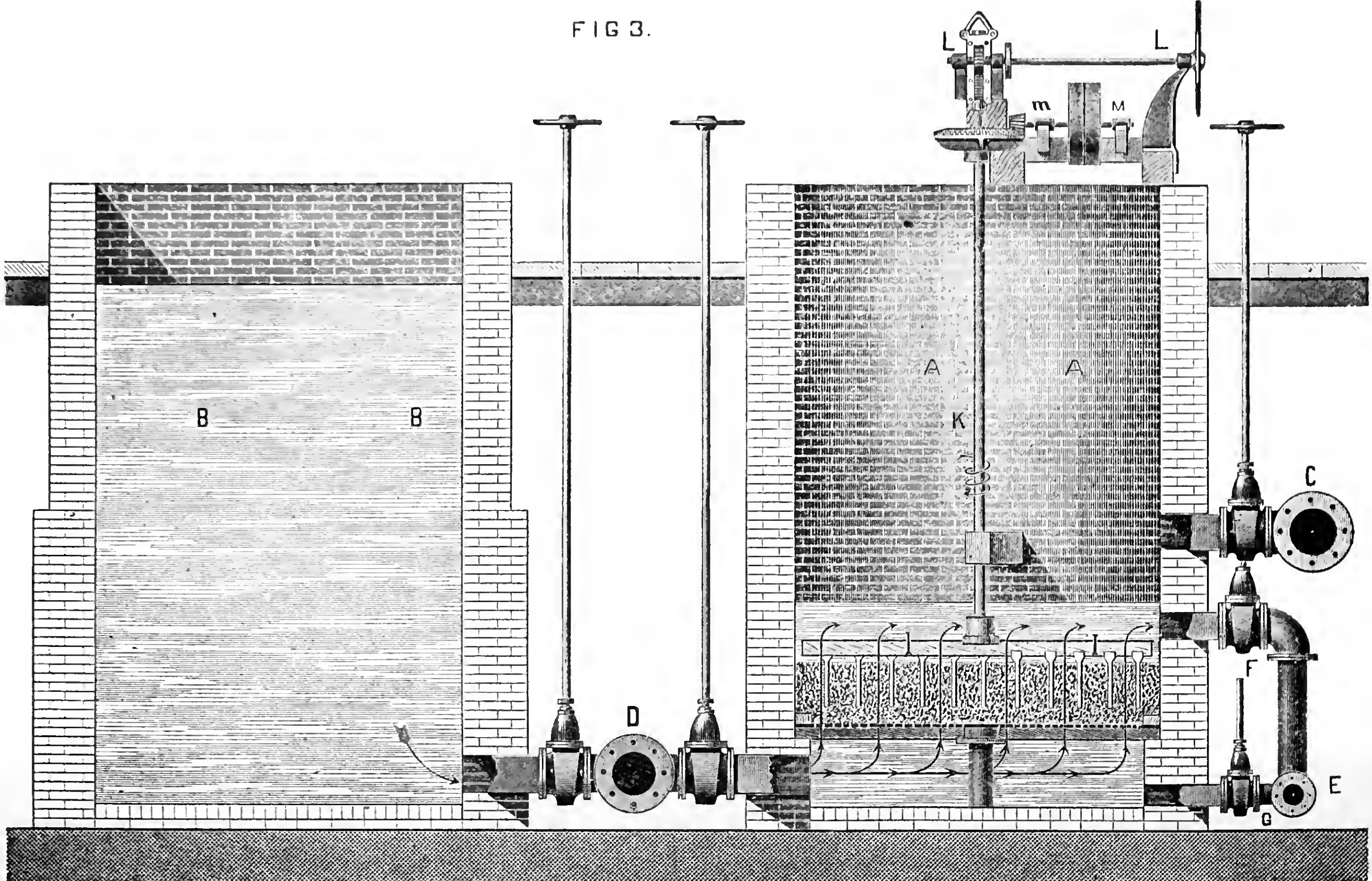


Fig. 3. Cleansing Process.

A, Filter tank with water drawn off.
B, Storage reservoir.
C, Inlet pipe with gate closed.
D, Outlet pipe, water passing from reservoir to tank.
E, Waste pipe carrying away water fouled with sediment.
F, Upper waste gate open.
G, Lower waste gate closed.
H, Filter bed—being stirred with the agitator.
I, Agitator lowered into the filter bed.
K, Agitator shaft, slowly revolving.
L, Sleeve and hand wheel for raising and lowering agitator.
M, Mechanism for rotating shaft in any position.

The operation of the system is best shown by the accompanying cuts. The water to be filtered, Fig. 2, in section, passes into an open tank, preferably of brick, although wood or iron may readily be used. These tanks may be of any size, but the uniform size of 8 feet diameter, thus affording an area of 50 square feet of filtering surface to each tank, will be found convenient. Near the bottom of this tank is placed a grating or false bottom of wood covered with a plate of perforated copper, fine enough to prevent the grains of the filtering material from passing through into the space below. On this rests the filter bed, which should be about 15 inches in thickness, and consisting of carefully selected and sifted gravel of uniform fineness throughout. The water passes through the inlet gate, and percolates downward through this filter bed into the space below, leaving its sediment, and then passing through the outlet gate to the pump or storage reservoir, as the case may be. If two or more filters are used in conjunction, a storage cistern will not be a necessity, as in that case one filter may be cleansed at a time, the others affording water for the purpose. The rate of filtration, or the amount of water which a filter of this size will afford, depends so much upon the character of the water to be filtered that no definite rule can be given. It is evident that time is an important factor in the process, and that better results may be obtained by allowing the water to percolate slowly through the filter bed than if forced through more rapidly. In the extensive filter which has been in use at Cumberland Mills, Maine, for the past two years, affording 12 million gallons daily, we have found that a flow through the filter bed of one foot per minute, which would afford one cubic foot of water to each square foot of area in the filter beds, amounting to more than a half million gallons daily for each filter of the proposed size, may usually be promoted by a head of from one to two feet. That is, the water in the storage gallery, from which 12 million gallons daily are pumped, will ordinarily stand at a level of from one to two feet lower than the water in the supply canal from the river. If the level falls below two feet the filters are cleansed. A much larger amount might be pumped by allowing more difference of head, but with somewhat less effect in cleansing the water. The process at this rate is complete enough for all the requirements of a paper mill in which all the best qualities of printing paper are made, and would be sufficient to cleanse the ordinary water supply for cities and towns.

To cleanse the filter bed, Fig. 3, it is simply necessary to close the inlet gate and open the sluice or waste gate, which will allow the water in the tank to escape, and as soon as it has reached a level lower than that of the water in the storage reservoir the water which has already been filtered will begin to boil up through the filter bed and pass off through the sluice, carrying with it the entrapped sediment.

This, however, is not in itself sufficient, as many who have tried it will testify, as the water will break up through in spots when it can do so the most easily, leaving much of the bed unchanged, and it remains to complete the process by stirring the filtering agent, which is accomplished by means of a vertical shaft revolving in the centre of the tank, carrying at its lower end an arm to which are attached teeth, the whole of which may be raised or lowered by means of the hand wheel, so that the teeth may plow up the filter bed to any required depth. The action of the water, together with the stirring and the attrition of the grains of the filtering agent upon each other, will rapidly and effectually cleanse the filter bed. When the process is complete, which may occupy from five to ten minutes for each filter, close the waste gate and again admit water at the inlet, and when it has again risen above the level of the water in the storage reservoir the process of filtration will go on as before. The lower waste gate is only needed when it is desired to empty the entire tank and expose the filter bed, which it is not necessary to do in the ordinary process of cleansing, as the waste gate is placed far enough above its surface to prevent the escape of the filtering agent when the current is reversed.

Although the primary object of the agitator is to cleanse the filter, the process of filtration may be greatly promoted by allowing the teeth to scratch the surface of the filter bed while this process is going on. The deposit of the sediment will be largely at the surface, where it will tend to form in time an impervious film, which the teeth of the agitator will break up and incorporate with an inch or two of the surface gravel instead; and again, much of the material in water which is barely buoyant enough to float along the bottom may be kept afloat by the slow motion of the agitator arm and not permitted to settle down upon the surface of the filter bed. By this means the cleansing process may be less frequent than would otherwise be necessary.

It may sometimes be found necessary to carry the process further than can well be accomplished in a single filter, in which case two or more can be combined, using different grades of material as to fineness. Aside from the question of first cost and greater amount of room required, the process may thus be carried to any extent, and work as simply and conveniently as in the single filter. A water supply naturally impure may thus be cleansed from everything of a sedimentary nature. That which is held in solution can only be removed by the action of chemical agents, a process entirely independent of simple filtration, and which may be used as readily and effectively with this system as with any other.

The advantages claimed for this filter may be summed up as follows :

1st. It provides the required amount of filtering surface at the least cost.

2d. The water comes in contact with the filter bed without the intervention of any screens which rapidly become clogged and are more difficult to cleanse than the filtering agent.

3d. The surface of the filter beds may be raked while the filtration is going on and their efficiency greatly increased thereby.

4th The filter bed is easily and effectively cleansed, and without interfering with the operation of the other filters in the system.

5th. All oily matter of a less gravity than the water floats upon the surface and is drawn off at the waste in cleansing, without coming in contact with the filter bed.

6th. Any number of filters may be combined to work in conjunction, either to provide greater area for single filtration or to repeat the process as many times as desired.

These filters may be seen in operation in the original plant at the Paper Mills of S. D. Warren & Co., at Cumberland Mills, Maine, and in the public water works at Brunswick and Augusta, Maine.

Bovine Tuberculosis.

By A. G. YOUNG, M. D., Secretary of the Board.

The outbreak of tuberculosis at the State College farm, at Orono in this State, which in the spring of 1886 necessitated the condemnation and slaughter by the "Cattle Commission" of the entire herd of thoroughbred Jersey and Short-Horn cattle, has drawn attention to the insidious character of this disease and the disastrous consequences which might result from a general distribution of it among the flocks and herds of our State.

The principal facts in regard to this remarkable prevalence of tuberculosis in the Orono herd, as given by Dr. Geo. H. Bailey, Secretary and Veterinary Surgeon of the Board of Commissioners for Maine on Contagious Diseases of Animals, in the Majority Report to the Legislature, are as follows:

Early in March, 1886, Dr. Bailey was called to inspect the College herd, which then numbered fifty-one head, and came to the conclusion that a large proportion of the animals was suffering with tuberculosis.

"The result of subsequent examinations and consultations with the State and College officials, and finally with Dr. C. B. Michener, who was detailed for this service by the Commissioner of Agriculture at Washington, culminated, as is now well known, in the condemnation and destruction of the whole herd."

"At the time of my first visit I found the buildings in which the cattle were contained were among the best and most commodious I had ever visited, and that every provision for the maintenance of perfect health among its occupants had been fully and amply secured. An abundance of sunlight and pure water, scrupulous cleanliness, sufficient and wholesome nutrition, thorough drainage, and ventilation so perfect that the air was almost as pure inside the barn as out; all contributed to the uniformly fine appearance of this high-bred herd, which proved so deceptive (upon further investigation) that, had it not been for the persistent and pathognomonic cough, by which they, one by one, betrayed their real condition, I should have much doubted the correctness of my decision. The rough coat and arched spine, the difficult and labored respiration, the sunken eye and pendulous abdomen, with extreme debility and emaciation, were nearly all absent in this herd, the judicious attention to hygiene, and the untiring care-taking of their faithful Superintendent, accounting in a great measure for the slow but sure development of the disease, a circumstance that so long deceived the attendants and College officials themselves as to their true condition. Many of the animals were also pregnant, and it is a well-known fact that increase of the tubercular growth is then held in abeyance, the energies of the nutritive processes of the body being diverted to the nourishment and growth of the fœtus, while after parturition the system is for a time debilitated, and rapid extension of tubercle is favored. Individual members of the herd were of great excellence, several cows having 'butter records' of sixteen pounds per week, while one hundred and fifty pounds of 'gilt-edged' butter was being sold in Bangor market weekly. About ten days before my visit, the Jersey cow Pet, No. 40, P. M., fourteen years old, had become so emaciated that she had been killed, and lay frozen in the field adjoining the stables, and this cadaver furnished me with ample opportunity to verify my diagnosis. From this cow I obtained the lungs, and a cross-section of the pulmonary tissue revealed the presence of numerous yellow tubercles, large and small cavities filled with a muco-purulent mass, others with caseous material. The lungs presented the identical lesions afterwards found in most of the animals at Orono, and of the peculiar metamorphosis which tubercles undergo, those of caseous degeneration afford the most favorable conditions for infecting the expired air of diseased animals. At the time of my second visit, March 12th, from among ten or twelve cows I had previously ordered isolated from the others, I selected two Jersey cows, Princess Alice, No. 44, P. M., and Princess Alba, No. 27, P. M. (the latter I then regarded as a typical case), and had them destroyed for the post mortem examination. Princess Alba had a temperature of 103 3-5°, marked emaciation, and dullness on percussion over the right lung, while auscultation clearly disclosed humid crackling or gurgling rales.

The autopsy revealed an extraordinary amount of disease. The lung, pericardial, and pleural membranes were loaded with deposit, which hung like bunches of grapes, exhibiting a perfect case of what is known as "angleberries." In some parts there was scarcely a remnant of proper lung-structure detectable, while others contained large tubercles filled with caseous material and also cavities connecting with bronchia, whose contents had been expectorated or absorbed. The bronchial glands in this case had attained enormous dimensions, the thymous weighing several pounds, and altogether the lesions were as extensive and varied as in any subsequent autopsy. I shall have occasion to speak particularly of this cow again as the dam of the 'Kent Bull' of Bucksport. The lungs of Princess Alice were studded with miliary tubercles scattered throughout them, while the bronchial lymphatic glands contained calcified material that grated under the knife when attempting to cut it. Mr. Gowell wrote me on March 20th: 'There is not a very marked change in many of the cattle, but in others, particularly those isolated in the stable, the process of 'wearing out' is going on actively, and every day's developments go to sustain my conviction and opinion expressed before notifying the Board of Commissioners that the entire herd was doomed. Unpleasant as it was, I was forced to recognize the truth.' "

"On April 6th, the Commissioners met with the Governor and Council, at Orono, when the herd was again inspected and final action recommended at an early date. I then suggested to Governor Robie the propriety of requesting the Hon. Norman J. Colman, Commissioner of Agriculture, at Washington, to send Professor Salmon, or some other expert examiner from his office, to consult and advise with the Cattle Commissioners, as to the proper disposal of so valuable a herd. The request was promptly complied with and Dr. Ch. B. Michener, Professor of Cattle Pathology and Obstetrics, at the American Veterinary College of New York, was detailed for this service."

"Dr. Michener arrived April 21st, and on the 22d and 23d, after a careful and critical examination of every animal in the herd, it was found necessary to condemn them all, when they were forthwith expeditiously and humanely killed, and the post mortems openly made in the presence of the Governor, prominent physicians, stock-owners, reporters and others interested, the autopsies in every instance revealing the fact that the disease had been correctly interpreted, and that every animal presented unmistakable lesions of tuberculosis."

The following extracts from the post mortem notes are given to show the character of the pathological changes which were found. Though a few are chosen as having presented points of special interest, the selections are pretty fairly representative of the whole lot.

(No. 1.) Pansey, I.

Cyst in centre of left lung. Apex affected, right filled with miliary tubercles. Age 8 years.

(No. 2.) Mildred, I.

Adhesions of both lungs to costal pleura, badly affected. Age 5 years.

(No. 3.) Hyacinthe, I.

Both lungs affected. Tubercles in right. Age 4 years.

(No. 5.) Helen Hart.

Both lungs and mammary glands affected, so that her milk was tainted. Age 8 years.

(No. 6) Helen's Calf.

Affected with miliary deposits in both lungs. Age 8 months.

(No. 12) Blanch.

Both lungs badly affected. "Grapes" (angle-berries) and abscess in right lung. Age 3 years.

(No. 15.) Tinney's Calf.

Parotid glands affected, coughed badly, and emaciated. Age 3 months.

(No. 16.) Blanch's Calf.

Glands affected, stiff neck. Age 9 months.

(No. 18.) Edith.

Both lungs badly affected, and pleural adhesions to ribs. Age 3 years.

(No. 22.) Flossy.

Lame in left shoulder. Right lung greatly affected with large abscess, left lung and bronchial glands also much affected. Age 2 years.

(No. 27.) Princess Alba.

Lungs loaded with deposit, angle-berries, large abscess and cavities, with bronchial glands greatly enlarged. Age 8 years.

(No. 28.) Jersey Lilly, I.

Stiff neck, emaciated, and bad cough. Age 2 years and 9 months.

(No. 37.) Clover, I.

Both lungs affected with tubercles. Age 14 years.

(No. 38.) Clover's Pet

Slightly affected in left lung, calcareous deposit in bronchial glands. Age 2 years.

(No. 39.) Clover's Pet's Calf.

Tubercles in both lungs, bad cough. Age 8 weeks.

(No. 51.) Roan Heifer.

Glands affected, and cough. Age 3 months.

The investigations which were undertaken by Dr. Bailey for the purpose of tracing the origin of the disease brought out the fact that the development of the outbreak had not been so sudden as the public at first supposed. It has transpired that as far back as 1876, ten years ago, there were cases of tuberculosis developed upon the College farm, and that occasionally since then, animals have died of chronic lung trouble or, having been slaughtered on account of a wasting disease, have been found to present the post mortem appearances of tuberculosis. Before the notification of the Cattle Commission, there were thus lost from the College herd seven cows from 1881 to 1886.

This outbreak of tuberculosis at Orono has strongly drawn public attention to those diseases which are liable to affect our domestic animals, and the interest which has been excited has suggested various enquiries to the public mind For the purpose of answering some of these questions regarding the special disease under consideration—tuberculosis—this compilation of facts and opinions is given.

SYMPTOMS.

As given by Dr. Bailey, "the symptoms of tuberculosis in cattle, in its earliest stages, are sometimes involved in more or less obscurity. Prominent among these are unthriftiness, with a diminished and capricious appetite. The animals are easily fatigued, and have a weak and hoarse cough, that is almost diagnostic; the skin is sensitive and dry, and the coat staring; the mucous membranes are pale, the digestive organs are weak, and they are prone to tympanitis. There is increase of temperature, with a variable pulse. The milk is deteriorated in quality, being blue and watery, and contains a larger proportion of alkaline salts; but is less rich in nitrogenous matters and fat and sugar, than in health, proving that assimilation is defective. In herds predisposed to tubercle they often become lame from some unassignable cause, when the post mortem examination proves that it is due to tubercular inflammation of a joint. Flossy (No. 22. P. M) was a marked case of this species of lameness in the College herd If the animal is compelled to walk quickly there is labored respiration, which becomes so prominent as to assume the abdominal character, if the pleura is invaded by disease. Nymphomania, or excessive sexual desire, is also frequent, but the animal is sterile; as the malady develops, the cough becomes more persistent and easily induced, and accompanied by muco-purulent expectoration. The animals are apathetic and sluggish in their movements. Emaciation proceeds more or less rapidly, extreme debility ensues, the eyes are sunken and brilliant, the mouth is open and drawn back at the angles, the spine is arched and tender, and the breath, as death approaches, becomes cadaverous and fœtid. Percussion gives dullness in some parts of the chest, and in others the normal resonance, although the members of my profession do not possess equal advantages with human practitioners, of free and easy access to the chest wall, owing in great part to the thick skin and hair of animals, as well as the wide distribution of the 'serratus magnus' muscle posterior to the scapula—while the sound resulting from the first gentle tap upon or beneath the clavicle in the human patient often only too clearly reveals lesions that seal the fate of a valuable life.

"Auscultation reveals an altered respiratory murmur; it is louder in some places than in others, and of a harsh and rushing sound. Instead of the normal vesicular murmur, we find the 'dry crackle' which is associated with incipient tubercle, the cavernous or bronchial sounds which occur during the passage of air into or out of a cavity in the lung, and the humid crackling or gurgling rales, which are pathognomonic of advanced tuberculization, and heard during the later stages of nearly all cases of consumption. Large crepitation depends upon the passage of air through liquids, but when pus or liquid matter of any kind is collected in a vomica, which communicates freely with the trachea through pervious bronchi, the bubbles produced by the entrance and exit of air will be still more numerous and large; and a sound is then produced which the word gurgling well expresses. Whenever, therefore, we hear gurgling during respiration or during the act of coughing, we conclude we have a cavity. Another constant accompaniment of progressve phthisis is emaciation, and if, without any apparent cause, an animal grows thin and weak, with a quick pulse and labored respiration, these indications are pregnant with meaning that tubercular disease is at work in the lungs, and is consuming life. The detection of the disease is sometimes difficult. It is easy when the tubercles are numerous, large or far advanced; difficult when they are scanty in number, thinly scattered and individually small, and in the latter case would not cause any appreciable deviation from the natural resonance of the chest on percussion, or from the natural smooth, equable rustle of the breathing. The disease always terminates fatally, if the animal be permitted to linger on, and it dies in a state of extreme marasmus."

CHARACTER AND ESSENTIAL NATURE.

Tuberculosis is a disease which affects many kinds of animals, especially such as are subjected to artificial conditions, though certain species are more prone to the disease than others. Cattle are very susceptible to the disease and so are swine, poultry, rabbits and guinea-pigs. On the other hand, the disease is rare in horses, sheep, dogs, cats, and the carnivora generally, though it may be communicated experimentally to all these animals, and is sometimes found occurring in them spontaneously. In the different animals in which the disease may occur, the post mortem appearances may be very various,—in fact, the pathological characters are somewhat distinctive for each species of animal in which the disease occurs,—and yet, in all, the essential pathological element of tuberculosis is tubercle. Tubercle occurs primarily as gray, or miliary tubercle, which consists of minute growths, developed within the tissues of certain organs, as the lungs, liver, or spleen, or scattered over surfaces, more frequently over those which are covered with serous membrane, as the pleura and peritoneum. The nodules in their earlier stage of development may be found of the size of millet seed or smaller, and may be few or innumerable. These miliary tubercles or "pearls" increase in size, and, particularly on the lining membrane of the chest and abdominal cavity, they form groups or clusters like bunches of grapes, and later many of them become pedunculated. Partly on account of the increase in the connective tissue formation, and partly by aggregation of the individual tubercles into composite growths, masses of considerable size may be found.

The secondary changes which occur in the tubercular nodules or masses are quite different in character and in point of time in different individuals of the same species and particularly in different species of animals. As the result of this different behaviour of these tubercular growths, the symptoms and course of the disease vary much. In man the tubercle of the lungs undergoes a cheesy metamorphosis (caseation) and, breaking down, is discharged as a purulent expectoration; in the ape the disease does not long remain restricted to the organs primarily affected, but extends itself rapidly over the system, and the tubercular nodules are rapidly transformed into a thin, purulent secretion; in fowls the nodules form somewhat dense tumors in which limy or chalky deposits are stored up; in cattle the extension of the disease over the organism is often delayed, the process of caseation going on somewhat slowly, and simultaneously there goes on the process of lime deposit (calcification). When, therefore, we cut into the lung of these last-mentioned animals in which the tubercles have undergone the secondary changes the knife passes through cavities which are filled with this cheesy deposit, and the sensation communicated to the fingers in making the incision sometimes gives evidence of the calcified deposits.

IS THE TUBERCULOSIS OF ANIMALS IDENTICAL WITH THAT OF MAN?

On account of the marked difference in symptoms and course of the disease, and in the pathological appearances after death, there was for a long time an earnest discussion among physicians and veterinarians as to whether the tuberculosis of animals, and particularly bovine tuberculosis, is the same disease as human tuberculosis. The answer to this question we shall reserve until we have answered the question

IS TUBERCULOSIS INFECTIOUS?

Observations which seemed to indicate the infectiousness of tuberculosis have not been reserved for recent years, and many have been put on record in veterinary literature. The following are a few of such:

"At the time (1848) that the views of veterinary authors were most crude with regard to the nature of bovine tuberculosis, I had occasion to treat the disease upon a farm where it had prevailed for a long time and caused much loss to the owner.

"Upon the farm were always kept fourteen milch cows and cattle, a bull, and four calves. Of these, four head were sold each year, and replaced by the same number of calves. The animals sold were not always of the same age each year; in one year the two and three-year-olds would be sold, in another older cows, and the third some of each, according to the fullness of the owner's purse, so that there were cattle on the farm two, six and twelve years old. Of these older animals, I found on my first examination two afflicted with a rough, dry cough, and with accelerated respiration. As I was aware of the constancy with which the disease had prevailed among the owner's cattle, it was my advice to get rid of these two as early as possible. The advice was followed. The cattle were fattened, and upon being slaughtered my diagnosis was confirmed.

"In the meantime every attention was given to the feeding and general care of the cattle upon the place.

"In 1851 I again found two of the cattle that coughed and gradually became somewhat emaciated. The attempt to fatten them was partially successful in one, but failed in the other. Both were killed, and tuberculosis found in them. Four calves were placed in the spring of 1852 with the cattle in the old stable, and four others placed where they were taken from. All seemed to be healthy to the spring of 1854, when one of the calves, which had become three years old and had been placed in the old stable, began to cough. The cough was at first very slight, but commenced to increase after the heifer had calved. In the following summer it again diminished, to augment very considerably in the fall. This animal was put out to graze in the spring of 1855, and to my surprise became quite fat; but upon being slaughtered the animal was found to be highly tuberculous.

"Of the old cattle there still remained a single cow, which we will call 'A,' that had always stood next to the above-mentioned animal. All the others had been sold and killed, their places having been filled by new ones. This cow had coughed for a long time; but, not suffering in condition, she had been kept, as she was a great favorite with the farmer's wife, especially as I had not then the slightest suspicion of infection by means of the atmosphere. Every animal which during this period had stood beside this cow had begun to cough after a shorter or longer period, and, as the positions of the animals were sometimes changed, it happened that in course of time nearly all of them began to have the same suspicious cough.

"The continued buying, rearing, and selling of cattle went on for nine years before I had opportunity to examine the cow 'A,' which was then sold to a butcher. The examination of the body and its contents resulted in finding it highly tuberculous. The result of all my experience awakened in me the suspicion of the transmission of the disease from animal to animal, an opinion which was then considered ridiculous. I communicated my opinion to the owner, and advised his selling off all his cattle and replacing them with new and healthy ones from parents and places where the disease was not known to exist. My advice was appreciated by the owner calling in a quack to take my place.

"On another farm were kept from twenty-four to twenty-six head of cattle. In 1864 the owner bought a calf to bring up, the mother of which died a few years later from tuberculosis. This calf developed very poorly for the first two years of its life; its neck and head were small and long, and its bones very small, so that the whole habitus of the animal was cachectic. This animal was killed in the fall of 1869. In the course of the winter of 1869–70 many of the cattle began to cough, and among them two, 'A' and 'B,' so severely that my services were requested.

"I found all the animals in an apparently healthy condition; only the two, A and B, were noticed to cough. By auscultation, I found in A a peculiarly marked bronchial respiration in portions of the left lung. At this time I knew nothing ot the breeding, or the phenomena seen in the above-mentioned calf, which had been slaughtered. During this winter and the succeeding summer the two cattle, A and B, besides others, continued to cough. All the animals on the farm coughed during the winter of 1870–71, except the yearlings and some calves that were kept in another stable. In the spring of 1871 the two cows, A and B, began to emaciate so much that it was considered advisable to kill them. The autopsy revealed the general characteristics of tubercular pneumonia, and tuberculosis of other organs. Basing my opinions upon the previously mentioned experience, I made no hesitation in pronouncing all the cattle in this stable that coughed as afflicted with tuberculosis, and advised the owner to gradually get rid of them all. On account of economical reasons, this was easier said than done, and the owner has never since been free from this disease among his cattle.

"During the period from 1864–71, tuberculosis has been always present among the cattle of this owner, who has lost nineteen head from the disease in that time."*

"Jamm, veterinary surgeon of the arrondissement of Loerrach, has published the following observations, which we think worthy of notice:—In the territory of Tannenkirch there is a farm called Kaltherberg, let for three years to a farmer named Gugelmaier. An

*Billings. The relation of Animal Diseases to the Public Health.

average of ten to a dozen cows, some heifers, and a bull are kept; these animals are partly of the Schwyz and partly of the Simmenthal breed, and are all lodged in the same stable. Four years ago this farmer bought at Fribourg, where he sells his milk, a grey cow, which soon began to cough and become emaciated; consequently it was killed, and it was then found to be affected with tuberculosis—pleural and pulmonary—to a very high degree. Since the purchase of this cow, Gugelmaier has lost ten other cattle from this disease, being obliged to kill some and sell others. The following is the succession of losses in this farm:—

1880,	June.	The first cow.
"	Sept.	The second cow.
"	Dec.	The third cow.
1881,	Sept.	The fourth cow.
1882,	March.	The fifth cow.
"	June.	The sixth cow.
"	July.	The seventh cow.
"	August.	The eighth cow.
"	Sept.	The ninth cow.
1883,	January.	The tenth cow.

"In another animal—a fat heifer sold to a butcher—when it was slaughtered there were found a small number of tubercles.

"In all these animals the disease commenced with a slight cough; it did not last longer than three months. Pregnant cows generally began to cough towards the middle period of gestation; after calving the disease progressed rapidly. It may be added, as an interesting fact, that the farmer lost, a year ago, a grown-up son, who died of tuberculosis, and that the farmer's wife, for a long time suffering from asthma, had been recently reported consumptive "*

The observations of M. Grad, a veterinary surgeon of Alsace, are significant. On different occasions, owners had informed Grad that they had lost two, three and four animals in the same stall from consumption,—marasmus, accompanied by cough. At first he did not attach any importance to these declarations, either because he thought the mortality occurring in this way was merely accidental, or was due to hereditariness, which he acknowledges plays such an important part in the production of the malady. However, one day, when

*Lydtin, Fleming and Van Hertsen. The Influence of Heredity and Contagion on the Propagation of Tuberculosis. Londen, 1883.

visiting the stables of an extensive farmer at Leinheim, he was informed that every year for five years one of the cattle had died from phthisis; 'and what is very curious,' said the farmer, 'this always happens in the same stall.'

"In proof of this, Grad was shown a young cow, which, on examination, offered all the symptoms of tuberculosis; such as excessive emaciation, skin clinging close to the bones, frequent and feeble cough, etc.

"Its value in this condition was from thirty to forty francs. According to the farmer, the animal had been ten months in the stall, and when first placed therein it was in flourishing health; it was the fifth cow that had fallen into the same state in this stall. Grad's attention could not but be strongly aroused by this report; nevertheless, he expressed his opinion that an hereditary tendency was doubtless the efficient cause in this succession of losses. Such, however, was not the opinion of the farmer, and it was at length agreed that Grad should choose a cow from another stable and put it in his stall as an experiment. With this object a cow three years old, and with calf, was selected; it had every appearance of perfect health, had been bred on the farm, had never been unwell, had never coughed, and none of its progenitors had been affected with tuberculosis. It was moved into the stall and remained quite well until after calving, when a short cough was the first symptom observed. This cough increased in frequency, and emaciation gradually set in, with the usual cortege of symptoms accompanying tuberculosis distinctly marked, so that in about twelve months the creature was only the shadow of its former self, and was sold for a trifle, like the others which had preceded it in the stall, to the low-class butchers. Grad could no longer resist the evidence in support of this cause, this being the sixth animal attacked with tuberculosis in the same stall; and he inferred that in all probability the disease had been transmitted by the ingestion of the matters expectorated by the cattle which had previously inhabited the same place.

"On his recommendation, all the wood work of the stall was removed, the manger and rack were thoroughly disinfected, and the spot left unoccupied for a certain time.

"When the stall was rebuilt, and again occupied by several animals in succession, tuberculosis made no more victims either in it or in other parts of the stable."*

*Clapp. Is Consumption Contagious?

The following history of an outbreak of tuberculosis which occurred at the Willard Asylum, Willard, N. Y., from the Medical Record of Jan. 15, 1887, is quoted at considerable length for the reason that it is recent and bears many points of resemblance to our epizootic of tuberculosis at Orono.

"During the fall of 1883 tuberculosis broke out in an acute form in the asylum herd, which consisted of about one hundred head of milch cows and forty head of young stock, most of which were of Holstein blood, and with the exception of a few head, all were in excellent condition and thought to be in perfect health. During the summer months, however, a number of the cows were noticed coughing, which attracted some attention, but nothing of a serious nature was suspected until late in the fall, when those that had been noticed coughing began to emaciate, presenting in general a very bad appearance; the hair seemed dead, having lost its gloss, standing erect, cleaving from the skin. Their eyes were sunken and presented a heavy appearance. The animals did not move about, and usually lingered behind on going to and from pasture, and if hurried, they seemed exhausted from want of breath. My attention was called to them, and on examination I found in several cases an entire absence of respiratory murmur over the greater portion of either lung, and where the respiratory murmur was perceptible I detected moist rales, and in places the rales had assumed a resonant character, which indicated consolidation. A severe diarrhœa had now developed, which was very offensive, and the milk supply had gradually lessened for several months. Finally, it was thought best to kill one of the feebler ones, and ascertain the true nature of the disease.

"Case I. The animal chosen for examination was eight years old, of Holstein blood, and one year previously would have weighed 1,200 pounds. On post-mortem, the animal was found highly tuberculous, and there seemed to be no organ in the body free from the disease. The lungs were voluminous and double their normal weight. They were completely adherent on either side, and the left lung on section seemed to be one mass of tubercular deposit. Small vomica had formed in some places, in other places the deposit was calcified, and in still others, cheesy. The bronchial glands were three to four times their normal size and degenerated. Numerous tubercles the size of hazel-nuts and smaller were found upon either surface of the diaphragm, and the liver was found at least three times its normal size and contained large masses that would equal in weight several pounds. On cross-section it revealed large cavities filled with a muco-purulent mass. The bowels were covered with tubercles, and in a state of sub-acute inflammation. All of the abdominal organs were more or less affected, also the milk-bag, which contained several large deposits, some of which were calcified, and others softened and in a semi-purulent state All of the glands throughout the body were enlarged, and in places degenerated.

"Case II was that of a Holstein six-years-old, much emaciated, and suffering from a chronic diarrhœa. No respiratory murmur was heard over the right side of chest-wall except at the apex. General enlargement of the superficial lymphatic glands, also of the submaxillary and thyroid. Post-mortem examination: Lungs completely adherent on either side, and differing in no respect from those of Case No. I. The lungs, with the heart and deposit intact, were removed and weighed, which weight equalled thirty-nine and one-half pounds. Deducting the weight of the normal lung and heart intact, we find about twenty-four pounds of tubercular deposit. The liver was double its normal size, and on section large quantities of muco-purulent fluid escaped; the mesenteric glands were degenerated, and the bowels were completely studded with tubercles about the size of peas. The milk-bag contained one large deposit between its two lobes which was calcified. The finding of these two animals so badly diseased, there being others that were failing and manifesting similar symptoms, naturally created a great amount of anxiety on the part of the medical superintendent, Dr. Chapin, who requested that I make an examination of the whole herd. On making such examination, twenty-four were found manifesting symptoms of the disease, besides several that were considered questionable. Finding so many diseased, they being the property of the State, it was thought best to seek advice from one of our State veterinarians, as to what means were best to adopt. Professor Law, of Cornell University, was sent for. After making careful examinations of the herd, he reported that twenty-six were diseased, and that he considered several suspicious, as they manifested some symptoms of the disease, although he was unable to detect anything abnormal on auscultation. He advised the killing of all those that were diseased, the isolation of all those that were considered doubtful, and a thorough disinfection of the stables. Having in the herd a full-blooded Holstein bull, it was considered quite essential to know if he was affected, although he had not manifested any symptoms of the disease. Upon careful examination nothing abnormal was detected. Professor Law's examinations were made March 22, 1884.

"Many of the diseased animals remained in the herd for several weeks, when the herd was again examined by myself. I found that those that only a few weeks previous were considered doubtful had now developed positive symptoms of the disease, and still others were found that seemed quite suspicious. The bull, at this time, appeared to be failing in flesh, but manifested no positive symptoms.

"On May 22d and 23d, twenty-eight of the most advanced cases were killed. On examination all were found affected, but not all to the same degree. The organs principally affected were the serous membranes, the lungs, liver, bowels, and the milk-bag in many cases. A number of them were affected to an equally great degree as the two cases I have already reported. Examination was again made of the herd on June 10th, and others were found manifesting the usual symptoms; the bull was again examined and it was very apparent that he was affected, although he had not manifested any cough, but he was rapidly losing flesh. He was then weighed, and was found to weigh 2,456 pounds. He was again weighed on July 10th, and his weight was then 2,290 pounds; and as at this time it was very evident that he also was affected, it was decided to kill him. On post-mortem we found a large deposit in the central portion of the left lung, and numerous small tubercles upon the left pleura. The bronchial glands were greatly enlarged, and on cross-section were found calcified. There were many tubercles upon the peritoneum and bowels. The liver in this case seemed free from disease. Upon the glans penis were several small tubercles, and in one place it appeared as though several had coalesced and had broken down, leaving a cicatrix. Had this been ulcerated, one might have thought it a soft chancre.

"Leaving the herd at present, I wish to call your attention to the calves that were born during the winter and spring of 1883–84. Writers tell us that it is not an unusual occurrence for animals well advanced in tuberculosis to abort. This seems to be true, as such was the case in this herd. I observed that eight calves were prematurely born, two of which required assistance at birth, as the mothers were much exhausted. One of the two that were removed was in about the eighth month of gestation. The fœtus on examination was found saturated with tubercles, some of which were as large as peas, and on drawing a knife across them they were found calcified. Tubercles were found in the liver, bowels, diaphragm and chest-wall; there being none observed upon the lungs. The mother of this calf was killed some weeks afterward, and was found highly tuberculous, the disease being well advanced to the third stage, or stage of suppuration.

"No. 2 was from a diseased mother, also in about the eighth month of gestation. On examination I found the liver, diaphragm, and bowels quite thickly studded, but the tubercles were much smaller than in the preceding case. Of the other six prematurely born, I was able to examine only two of them, as the other four had been destroyed before I was acquainted of the fact. One of the two, however, that I did examine, was found to have a tuberculous liver.

"During the winters and springs of 1883-84 and 1884-85 fifty-three calves were born to the herd, and each one was examined with reference to the disease. Twenty-nine of the number were found tuberculous in some of the viscera. The greater number of the calves were killed within five weeks after birth, and the whole number before the expiration of four months. I will only call your attention to the most interesting cases. One calf killed at the age of five weeks was found highly tuberculous. The liver was double the normal size and covered with tubercles. On cross section it was found to contain a large vomica, filled with at least one pint of fluid of a muco-purulent character. Tubercles were also found upon the pleural surface of the left lung; also an extensive deposit in the apex of the same lung. The mesenteric glands were enlarged and cheesy. The bowels were thickly studded and in a state of subacute inflammation. This calf had suffered from a severe diarrhœa for several days, and had failed considerably in flesh.

"The mother of this calf was killed shortly afterward, and was found badly diseased. Among the organs affected was the milk-bag, which contained a large tuberculous abscess. In this case does it seem possible for the disease to have been acquired wholly after birth? To my mind it does not seem possible that the disease could have developed with sufficient rapidity to have produced an abscess of the liver in such a limited time. However, I am of the opinion that the intestinal lesions were produced, to a great extent, from the milk of its mother, as undoubtedly the milk must have contained elements of the disease.

"In another calf, seven weeks old, the left lung was adherent to the chest-wall at the apex, where there was a large tubercular deposit, Also there were many small tubercles upon the lungs and in other places. The liver and bowels contained many tubercles the size of peas, and on cross-section were found in a state of cheesy degeneration. In the remaining cases the lesions were not as marked, but the disease was none the less apparent.

"You have now the history of the herd up to June, 1884, and we find that nearly one-half of the herd of milch cows has been disposed of, all that were supposed to be diseased having been killed. The remainder of the herd were observed from time to time, and examinations repeated every twenty or thirty days; and upon each examination new cases were discovered, which were immediately removed from the herd, as it was thought they could be fattened and made use of.

"The sorting out and feeding continued for several months, and at the time of killing many had not gained at all, while others had taken on considerable flesh; but upon killing only five were found fit for use, and four of these were slightly diseased in some of the viscera.

"During the spring of 1885 a number of young heifers, which had been kept upon another portion of the farm, were with calf by the bull killed in June previously. Before putting them with the old herd they were examined, and many of them were found diseased. It was deemed advisable to kill them. The calves of these heifers were all diseased, the disease in one calf being traced directly to the bull, as the mother was found unquestionably healthy. The remainder of the young herd which had been exposed to the disease were put with the remaining portion of the milch cows, and the combined herds now numbered about forty head. The examinations were still continued from time to time, during the summer and fall of 1885, and occasionally one was found manifesting the usual symptoms of the disease. This procedure was continued until the spring of 1886, when it was thought advisable to feed the remainder of the herd. During the past summer, all were killed except ten, which have been killed during the past month, and, in nearly every case, disease could be found in some of the viscera, and some badly diseased, as I will show you from specimens that I have here. The specimen that I wish to show you is a very interesting one, inasmuch as it shows that one is not able, at all times, to tell whether or not the animal is diseased. You will observe that the disease, in this case, is confined wholly to the bronchial glands, there being no other organs affected—that is, as far as I have been able to determine. Auscultation of the lungs in this case revealed nothing abnormal, and the superficial lymphatic glands were not enlarged, and the animal had not manifested a cough. The bronchial gland, in a healthy cow, is about four or five inches long, about one inch wide, and one-half inch in thickness. Here we have a specimen, removed from a Holstein cow nine years old, in which we find the gland is about ten to twelve inches in length and nearly six inches in thickness. This, on section, we shall find in some places calcified, and in others cheesy. I also have other specimens here, removed from another case, in which no disease could be found except in the glands, and these without apparent enlargement.

"During the winter of 1883 the asylum purchased a full-blooded, registered, Holstein bull-calf, from one of the leading breeding firms of this country. This bull was kept from the herd until old enough for breeding purposes, and then only came in contact with the herd as occasion required. This animal thrived until April last, when I noticed that he began to manifest symptoms of the disease. He was examined at frequent intervals during the summer, and each examination confirmed the previous diagnosis. He was killed on November 10th, last. Previous to being killed he weighed nearly two thousand pounds. On post-mortem I found the left submaxillary gland enlarged and suppurating, thyroid gland enlarged and calcified and several deposits in the left lung about the size of walnuts; also tubercles upon the peritoneum and bowels. The liver, in this case, was free from disease. The glands and portions of the lungs I have here for your inspection.

"The only possible objection that could be raised regarding the care of these animals was that of ventilation. The stables were kept scrupulously clean, being washed out daily, and there were no cesspools about the barns or yards. The barns are situated upon a side-hill, thus affording the best possible drainage.

"Their food was of the best of hay, corn fodder, bran, and vegetables. In the spring of 1884 all of the animals were removed from the barns and put in pasture, and open sheds built for their protection.

"During the following winter the animals were confined in the barns only during the time of feeding and milking, they being out during the day and protected at night by sheds open on one side. Also in the breeding of this herd of stock there was the greatest amount of vigilance exercised in order to avoid inbreeding."

For the purpose of determining the question of infectiousness, much experimental work has been done upon animals by inoculating them with tuberculous matter, by feeding it to them, and by subjecting them to the inhalation of it. The great majority of such experiments have been successful in communicating the disease to the experimental animals, whether the inoculated material was taken from human or animal tubercle. Notwithstanding the preponderance of positive over negative results, the questions involved needed for their satisfactory solution some experimental work which has been done in the last few years.

In the early part of 1882 a decided sensation was produced in the medical world by the publication of a paper which had been read before the Berlin Physiological Society by Dr. Robert Koch, under the title of "The Etiology of Tuberculosis."

The work of previous experimenters had made it somewhat probable that the primary cause of this disease was to be sought in a micro-organism. Koch had already distinguished himself by his bacteriological studies, and in this paper he announced the discovery of the *bacillus tuberculosis.*

The bacillus of tuberculosis may be most conveniently examined with a microscope which gives a magnification of from 450 to 700 diameters. A considerably lower power will suffice, with proper staining, for diagnostic purposes. The bacillus cells appear as slender rods from a quarter to a half of the diameter of a red blood-corpuscle, straight or curved. They may occur singly or in twos and threes, or in bundles. They are formed pretty uniformly in the giant-cells of tubercle, and appear to bear some relation to these. They are motionless. With a high enough power, spores may be seen within the bacilli, presenting the appearance of clear vacuoles. The bacilli may be cultivated artificially, the best medium for this purpose being solid blood serum of ox or sheep, and the most favorable temperature from 37° to 38° C.

The following summary of his experimental work with the bacillus of tuberculosis is taken from the Report of the Imperial Board of Health of Germany* which was sent out two years after Koch's announcement of his discovery.

A series of experiments was undertaken partly for the purpose of studying the results of inoculation with the tubercular products of different organs and of different animals. The inoculations were made upon rabbits and guinea-pigs, and if death did not occur within eight weeks the animals were killed and examined for evidences of tuberculosis. The tubercular material which was used in these in-

*Mittheilungen aus dem Kaeseil, Gesundheitsamte. Band II, 1884.

oculations was in every case examined and the presence of the bacilli verified. The following are a few of the groups of inoculations, showing the origin of the tuberculous matter used and the results.

No. 1. Miliary tuberculosis of man, grey nodules of pia mater very rich in bacilli. Six guinea-pigs inoculated. Five died, one killed. All tuberculous.

No. 2. Miliary tuberculosis of man, grey nodules of lung. Six guinea-pigs. All became tuberculous.

No. 8. Phthisical human lung with cavities. Six guinea-pigs. All became tuberculous.

No. 11. Consumptive human sputum. Nine guinea-pigs. All became tuberculous.

No. 13. Consumptive human sputum which had been dried two months. Three guinea-pigs. All became tuberculous.

No. 21. Partially calcified nodules from lung of tuberculous cow. Eight guinea-pigs. All became tuberculous.

No. 22. Tuberculous nodules from peritoneum of ox. Six guinea-pigs. All became tuberculous.

No. 25. Tuberculous caseous pneumonia of swine. Five guinea-pigs. All became tuberculous.

No. 26. Tubercles from lung of rabbit dead of spontaneous tuberculosis. Four guinea-pigs. All became tuberculous.

No. 27. Tubercles from lung of ape dead of spontaneous tuberculosis. Two guinea-pigs and two cats. All became tuberculous.

These will show the variety of sources from which the inoculated material was derived. In all cases the same characteristic symptoms were observed during life, and the same tuberculous changes after death, whether the inoculated matter had a human or an animal origin. The diagnosis of tuberculosis was in every case confirmed by a microscopical examination for the characteristic structural elements of tubercle, and in every case the bacillus of tuberculosis was found, as it had been in the inoculated matter. In all, there were inoculated 179 guinea-pigs, 35 rabbits and 4 cats, and in no case was the result unsuccessful,—every animal became tuberculous.

These experiments were preliminary to others which were to follow. Koch had found that the bacilli can be cultivated artificially, and that the best medium for this purpose is solid blood serum of cow or sheep with or without the addition of gelatine. On this soil the growth of the bacilli takes place very slowly and only between the temperatures of 30° and 40° C. It is not until eight or ten days that the growth appears as little yellowish scales or grains. The blood serum during the growth of these pure cultures, as they are called, is not liquefied. From one of these little scales a new generation may be started. The scales gradually increase in size and consist entirely of bacilli.

The objections to former experiments had been that in the inoculations other matter than the bacilli had been transmitted, and consequently, that the infective power may have resided in this other material instead of in bacilli.

By carrying the bacilli through a sufficient number of these pure cultures, and then inoculating from the bacilli so produced, it seemed that this objection could be removed.

Accordingly, in some of these experiments the *bacilli* derived from a case of phthisis were carried through a series of twenty-six cultivations, occupying a period of a year and a half, and then from these bacilli, twenty-six removes from the original source of the infection, guinea-pigs were inoculated, and became tuberculous and died in a rather shorter time than after inoculation with the crude material. Otherwise than this, the course of the tuberculosis was exactly the same as when the fresh material was used.

Another line of experiments was a series of inhalation experiments with these pure cultures. A pure culture, the bacilli of which were originally derived from a phthisical human lung, and which had been carried through twenty-three cultivations during a period of fifteen months, was rubbed up with distilled water, and then so far diluted that it appeared almost clear. It was then allowed to stand until the visible particles had subsided, and the upper portion of the liquid, which appeared almost perfectly clear, was made use of for the inhalation experiments.

The animals used in the experiments were, for half an hour on three consecutive days, confined in a cage and subjected to the spray from an atomizer loaded with the above-mentioned fluid. After the inhalation was finished, the animals were separated in other roomy cages and well taken care of. There appeared in some of these animals, even after only ten days, difficulty of breathing; many of the rabbits and guinea-pigs died in the course of from fourteen to twenty-five days. All the other animals were killed at the end of twenty-eight days after last inhalation. All of these animals were found tuberculous.

Although rats and mice are very little susceptible to tuberculosis, very numerous tubercles of the lungs were found in the animals of this kind which were used in these experiments.

Summing up the results of these inhalation experiments with the pure cultures, there were made use of, in all, 217 animals, consisting of 94 guinea-pigs, 70 rabbits, 9 cats, and 44 field mice, and that in no case did an animal so experimented upon fail to become tuberculous.

At the same time with these, a considerable number of other animals were experimented upon exactly in the same way, with the exception that inert substances were used in the atomizer. Of these none became tuberculous.

Further than this, we are told that an exceedingly large number of trials were made with other pathogenic and non-pathogenic germs. Rabbits, guinea-pigs, mice and other animals received these by subcutaneous inoculation, by injection into the peritoneal cavity, and also by inhalation, but never in any of these was tuberculosis produced.

In the three years which have elapsed since the report of these experiments was made, considerable other experimental work of a similar kind has been done in various quarters, the most of which is confirmatory of the conclusions arrived at by Koch that tuberculosis is an infectious disease, that the bacillus tuberculosis is to be regarded as the infective agent and the essential cause of the disease, and that human consumption, the "pearl disease" of cattle, and other forms of animal tuberculosis are identical in their nature.

HOW IS TUBERCULOSIS COMMUNICATED?

We have already seen that experimentally the disease may be transmitted by inoculation, by inhalation, and by ingestion. Evidently the first method of communication comes into operation but very rarely in spontaneous tuberculosis. On the contrary it is easily conceivable that by inhalation and by ingestion the opportunities for receiving the infection are not of so infrequent occurrence. In man, the tuberculous expectoration which contains the infectious bacilli, as is shown in another paper in this report, retains its infectious qualities for a considerable time, even when thoroughly dried and pulverized. By the inhalation of this pulverized sputum undoubtedly a large proportion of the cases of lung tuberculosis in the human race is acquired. In the tuberculosis of birds a prominent characteristic of the disease is the tuberculous nodules of the mucous membrane of the intestinal tract. From this source undoubtedly the bacilli are mingled with the feces and when expelled upon the ground are likely to contaminate the food, which is picked up from the same places. This is the most probable explanation of the causation of these outbreaks of tuberculosis of fowls which sometimes destroys whole flocks. In bovine tuberculosis expectoration is scanty, but inoculation experiments with the saliva of a tuberculous cow proved to Toussaint that it is possessed of infective qualities. Standing as cattle often do nose to nose, and eating from the same cribs, and drinking from the same troughs, it can be imagined that the chances are many for the infection to be carried over from the sick animal to the well by the inhalation of the expired breath, or by the ingestion of fodder or drink which has become infected by the expired air or by the secretions.

RELATION OF ANIMAL AND HUMAN TUBERCULOSIS.

In view of the established etiological unity of animal and human tuberculosis, the enquiry in regard to the relation of animal and human tuberculosis, and especially, the enquiry as regards the influence of the prevalence of bovine tuberculosis upon the public health, becomes a question of the greatest interest and importance to the sanitary student, and to the people at large. To learn that such is the fact we have only to turn to the current medical, veterinary and sanitary literature. The assumption that in various ways this fatal disease may be communicated from animal to man and, conversely, from man to animal, opens possibilities of establishing foci of the disease in the human race and in animals, hitherto but little thought of. The following cases illustrate some of the ways in which tuberculosis may be accidentally transmitted from man to animals or *vice versa*.

"A woman fifty-eight years old, who had been consumptive for several years, kept a pet dog, which for a year eagerly swallowed her phthisical expectoration. At the end of six months the dog coughed up copious purulent expectoration, and finally became very thin and died. The woman obtained another dog a year old and a foot high. Although she gave him plenty of milk and meat, he soon evinced the same taste as his predecessor. Six months afterwards he also became sick, and died at the end of twenty weeks. Both of his lungs were found almost entirely destroyed by phthisical suppuration."

The European veterinarians frequently cite similar cases, a sample of which is given in the following from a French journal.*

*Revue D'Hygiene, 1885, p. 430.

"A dog which frequently licked up the matter expectorated by a young girl who has since died of phthisis succumbed a few months afterward to a general tuberculosis, and at the post mortem examination the diagnosis was verified. The characteristic histological lesions and the bacilli of tuberculosis were found."

Still more frequently the same journals have narrated the histories of the transmission of tuberculosis from man to the flocks in the poultry yard. In one case which is given, large numbers of chickens in a poultry yard had been dying for a long time and the post mortem examinations revealed the bacilli and the characteristic changes of tuberculosis. A veterinary surgeon was consulted in regard to the cause, and he learned from the proprietor that his daughter had been sick with phthisis and had recently died. During the last stage of her sickness she had not left her chamber, but the expectorations from the spittoon had been emptied within reach of the poultry.

In another case a farmer had owned a fine flock of poultry, but lost successively, for two or three months, half a score of fowls young or old that had died at an extreme stage of emaciation. At the autopsies of some of the last victims extensive tubercular lesions were found in the abdominal viscera and a microscopical examination revealed the bacilli of tuberculosis. It was learned that on the farm there was a workman who, for a time, had presented unmistakable symptoms of pulmonary tuberculosis. Little by little this man became incapable of doing his ordinary work, and, not to deprive him of the means of earning his living, the farmer confided to him the care of his poultry yard, which he attended to for five or six months, and about three months after he took charge of it the fowls began to die. The method of contagion appears very simple. The invalid attendant related with apparent pleasure that his chickens appeared very fond of his supplement to their rations when he expectorated. The sputa of this patient had been found to contain the bacilli of tuberculosis and there seems no need of looking further for the cause of the outbreak of tuberculosis in the poultry yard.*

"Dr. E. G. Janeway relates a number of cases of phthisis (Archives of Medicine) illustrating its possible contagiousness. Among others was the case of a phthisical young man who kept a pet dog. He was accustomed to sleep with the dog nestling in his arms. The animal became afflicted with a cough and subsequently died.

*Revue D'Hygiene, 1885, p. 429.

Another dog shared the same fate. A third dog suffered from a cough, but its owner died of phthisis and the dog subsequently recovered."*

"A man in our neighborhood was in the habit of buying all the 'wasters' he came across—in fact, created quite a trade. The milk in every case was used for food purposes. The consequence was that several members of the family were attacked with phthisis, and died. This was discussed at the time as being a strange coincidence; but the pathology of consumption not having the same light thrown upon it as it has now, the matter lapsed into oblivion."

"A cousin of my own was attacked with phthisis. During the progress of the disease, it was discovered that two of the three cows which her father possessed were suffering from tuberculosis, one of which went off as a 'waster.' The girl in question likewise succumbed. As the milk from these cows formed her principal diet, it is not difficult to imagine that it was the means of generating the disease."†

The most of the chances for the communication of tuberculosis from man to the domestic animals comes from an inconsiderate disposition of the expectoration of consumptives. Without the corroborative evidence of such cases as the foregoing and in the light alone of the experimental work which has been done to determine whether tuberculous products may communicate the disease when taken into the stomach, it would be rendered highly probable that occasionally the eating of food which has been soiled by the sputum of consumptives might give rise to the disease in animals. But the character of the reciprocal relations between the human race and some of our domestic animals makes the chances very much greater that man should be the party to suffer the most frequently in this reciprocity; and it will be easily surmised even by one who has before given this subject no thought, that this danger to man comes almost wholly in his food supply. That the flesh and milk of tuberculous animals is a real danger to mankind is expressed in the opinions of many persons whose positions and opportunities should qualify them to speak with authority.

Fleming, the leading veterinary authority of England, said, before the identity of bovine and human tuberculosis was fully established, that "there is every reason to view with grave suspicion the use of flesh from phthisical cattle, especially if the disease be much advanced and the tissues generally are involved. But with more reason

---

*Journal of Comparative Medicine and Surgery. April, 1883, p. 180.

†Communication to the first meeting of the National Veterinary Association, London.

the milk from cows affected with tuberculosis should be prohibited, particularly when given to infants, who mainly rely upon this kind of food for their nourishment, and whose powers of absorption are very active. Even if such milk did not possess dangerous infective qualities, its deficiency in nitrogenous elements, fat and sugar, and the increased proportion of earthy salts, would render it objectionable as an article of diet. It has long been known that it was liable to produce diarrhœa and debility in infants; but though many children fed on such milk have died from general or localized tuberculosis, the part probably played by this food in its production has not been suspected. One of the first matters to be taken into consideration at this point is a reconsideration of the question whether bovine tuberculosis is essentially the same disease in kind as the human form."

Prof. Walley of the Edinburgh Royal Veterinary College says:* "As to the use of milk from animals in which tubercle is suspected to exist, no two opinions can be held; its deleterious effect, even when exposed to a tolerable degree of heat, has been abundantly proved."

Dr. Albert Johne, of the Royal Veterinary School of Dresden, Germany, expresses the following opinion:† "The milk from tuberculous animals is to be considered as possessing an unquestionable infectious character. It must be the duty of the police to put a stop to the reckless usage of such milk to babes."

Gerlach, the late director of the Royal Veterinary Institution at Berlin, whose extensive experimental work in this direction eminently qualifies him to express an opinion, says:‡

"We have, therefore, not only the right, but the duty, to adapt the result of our investigations to questions of public health. They point to one cause of tuberculosis in man as being in the food we eat."

Dr. F. S. Billings now in charge of the Bacteriological Laboratory, University of Nebraska, says:§

"This question of the specific infection of milk from tuberculous cows is no trifling matter; on the contrary, *it is one of life and death.* How many thousand babies are yearly brought up on the bottle with cow's milk!

---

* The Four Bovine Scourges, Edinburg, 1879.

† Jr. Comp. Med. and Surg., Vol. VI, p. 260.

‡ Ibid, p. 185.

§ Op. cit.

All the fond parents ask is, *that the milk is from one cow.* This guaranteed, they appear to feel perfectly satisfied. No one seems to have thought that a trustworthy and expert *guarantee* of the hygienic condition of the cow giving the milk was necessary. We make great demands, and get terribly excited about the purity of our water supply. We spend millions of dollars to keep the fountains pure, and to prevent all foreign admixtures on its passage to us. Is it not as much our duty to examine into the purity of the fountains from which comes our milk supply?"

Experimentally it has been determined that the infective principle of tuberculosis resides in the milk of cows which are suffering with that disease, and that when fed to animals it may communicate tuberculosis to them. The first experiments of this kind were made by Gerlach. He says: "Having a cow afflicted with tuberculosis, it was resolved to test the question whether the milk from such a cow is capable of producing a similar disease in young animals when fed upon it." The results of these experiments were partly negative, but there were enough positive results to prove that the disease under consideration may be communicated through the medium of the milk of tuberculous animals.

Johne* reports 91 feeding experiments with tuberculous milk. From these were 31 7 per cent of positive results.

Bollinger† sums up the results of his milk-feeding experiments as follows: 3 pigs, 1 positive, 2 doubtful; 3 calves, 2 positive, 1 died prematurely; 1 lamb, 1 positive; 2 dogs and 2 cats, negative; 14 rabbits, 2 positive, 6 negative. The milk given to the 6 in which negative results followed had been previously boiled.

Bang‡ of Copenhagen, in a paper read before the International Medical Congress in that city, called attention to the frequency of local tubercular disease in the udder of the cow, and gave the results of his experiments in feeding the milk from tuberculous cows, some of which were affected with local tuberculosis of the udder and some were not. In all cases where the disease had affected the milk-bag, the milk communicated the disease to the animals to which it was fed, whether it was taken from the half of the udder that was affected or not. In the experiments with the milk of tuberculous cows

---

*Jr. Comp. Med. and Surg., Vol. VII, p. 94.

†Ibid, p. 93.

‡Ibid, Vol. VI, p. 143.

which did not have the local udder tuberculosis the results were partly positive and partly negative.

"Klebs has been successful in producing tuberculosis by giving animals milk from those which were diseased, and his experiments, therefore, have an extremely important bearing. In addition to rabbits and guinea-pigs,—creatures which appear to be very susceptible to the artificial production of the malady,—he accidently induced the disease in a dog by feeding it with the milk from a cow in the last stage of phthisis. The results of his experiments led him to the conclusion that the use of this milk always produces tuberculosis, which commences as an intestinal catarrh, and then assumes the form of tubercles in the mesenteric glands; it afterwards affects the liver and spleen, and subsequently the thoracic organs. He asserts that the tubercle virus is present in the milk of phthisical cows, whether they are slightly or gravely affected; and that it chiefly exists in the serous portion, as when milk has been so filtered as to deprive it of its solid particles, the fluid portion appeared to be as active as when the malady had reached an advanced stage in the animal from which it had been procured.

"He admits that it may produce no injurious effects on vigorous subjects, and he has even observed fully developed tubercles to be absorbed and disappear after a time. He thinks it probable that the virus of tuberculosis may exist in varying proportion in the milk of phthisical cows, according to the extent of the disease in them; and he is further of the opinion that the malady may be developed in children born without any tendency to it, through the medium of the milk of the mother or nurse."

Besides these experiments which were purposely instituted to determine whether tuberculosis may be communicated by means of milk, many other experiments unintentionally happening might be cited, the evidence of which is in the same line. In the outbreak of tuberculosis at Willard Asylum, an account of which is given in this paper, there was an unintentional experiment of this kind which was not quoted and which read as follows:

"In proof that the disease may be acquired by the ingestion of tuberculous substances, allow me to call your attention to the Asylum herd of swine, which numbered nearly three hundred head. These animals were kept in different yards. In one the breeding sows; in another the half-grown pigs, and in the third yard, which was adjoining the slaughter-house, were kept the large hogs which were being fattened. The hogs in this latter pen had access to the offal from the slaughter-house where a number of tuberculous cows had been killed. Later in the fall a number of the large fat hogs died suddenly in full strength, and on post mortem were found highly tuberculous. The disease, however, did not present the same pathological conditions as in the cows. The disease seemed more especially confined to the abdominal viscera and the glandular system, the lungs being rarely affected. In those cases that died suddenly I found a tubercular peritonitis, to which was attributed the cause of death. During the killing season many were found diseased, there being large metastatic abscesses in different portions of the body, but more especially in the side; and in the sows the rudiments of the milk bag were often the seat of abscess. Also the joints were frequently affected; many of the hogs, both large and small, became lame. During the winter a number of them became partially paralyzed in their hind parts. The paralysis progressed, and finally they were unable to use their hind limbs at all, and for several days three of them moved about, walking upon their fore limbs and dragging their hind parts. Still they were fat and seemed to eat equally as well as the others. Finally they were killed, and on post mortem the bodies of the vertebræ in different portions of the column were found to have undergone caseous transformation. The cord at these points was softened, and in some cases completely obliterated.

"There were three sows in this yard that proved to be with pig. They were taken out and put with others in another yard. One of these sows, shortly after pigging, became paralyzed similarly to those that I have already alluded to. In about three months her young pigs became hollow-backed; they walked about with their bellies touching the ground. Finally they were killed. All were found diseased and the bodies of the vertebræ very incompletely formed. The other two sows became paralyzed and were killed before pigging, but unfortunately an autopsy was not held.

"After the killing of all the swine that had access to the offal, and disinfecting the yards, we have since had no more disease in the herd."*

The following interesting case from a German source is quoted from Billings:

"The milk from a tuberculous cow had been used for some time in a cooked condition, but the condition of the cow finally became so bad it was decided to give the milk to the hogs, but uncooked.

*Op. cit.

"From May of the same year, the farmer's wife noticed that the young pigs (four or five months old) fed upon this milk did not appear to thrive well, and as, in the course of a few weeks, three died, I was requested to make an examination of the last one. I found the same much emaciated. I found a tuberculous peritonitis with effusion in the cavity of that organ. The lungs and bronchial glands were normal; the mesenteric glands enlarged—on section of the same, found them filled with a tuberculous mass; tubercles in the liver. In the course of a few weeks the two remaining pigs of the litter also died. I found tuberculosis in one of them, and the owner told me that the other, and another of an old litter which was with them, and fed on the same milk, were also found tuberculous on being examined."

Johne sums up the subject of infection from tuberculous milk as follows:*

"Zippelus reports a fatal case of diarrhœa, in a calf with large tuberculous ulcerations in the intestines and tuberculosis of the visceral peritoneum; the mother of the calf was slaughtered on account of the disease, which she had in a very severe form. Aufrecht found the liver of a thirty-seven-days-old rabbit to be the seat of an extensive miliary tuberculosis the mother of which was inoculated with virulent material a day after it gave birth to young. Others have reported similar results.

"Such milk has also caused tuberculosis in swine fed upon it, and is especially prevalent in North German swine, where tuberculosis is also most frequently met with in cows. Observations have been resorted to where whole families of swine held at dairies and cheese factories have gradually perished from this cause. Frequently the disease seems to have appeared in the cattle and swine of the same form.

"Dr. Stang in Amerbach reports a case of tuberculosis in a five-year-old child, where no trace of an hereditary influence could be discovered, which had been for a long time fed upon warm milk taken directly from a cow in which tuberculosis was unquestionably proven to exist.

"Bollinger considers the danger of transmission to human beings as being greater from the consumption of the milk from such diseased animals than from that of the flesh, as the former is more frequently taken in an uncooked condition, especially by children. The

*Jr. Comp. Med. and Surg., Vol. VI.

receptivity of the latter for the injurious influences of food far exceeds that of matured individuals. Bollinger even goes so far as to assume that the influence which such food has exerted upon babes may have too often been attributed to hereditary conditions. He also places emphasis upon the general disposition which seems to exist in man to tuberculosis. Bollinger seeks further to support his position by quoting the frequency with which tubercular phthisis is quoted as causa lethalis in human statistics: 30.25 per cent of all deaths in Munich, and according to Koch, one-seventh of all human deaths, are due to phthisis.

"Bollinger, however, has failed to notice quite a number of cases of a similar nature: for instance, Demone, Uffelmann, Ebstein, Hergard, Felizst, have reported such. Zippelus has endeavored to gather statistics with reference to the occurrence of tuberculosis in cows and in babes. This important subject needs much more detailed consideration than it has thus far received from boards of health. According to Z.'s table, it appears that the death rate among children under two years old, from tuberculosis, is the greatest in those regions where meat inspection has shown the greatest prevalence of tuberculosis in slaughtered cattle.

"Orth also considers the transmission of bovine tuberculosis to human beings as possible, both through consumption of flesh and milk. Cohnheim and Aufrecht both consider the milk of tuberculous cows to be a cause of phthisis mesenterica, the primary intestinal and acute miliary tuberculosis of children. Semmer adopts Bollinger's views. The transmission of tuberculosis to dogs by such food speaks strongly for these views, for dogs have as little susceptibility to this disease as any animal. Virchow is inclined to the same opinion, though he does not consider that the results of the experiments that have thus far been made fully warrant condemning the meat of such cattle for consumption, as tubercles have not yet been proven to exist in the flesh itself, though the parts infected should not be permitted to be sold.

"Toussaint believes that infection results easier when tuberculous material is taken into the intestines than when inoculated subcutaneously. Basing his ideas upon exact experiment, he considers it dangerous to feed meat or its juices, either raw or half-cooked, to invalids or children.

"When we carefully consider all the evidence, *pro* or *con*, in this question, as well as the results of Koch's investigations, which absolutely prove the identity and virulence of the disease in both man and animals, we are forced to the conviction that we can no longer doubt the possibility of the transmission of tuberculosis from animals to man through the consumption of the flesh and milk of animals thus diseased. Further investigations must be made in the most exact manner by unquestionably competent persons. Until it has been positively demonstrated that such a possibility does not exist, we must accept the evidence of Gerlach, Chauveau, Klebs and Toussaint with reference to the transmissibility of bovine tuberculosis, and see that the products from animals thus diseased are not sold for human food."

As regards the danger to be apprehended from the use of the flesh of tuberculous animals as food, there is not a harmony of opinion among authorities. Some hold that the flesh of tuberculosed animals should in all cases be condemned as human food. Others, and the larger number who have written upon the subject, would permit the use of such meat under certain conditions and under what they deem proper restrictions.

Gerlach* would not prohibit the use of such meat when the tubercular formations are strictly localized, but would condemn the flesh from all animals in which any one of the following conditions are found: 1. When the lymphatic glands in the neighborhood of the tuberculous organs have also become tuberculosed, and therefore the extension of the disease has become more general; 2. When caseous degeneration of the nodules has occurred; 3. When a general distribution of tubercle in the body is found; 4. When emaciation has begun.

Johne, whose views generally are trustworthy in a high degree, would not go so far as Gerlach and condemn all carcasses in which the lymphatic glands have become involved.

Most of the legislation on this subject in Europe, and the meat inspection which is done under it, has been founded in accordance with views similar to Gerlach's and Johne's, and no absolute prohibition of the use of the flesh of tuberculous animals is made. But it should be understood that the words and acts of the veterinarians and law-makers of the older countries have been dictated largely by motives of expediency and of economy. The scarcity of meat as food for the people is severely felt and the price of it is high. While the cost of living generally is considerably less than it is in this

* Eulenburg's Real-Encyclopaedie der gesammten Heilkunde, Vol. V, p. 344.

country, the price of butter, cheese and meat is always very high. Tuberculosis, moreover, is in many countries much more prevalent than it is with us. Under these circumstances the sweeping condemnation of all carcasses in which tubercular nodules might be detected is considered too great a curtailment of the food supply.

The two authors which have been cited do not deny that tuberculosis may be acquired by the ingestion of the flesh of tuberculous animals. Gerlach fed thirty-five animals with the raw flesh of tuberculous cows. Of these eight contracted the disease. Johne gives forty-six animals as having been fed with the raw flesh of tuberculous cows. 13.1 per cent of these gave positive results and 86.9 negative. These suffice to prove the existence of the danger.

HEREDITY.

It is not long since there were very few who doubted that heredity is by far the most potent influence in the causation of tuberculosis, human or animal, but the investigations of the last few years have led to a feeling of uncertainty as regards the part played by heredity. The result of the experimental and other evidence, which conclusively shows tuberculosis to be an infectious disease and capable of transmission both by ingestion and inhalation, suggests the possibility that many of the cases of tuberculosis which have been credited to hereditary influence have really been cases of tuberculosis acquired after birth.

It has been well shown that tuberculosis is not very often found in early bovine life; in fact, the cases in which it is found in the earliest weeks of the life of the calf are very rare, so that when found they have been matters of some interest to pathologists and veterinarians. Thus, it is recorded that "on March 27th, 1880, District Veterinary Surgeon Butscher of Bruck (Upper Bavaria) showed the tuberculous lung of a sucking calf at one of the meetings of the Munich Veterinary Association."

In one of the German veterinary journals it is mentioned that a tuberculous calf was found in the abattoir of Nuremburg and the same journal in the same year reports that there were five tuberculous calves killed in the Augsburg abattoir.* In the latter abattoir under official inspection there were killed in the year 1876, 25,909 calves. Of these, one, three weeks old, was found tuberculous.†

†Billings, Animal Diseases.

*Propagation of Tuberculosis, Lydtin, Fleming and Van Hertsen.

In the slaughter-houses in Berlin, 1884–1885. tuberculosis was found in 1599 cattle, in 2304 swine, and in two calves. In the slaughter-houses of Munich, according to an official communication, there were, in the course of several years, 150,000 calves slaughtered. Of these not one was found tuberculous. In Munich, however. in 1884, one calf was found tuberculous.*

As infrequently as tuberculosis has been found in the earliest weeks in the life of the calf, the authentic reports of cases of bovine fœtal tuberculosis are still more rare. It was only four years ago that one of the most experienced of German pathologists said that "there has never yet been discovered any trace of tuberculosis at any stage of fœtal development, whether human or animal."† Possibly Klebs went too far with this positive enunciation, for in the same year, 1883, we find in the Report on "The Influence of Heredity and Contagion on the Propagation of Tuberculosis" which was made to the International Veterinary Congress of that year, several cases of bovine fœtal tuberculosis.

Semmer relates five cases of pulmonary tuberculosis he met with in fœtuses of cattle. In the first of these cases he remarked several small nodules in the lungs of a three-months embryo, aborted by a tuberculous cow. These nodules consisted of aggregations of spherical and fusiform cells, with filamentous ramifications. The second case was that of a six-months' fœtus, also aborted by a tuberculous cow; in this fœtus the lungs showed numerous white points or nudules, some the size of a pin's head. These had the appearance of round-celled sarcomata, the cells in some places being so matted that the connective tissue appeared to be completely absent; these masses of cells might be considered as the point of departure of a tubercular formation. The third case was a fœtus of eight months, from a tuberculous cow; the lungs contained isolated nodules larger than in the two preceding cases, though analogous to them in structure. The two last cases were new-born calves from diseased cows; their lungs were full of nodules of various sizes and in different degrees of formation, some being in the earlier stages and others already caseified or calcified.

Jessen found the lungs of an aborted bovine fœtus, three months old, full of recent tubercles.

As regards these cases there is a chance to doubt the specific character of the tubercular nodules; but Johne of the Dresden school

*Fortschritte und Leistungen auf dem Gebieteder Hygiene, 1885.

†Real Encyclopædie, Vol. XIV, p. 134.

has more recently reported one which must undoubtedly be accepted as an authentic case of congenital tuberculosis. The fœtus was at the eighth month of development, and the cow, the mother of it, was slaughtered and found to be tuberculous. The report says: "The histological examination of the hardened tissues confirmed the existing views so far as we are justified in speaking of a characteristic histological structure in tubercles, and the microscopical examination."

"The characteristic tubercle bacilli were well represented in the giant cells and in the tissues of individual noduli in the limits of the caseous elements, in the intermediate tissue before the caseous passed into the epitheloid elements of the tubercles. In the last-named elements no bacilli were to be found.

The presence of the bacilli in the noduli proved their genuine tuberculous character, and that this case is the first known one of undoubted foetal tuberculosis."

While then recognizing the fact that congenital tuberculosis is a possibility, but that its occurrence is extremely rare, how are we to account for the fact that at a few months later than the "vealing" age tuberculosis begins to be not so rare a disease as earlier. For instance, in Dr. Bailey's post-mortem notes of the Orono herd, No. 6 was eight months, No. 15 three months, No. 16 nine months, and No. 39 two months old.

Two theories stand ready at hand. According to one there has been a congenital transmission of the germs (specific) of the disease which have lain dormant for some months or some years before they have given rise to the recognizable lesions of tuberculosis. According to the other, these cases of late-appearing tuberculosis are acquired after birth by contagion through infected milk or otherwise.

In favor of the contagion theory is our present positive knowledge that tuberculosis is an infectious disease and may experimentally be communicated to animals by ingestion and by inhalation. In favor of congenital transmission would be the observations, if such have been made, that the calves of tuberculous parents when absolutely removed from the possibilities of contagion have, nevertheless, become tuberculous. Authentic observations of this kind have probably not been made.

Further than this it may be said that congenital but delayed tuberculosis, though an old idea, is as yet a hypothesis pure and simple. Against it, is the deduction which may be drawn from the thousands of experiments in which, whether the bacilli are implanted in the system of a living animal or on an artificial ground, or culture medium, such a thing as a prolonged dormant stage is entirely unknown. No matter in what way the bacilli are introduced into the organism or culture field, in a short time, in two or three weeks, they begin to develop and to bring forth the typical pathological lesions of tuberculosis. That when transmitted congenitally they should behave differently requires, in the absence of sufficient proof, a considerable amount of credulity.

Notwithstanding what has been said, it cannot be denied that hereditary influence or a hereditary predisposition is a considerable factor in the causation of tuberculosis. If tubercle as such or the bacillus tuberculosis is very rarely inherited, the structural peculiarities of the parents, or their lack of vital resistance to the infection of tuberculosis may be transmitted. But, even here, it is uncertain what part should be credited to this transmissible hereditary predisposition and how much to contagion, for as in the human family so with cattle, the offspring of tuberculous parents are more exposed to the danger of infection than are most other individuals.

CAUSES OTHER THAN CONTAGION AND HEREDITY.

Contagion and hereditary influence belong at the head of the list of causes of tuberculosis. The others which may be enumerated stand in the relation of accessory causes, and consist in a variety of circumstances and conditions to which the animals may be subjected and which have a tendency to render their systems more assailable by the essential cause.

Climate is not without influence in predisposing to this disease. Further than that the nearer the equator is approached the more the climate seems to predispose to tuberculosis, and that dampness and coldness of soil favor the disease, we are not very sure of the climatic causes. It is well known that in some countries and districts bovine tuberculosis is very rare, while in others it is very prevalent. The causes of these differences are not always strictly climatic, but in some cases are due to local differences in the care of the cattle and sometimes, probably more frequently, to the introduction of contagion.

"In Baden the affection is most frequently met with in the neighborhood of large towns; it is much less common, or is almost entirely absent, in hilly or mountainous parts. In certain regions where cattle are kept almost exclusively for breeding, tuberculosis is nearly unknown, as in those in which are raised the Hinterwald cattle (Schönau, Lörrach, and environs), and in the administrative districts of Pfullendorf and Messkirch. Up to the present time these districts have also remained free from contagious pleuro-pneumonia, while those which were previously visited by the latter malady are the ones that now have numerous cases of tuberculosis occurring in them.

"Contagious diseases in general, and tuberculosis in particular, are very infrequent in habitations to which strange cattle are not admitted, and where vacancies are filled up by the home stock."*

Other predisposing causes which may be mentioned are ill ventilation of stables, swill and refuse feeding, prolonged and excessive lactation, age, and to some extent, breed.

SIGNIFICANCE OF BOVINE TUBERCULOSIS FROM AN ECONOMIC AND A SANITARY POINT OF VIEW.

Something of the import of the prevalence of tuberculosis amongst our domestic animals may be gathered from what has already been said, and from the following quotations from the words of others more may be gathered.

In Great Britain the loss from the cattle-plague, pleuro-pneumonia and foot-and-mouth disease has beenmany millions of dollars, yet Walley of Edinburgh, in his able work on "The Four Bovine Scourges," includes tuberculosis with these three. In his preface he says:

"Those who know nothing of tubercle may question its claim to a place amongst what may be called *the* bovine scourges, but as will be seen on studying it, it is a more insidious (and equally deadly) foe to the stock-owner than either of the other three diseases," and in the chapter on tuberculosis,

"The insidious nature of tuberculosis has perhaps had much to do with the comparative slowness with which professional and public attention has been directed to it, but the strides which it has made and the hold which it has gained on our stock render it one of the most—if not the most—important questions affecting the future well-being of the bovine species.

"Looking at an individual tubercle we might be led to despise its comparative insignificance, and to ignore its deadly meaning; but

*Lydtin, Fleming and Von Heitsen, op. cit.

when we see thousands upon thousands of these knots existing in the organism of a single animal, a truth is forced upon our minds which we cannot refuse to recognize—viz: that we have to deal with an insidious, implacable and deadly foe."

In the report of the committee on tuberculosis to the International Veterinary Congress held in Brussels in 1883, it was said:

Tuberculosis is, of all the maladies affecting the domesticated animals, that which is the most wide-spread, and which, of all others, most deserves the qualification of universal panzoöty (Weltseuche).'

Johne says: "The carelessness, which in many cases might be called reprehensible, with which agriculturists have tolerated tuberculosis in their cattle, must be abolished, and the medical and veterinary professions will be compelled to assume a most decided position on the question of tuberculosis."

In a number of the larger German cities where an inspection of the slaughter-houses is made, it would seem that about two per cent of the cattle killed have been found tuberculous.

Dr. M. D. Blaine, the reporter of the Willard Asylum outbreak says: "During the past two and one-half years I have examined over four thousand head of animals in different sections of this State, and I find that the disease is more prevalent than is generally known. The majority of animals that I have examined were milch-cows, and I found twenty-one per cent manifesting symptoms of the disease; but perhaps not over four per cent of them manifested pulmonary lesions. I have visited some herds where at least fifty per cent could be shown to be tuberculous. The disease seems to be much more prevalent in some localities than in others. For instance, in low, wet, and marshy districts it is very common; also in places where animals are poorly fed and kept in close confinement, and in poorly ventilated stables.

"I visited your stock-yards during the month of July last, also examined a number of herds about your city and Brooklyn. The morning I visited the stock-yards at 159th Street, in company with Mr. Romane, one of your meat inspectors, I saw thirteen cows that were offered for sale, three of which were badly diseased, and one of the three was a cow thirteen years old and manifested pulmonary lesion. I acquainted Mr. Romane of the fact, and when he consulted the manager of the yard in regard to the cattle, he said that they had been sold to parties in Jersey City for milkers. I visited herds that furnished milk for the city of Brooklyn, and I did not fail to find tuberculous animals in every herd that I visited, and in some herds to a great degree. But I was astonished in not finding more disease than I did, as the manner in which the animals were being cared for was not only unhygienic, but cruel, especially in winter, as several herdsmen informed me that their animals were tied in those small barns in the fall, and were not taken out in the open air until springtime."

In his report to the Department of Agriculture, on the contagious diseases of domestic animals, Professor Law of Cornell University says that, "twenty, thirty, and even fifty per cent of certain herds, that supply New York City with milk, are affected with this disease. In some country districts can be shown large herds with ninety per cent subjects of tuberculosis."

This is a report for only certain districts. In this country we have no statistics to teach us anything as regards the general prevalence of the disease, but there is reason to fear that it is on the increase here as Fleming thinks it is in England. This author* said ten or twelve years ago:

"Recent researches have shown, in the clearest manner, that scrofula or tuberculosis—a contagious disease—is very common in cattle, and especially in dairy cows; and that not only will the flesh of these produce consumption in other animals fed upon it—and particularly young animals—but that their milk also will infect. We dare not experiment upon human beings, to ascertain whether such a terrible result is possible with them, but judging from analogy, we cannot venture to doubt it. The flesh and milk of scrofulous cattle enter largely into the diet of probably thousands of people every year. That contamination may take place from the milk is, perhaps, the most serious reflection, as this is rarely boiled; for it has been proved that a high temperature will destroy the infective property, and hence the flesh, if thoroughly cooked, may be rendered inert.

"When we remember that milk is the staple diet of young children, and that infantile diarrhœa and glandular affections of a scrofulous nature annually carry off large numbers, while phthisis in young people and adults is a wide-spread and fatal malady, we are brought face to face with the serious question as to the share the

*The Contagious Diseases of Animals.

flesh and milk of diseased cattle may have in the production of this mortality."

In our State we have good reasons for believing that the prevalence of bovine tuberculosis is less than in most of the other States,—probably less than in any other State. Excepting the limited extension of the malady from a very few infected points, according to the best testimony which we have, our herds are free from the disease. From what has been given in this paper, it is thought it may be understood how important it is, both as a question of public health and of public wealth, to keep our domestic animals, especially our cattle, as free as possible from this scourge. One of the aims has been to show how closely inter-related is the tuberculosis of animals and of man,—that the general prevalence of animal tuberculosis would be a constant source of danger to the human population, and that, from infection derived from human sources, outbreaks of tuberculosis may start in our domestic animals. We are therefore liable to have fresh outbreaks of bovine tuberculosis the origin of which cannot be traced to any other preceding case of animal tuberculosis as long as human pulmonary consumption is the leading disease of civilized life. From whatever source derived, and wherever found, a strictly administered weeding-out policy should be applied by State and municipal governments. This should be carried out, not only as a humanitarian policy as regards the vital and financial welfare of our own people, but also in consideration of the welfare of the many thousands who yearly spend the summer months with us. They come not only for the pleasure which may be derived from our coast and inland scenery, but many of them in consideration of the fresh air, pure water, and uncontaminated milk and butter supply for their children. Many of these summer visitors have been in the habit of thinking of these sanitary considerations rather more than we have until of late, and in studying to promote the welfare of this transient part of our population, we shall best subserve our own interests.

PREVENTIVE MEASURES.

Any other disposition of tuberculosed animals than by quarantine and speedy slaughter would be a serious error. The following regulations given by Johne for stamping out the disease are in accord with the views of all intelligent veterinarians.

"All tuberculous or animals with tubercular or tendencies to pulmonary diseases must be unconditionally excluded from breeding.

"All animals diseased with tuberculosis must be unconditionally separated from healthy ones, and immediately slaughtered. Suspected ones should be treated in the same manner.

"Stables in which such animals have been kept must be thoroughly cleansed and disinfected.

"All momenta tending to produce a predisposition to disease must be carefully avoided, and great care given to ventilation, diet, exercise, exposure, etc."

In connection with preventive measures it may be said that some authorities would permit the use of the milk and meat from tuberculous animals provided that previous to its use it be subjected to a sufficient degree of heat. As regards milk, there can be no question that boiling is destructive to the vitality of the bacilli which may be present in it. Bang has concluded from somewhat recent experiments that milk which is kept at the temperature of 72° C. (161.6° F.) for a quarter of an hour is sterilized and made harmless. The sterilization of the milk so treated was tested only on two rabbits. Koch, on the contrary, affirms that the degree of heat fatal to the bacillus of tuberculosis is not reached below the boiling point. Recently Professor Sormani* has communicated the results of his experiments in the same direction. He mixed fresh tuberculous sputum with milk and subjected it for ten minutes to temperatures of 70°, 80°, and 90° C. Another portion was brought to the boiling point. On the 41st day after inoculation all the animals so treated with these specimens were found tuberculous. The results were very different, however, when the milk was maintained at the boiling point five minutes,—the animals then remained sound.

As regards the effect of cooking upon the bacilli in the flesh of tuberculous animals, we have some experimental work which gives some data. Liebig was the first to attempt to determine the temperature which was required to cook the interior of pieces of meat. According to him, when in the interior of such masses a temperature of 70° C. (158° F.) has been reached the flesh is fully done, so that it has lost its red appearance. Perroncito found that when considerable masses of flesh were cooked for three hours the interior never reached a higher temperature than 84° C. (183.2° F.) Wolffhugel

* Revue D'Hygiene, 1885, p. 430.

and Hueppe learned in their experiments* that, in the process of either baking or boiling large pieces of meat, the heat penetrates very slowly and that it never reaches, even after several hours cooking, 100° C. (212° F.) in the interior of the mass and only very rarely reaches this temperature even in the superficial parts.

* Mittheilungen a. d. Kaesul Gesundheitsamte, Vol. I, p. 399.

A Comparative View of Sanitary Laws, and What Changes are Needed in Those of Maine.*

By A. G. Young, M. D., Secretary of the Board.

An examination of the public health laws of the various English-speaking peoples shows unmistakably in many directions the moulding influence of the few earlier models of this kind of legislation. It shows also among the laws many points of difference and various degrees of excellence. A law has been defined by some of our jurists as the expression of a want. These wants which have found utterance in the language of our statute books it is quite conceivable have not been found to be the same over the whole length and breadth of the many degrees of longitude and latitude. As the want has differed so shall we find the expression of the want to be dissimilar. But more frequently, undoubtedly, the dissimilarity in our sanitary enactments has been due to other causes,—to the slighter or more careful study which the makers of legislative bills have given to the needs of the State, to the differences in composition of legislatures as far as intelligence regarding sanitary matters is concerned, to the more or less advanced state of preparedness of the general public for improved sanitary laws, and often, undoubtedly, to the correct or incorrect appreciation of the state of the public mind, by makers of bills or legislative enactors of them.

In a few of our States there has lately been an attempt to codify and improve the scattered enactments and to make the laws more in conformity with the clearly felt needs of modern sanitation, and some of these it is a pleasure to read.

But in most of our States the existing legislation is well characterized by the expression "tumbled up;" it has been done piecemeal,

*Read before the Third Annual Meeting of the National Conference of State Boards of Health, Toronto.

and in almost all directions there is a reverential clinging to antiquated forms which in this age, for effectiveness and utility, are as much out of place as is the wooden plow of our Aztec neighbor.

In my own State, which was originally a part of Massachusetts, the public health laws were copied largely from those of the mother State. For instance, almost everything which we have relative to the important matter of the management of the contagious diseases we got from an act approved March 10th, 1821, entitled "An act to prevent the spreading of the Small-Pox, and other Contagious Diseases." This was copied without change from the Massachusetts law of that time, and this Massachusetts law was passed by the General Court of the Commonwealth June 22d, 1797.

Furthermore, a large part of this Massachusetts law was a transcript of the old Colonial law. In an act passed one hundred and eighty-five years ago, in the reign of William the Fourth, we read:

"SEC. 3. That, if need so require, any two justices of the peace may make out a warrant, directed to the sheriffe of the county or his deputy, or constables of the town or place where any such sick person or persons shall be, requiring them or any of them, in his majesty's name, with the advice and direction of the selectmen of the same, to impress and take up convenient housing, lodging, nurses, tendance and other necessaries for the accommodation, safety and relief of the sick."

This venerable law, handed down from the early colonial times to the newly erected Commonwealth, and by her in later years bestowed as a part of the legal dowry of our own State, where it remains intact, is a fitting testimonial of the sterling good sense possessed by our early legislators and may be deemed a reflex of the sanitary knowledge and of the methods in those times of dealing with contagious diseases and the question of quarantine; but standing as it now does, without amendment and without change, save to be shorn of its antiquated phraseology, it is a sorry index of the needs of this latter half of the current century and a very inefficient piece of legal machinery for dealing with many of the sanitary problems as they now present themselves to us.

In the following very incomplete comparative view of the health laws of some of our States, together with those of England and the Province of Ontario, the presentation will mostly be made under four separate heads, viz:

State Boards of Health,
Local Boards of Health,
Nuisances and
Contagious Diseases.

STATE BOARDS OF HEALTH.

A marked difference exists in the various State or central boards of health in regard to their powers and duties. The role of some of them, as defined by the legislative acts establishing them, would appear to be hardly more than educational and advisory. Examples of such boards with restricted executive powers are those of Maine, Rhode Island, Connecticut, Indiana, and Michigan. Some of these, notwithstanding their limited jurisdiction, have done excellent sanitary work.

To other boards their legislatures have delegated a certain share of law-making power, thereby under certain circumstances or in certain emergencies increasing their effectiveness and usefulness. The law of Illinois defining the powers of the Board says that it "shall have authority to make such rules and regulations and such sanitary investigations as they may, from time to time, deem necessary for the preservation or improvement of public health; and it shall be the duty of all police officers, sheriffs, constables and all other officers and employes of the State, to enforce such rules and regulations."

"Under this section," says the Attorney-General, broad duties devolve upon the State Board of Health, and ample power is given to enable them to discharge their duties. They not only have the right, but it is their duty, to make any and all rules and regulations which they deem necessary to preserve the public health. Such rules and regulations, when promulgated, have the force and authority of law, and are to be enforced, if necessary, by the entire power of the State."

The same powers are given to the Iowa Board in the same words, and by a recent enactment similar powers have been granted to the New Hampshire Board. In Arkansas "At any time the Governor of the State may require the State Board of Health to examine into nuisances or questions affecting the security of life and health in any locality, and in such case the said board shall have all necessary powers to make examinations and shall report the results thereof to the Governor." In accordance with the report of the Board the Governor may declare the matter or thing under consideration a nuisance and is granted the necessary powers to have it changed, abated or removed. New York in 1882 adopted the same as an amendment to her law.

In England the powers and duties of the Local Government Board are various. It acts in many cases as a board of appeal; the by-laws of the local authorities must be submitted to it for approval; it may from time to time make, alter and revoke regulations for the prevention of contagious diseases; it may require any two or more local authorities to act together, or for various purposes may form two or more districts into a united district, or may unite two or more districts for the purpose of appointing a medical officer of health; it may, by provisional order, dissolve any local government district or merge it into some other urban or rural district; it may invest a rural authority with the powers of an urban authority; it may order and compel the local authority to undertake and contract to clean streets and remove and dispose of garbage; it may, when a local authority is in default in performing its duty, make an order and enforce it by writ of mandamus if necessary, or appoint an agent to do the duty.

Some of our American State and provincial legislatures have done well in drawing freely from some of the better parts of the English law. Minnesota and Ontario have adopted with slight changes the following from the English law. "Whenever any part of England appears to be threatened with or is affected by any formidable epidemic, endemic or infectious disease, the Local Government Board may make and from time to time alter and revoke regulations for all or any of the following purposes; (namely),

(1.) For the speedy interment of the dead; and

(2.) For house-to-house visitation; and

(3.) For the provision of medical aid and accommodation, for the promotion of cleansing, ventilation and disinfection, and for guarding against the spread of disease."

Among other commendable points in some of the laws establishing American boards may be mentioned the power, as far as it may be conferred by State legislative authority, of inspecting and if necessary detaining steamboats, railway trains, and other conveyances when necessitated by the existence of contagious diseases, as in Ontario, West Virginia and New Jersey; of appointing sanitary police, as in Ontario; of appointing inspectors and assigning them "to such duties as the interests of the public health in any part of the State may require," as in New Jersey; of ordering "nuisances, or the cause of any special disease or mortality, to be abated and removed," as in Pennsylvania; the appropriation of an epidemic or emergency fund, as in New Hampshire, Connecticut, New Jersey, Maryland, Minnesota and Illinois; the giving to the State Board local jurisdiction co-ordinate with the powers of the local board when infectious diseases exist, as in Massachusetts; and the investing of the State Board with the powers of justices in making examinations, as in Minnesota and Ontario.

LOCAL BOARDS.

In regard to local boards of health there is the question of the unit of local administration. Some contend it should be the town or township, others that it should be the county. For some of the States county boards alone would be manifestly inappropriate when we take into consideration the size of some of the counties. In the State of Maine there are counties 125 or 130 miles in length, and one with an area almost large enough to make one Connecticut and two Rhode Islands.

There are various other questions which are of practical importance in forming local boards, and which have been answered very differently by the laws of different States.

What shall be the number of members on the board?

England answers by letting the Local Government Board determine in each case.

In Ontario the number in townships or incorporated villages is five; in towns with a population less than 4000 it is five, if more than 4000, nine.

In Maine and Massachusetts three to nine.

New Jersey has five to seven.

Delaware three to seven.

Illinois three on township boards.

Michigan four.

New York, in cities, seven; villages, three to seven.

California five, and in Pennsylvania in cities, the same.

Minnesota not less than three.

Who shall constitute the board?

In England this depends largely upon property qualifications.

In Rhode Island, Indiana, Illinois, Michigan and Iowa the municipal officers constitute an *ex-officio* board, and in Indiana and Kansas the County Commissioners form an *ex-officio* county board.

In Maine and Massachusetts, when the town fails to elect a board, the municipal officers are the board.

The board consists in Connecticut of the justices of the peace and the selectmen.

In New York, in cities and villages the board shall not be *ex-officio*, neither shall any of the members be connected with the city council, or on the board of village trustees. In towns the supervisor, justices of the peace, town clerk, and one elective member.

In Delaware there shall be at least one physician, and, when there is a port physician, he shall be an *ex-officio* member.

In Ontario, in townships and incorporated villages the reeve, clerk and three rate-payers; in towns of less than 4000, mayor, clerk, and three rate-payers; in city or town of more than 4000, the mayor and eight rate-payers.

In Pennsylvania, in cities the mayor as *ex-officio* president, and four appointed members; in boroughs, the council forms an *ex-officio* board.

How shall the board be chosen, by election or by appointment?

We find it is by election in England.

In Maine and Massachusetts it is by election in town meetings in towns; in cities the board of health is appointed by the municipal council.

In New York in cities, appointed by council upon nomination by mayor; in incorporated villages, appointed by trustees; in towns the one elective member is elected by the *ex-officio* members.

In New Jersey, Pennsylvania, Delaware and California appointed by the common council.

In West Virginia, nominated by the county court and appointed by the State Board.

Shall the choosing of the board be optional or obligatory?

Outside of the States which have *ex-officio* boards the law of Ontario, New York, Delaware and West Virginia says *shall*. In Maine, Massachusetts and Pennsylvania it says *may*.

In Tennessee it says *shall* for every municipality of 5000 or over.

What provision or penalty other than providing for an *ex-officio* board when a board is not chosen?

There is none in most of the States.

In Ontario the Provincial Board may appoint the appointive members.

In New York the board is appointed by the county judge.

In Pennsylvania the State Board may act.

In West Virginia vacancies may be filled by the State Board upon nomination of the county court.

What shall be the term of office?

The law says one year in Ontario, Maine, Massachusetts, Delaware, Minnesota, and in villages and towns in New York and in the States having *ex-officio* boards. Two years in West Virginia and Pennsylvania.

Three years in England, Ohio, and in the cities of New York.

In New Jersey it shall not exceed four years.

In California, at the pleasure of the appointing power.

How many members shall retire yearly?

In Ontario, Maine, Massachusetts and in the States having *ex-officio* boards, the whole board retires annually in most cases.

In England as nearly as may be one-third shall go out of office yearly.

In New Jersey in cities of more than 100,000 inhabitants not more than three.

In Ohio two.

In New York and Pennsylvania, in cities, two.

What provision or penalty when the board makes default of duty?

In England the Local Government Board shall make an order limiting a time for the performance of their duty. Then if not done, it may be enforced by a writ of mandamus, or the Local Government Board may appoint some person to perform such duty.

In New York the performance of the duty may be enforced by a writ of mandamus at the instance of the State Board of Health, its president, secretary or any member thereof.

In Pennsylvania "The State Board of Health shall have power and authority to order nuisances or the cause of any special disease or mortality to be abated and removed," etc.

In Minnesota "any member of any board of health or health officer, who shall neglect to perform the duties required of him under the provisions of this act, or any other acts relating to the duties of the boards of health or health officers of this State, or who shall neglect or refuse to obey any reasonable directions as to infectious diseases as shall be directed by the State Board of Health, shall be liable, upon conviction in any court having competent jurisdiction, to be fined in a sum not less than twenty-five ($25) dollars nor more than one hundred ($100) dollars, and shall become disqualified from holding the office of a member of the Board of Health."

By whom shall the local rules, regulations or by-laws be made?

In England by the local authority and approved by the Local Government Board.

Ontario, made by the Legislative Assembly and in force in every municipality till altered by the municipal council.

Maine, except in cities, must be adopted by the towns in open town meeting.

New Hampshire, made by health officers and approved by the selectmen.

In Pennsylvania by the board of health, when the necessary powers are granted by the council.

Indiana by the board under the direction of the State Board.

In most of the other States this power lies with the local board.

NUISANCES.

When an unsanitary condition or nuisance comes under the cognizance of the local authority a preliminary notice to abate is usually served, although not always a legal requirement. In regard to the farther proceedings the law says:

In Ontario, Maine, Massachusetts, Delaware, Michigan, Iowa and most of the other States that the local board *shall* or *may* abate at the expense of the owner.

In New Jersey may abate in a summary manner, or file a bill in a court of chancery for an injunction.

The provisions regarding the important matter of the resulting costs and expenses of abatement are in the English law that the "costs shall be deemed money paid for the use and at the request of the person on whom the order is made. The costs may be recovered in a summary manner, or in any county or superior court. Costs recoverable from owner may be recovered from the occupier, to be deducted out of the rent. The court shall have power to divide costs, expenses and penalties."

In Ontario the board may recover costs by action or distress. In case of the non-payment thereof the same shall be recovered in like manner as municipal taxes.

In New York the board may sue and recover costs of abating. If the execution is not satisfied the judgment shall be a lien upon said premises having preference over all other liens or incumbrances whatever.

In New Jersey the board shall have the right to recover by action of debt the expenses incurred, or "if it shall be deemed inexpedient to bring such suit they may present a bill to the local municipal authorities and such bill shall be paid by the municipal government."

In Illinois the board shall cause suit to be brought under the criminal code.

In Iowa costs to be recovered by civil action in the name of the State.

Regarding the power of entry to examine or abate nuisances, the law of England says, "The local authority or any of their officers shall be admitted. If admission is refused any justice *may* issue an order of admission."

This is generally the law in our States, excepting in some it is said that the justice *shall* issue his writ.

In case of default of duty of the local board, what redress for the individual or the community against nuisances?

In England the individual may make complaint to a justice. The Local Government Board may authorize any officer of police in the district to abate.

In Ontario the Provincial Board may investigate and, if necessary, abate.

In Massachusetts appeal may be made to the county commissioners.

In New York the State Board may make an order and enforce it.

In Pennsylvania, may be enforced by the State Board.

In Maine "any person injured may maintain an action on the case for his damages."

CONTAGIOUS DISEASES.

An examination of modern statutory enactments for the prevention and restriction of the contagious diseases will show that, as can be found in the laws of a century ago, there is pretty uniformly provision of some kind made for the notification of the arrival or existence of an infected case, for isolation in hospital or otherwise, and usually the imposing of certain obligations upon householders and physicians.

We do not, however, so frequently find the law taking cognizance of many other things which the modern health officer knows is often indispensable to success.

For example, the laws of many of the States are deficient in provisions regarding the nurses and attendants upon the sick and the danger of their transporting infection to others. The law of Ontario, however, is explicit on this point.

"Except the attending physician or clergyman, no person affected with small-pox, scarlet fever, diphtheria or cholera, and no person having access to any person affected with any of the said diseases shall mingle with the general public until such sanitary precautions as may be prescribed by the local board or attending physician shall have been complied with."

So is the Minnesota law excellent in this direction.

Provisions for the restriction of the movements of persons and things, generally, for the purpose of preventing the transmission of contagion are virtually absent in some of the States but in other directions the laws are commendable.

England has this:

"Any person who—

(1.) While suffering from any dangerous infectious disorder wilfully exposes himself without proper precautions against spreading the said disorder in any street, public place, shop, inn or public conveyance, or enters any public conveyance without previously notifying to the owner, conductor, or driver thereof that he is so suffering; or

(2.) Being in charge of any person so suffering, so exposes such sufferer; shall be liable to a penalty not exceeding five pounds; and a person who, while suffering from any such disorder, enters any public conveyance without previously notifying to the owner or driver that he is so suffering, shall in addition be ordered by the court to pay such owner or driver the amount of any loss and expense they may incur in carrying into effect the provisions of this Act with respect to disinfection of the conveyance."

Maryland has this section of the English law, and the following admirable one appended to it:

"Any person, parent or guardian or other party, who carelessly carry about children or others affected with infectious diseases, or who knowingly or wilfully introduce infectious persons into other persons' houses, or permit children under their care to attend any school, theatre, church or any public place where they will be brought in contact with others, shall be liable to a penalty not exceeding one hundred dollars for each and every such offence."

Michigan and Minnesota have also excellent provisions in this direction.

Disinfection is by no means a new word, yet it is too modern to be found in the law of some of the States.

The law of Maine (Chapter 14, Section 9) speaks of "purifying" infected articles, but whether this shall be with the mild methods of the washerwoman or by the more effectual germicidal processes the law does not say.

The English law says on this point:

"Where any local authority are of opinion, on the certificate of their medical officer of health or of any legally qualified medical practitioner, that the cleansing or disinfecting of any house or part thereof, and of any articles therein likely to retain infection, would tend to prevent or check infectious disease, it shall be the duty of such authority to give notice in writing to the owner or occupier of such house or part thereof, requiring him to cleanse and disinfect such house or part thereof and articles within a time specified in such notice."

Ontario and Maryland have adopted this section, and so has Minnesota, with an improvement including buildings, cars, vessels and vehicles in the same provision.

Satisfactory regulations regarding infected clothing are not found on the statute books of most of the States.

In England "Any person who gives, lends, sells, transmits or exposes, without previous disinfection, any bedding, clothing, rags or other things which have been exposed to infection from any such disorder, shall be liable to a penalty not exceeding five pounds."

It is further provided that "any local authority may direct the destruction of any bedding, clothing or other articles which have been exposed to infection from any dangerous infectious disorder, and may give compensation for the same." And "any local authority may provide a proper place, with all necessary apparatus and attendance, for the disinfection of bedding, clothing or other articles which have become infected, and may cause any articles brought for disinfection to be disinfected free of charge."

Ontario, Maryland and Minnesota have the same or very nearly the same.

Particularly praiseworthy is the law in England, Ontario and Maryland regarding infected rooms and the liabilities of those who let them without adequate disinfection, and regarding infected vehicles and the requirements for their disinfection.

In the laws of Maine there is nothing to protect the public from the danger of infection in the burial, disinterment and transportation of the bodies of those dead of infectious diseases.

Commendable features of the law of Massachusetts and Michigan are provisions for the protection of schools from the contagious diseases.

What I have said I have called "A comparative view of sanitary laws and what changes are needed in those of Maine." As a comparative view of the subject, it is very imperfect for not including the laws of all the States, and probably for frequent errors and misapprehensions.

As treating wholly of statutory laws in contradiction to provisional rules and regulations made by virtue of delegated legislative power, it does an injustice to certain States, particularly to Illinois, whose sanitary laws are largely of this kind. The object has not been to teach but to suggest, with the hope of learning from the resulting discussion regarding the changes needed in the laws of Maine.

Healthful School-Rooms.

From a paper read before the Maine Pedagogical Society, Dec. 31, 1886, by Dr. J. O. Webster of Augusta, member of the Board.

It is needless to argue the importance of school hygiene; it is self evident that the places in which our children spend so much of their time, in the formative and most susceptible period of life, should be in that condition most conducive to health; that however heavy a burden of unhygienic arrangements they have to bear at home, this burden should be lifted during the period in which they are under the authority of the commonwealth.

The three most important factors in securing healthful school-rooms are proper *heating and ventilation, seating, and lighting;* and it is to these topics that this paper is devoted.

HEATING AND VENTILATION.

I will take up first the subject of heating and ventilation, inseparable in our climate—a subject of prime importance, since hygienists are agreed that one-half the deaths are due to disease caused by impure air.

In contrast to Dr. Phillips' observation in his locality, our Augusta school-houses are more apt to be over than under heated; but I have not observed that this, in the rural districts, prompts to the opening of windows. When it does have this effect, the rapid currents of air caused by differences of temperature, striking upon the children's heads, are not conducive to health.

For the healthy ventilation of a school-room it is required that the air be changed four times an hour, and that it be done without causing currents of greater rapidity than five feet a second. In cold weather, of course, the heating of the air is also involved

Hygiene demands of a heating apparatus for the school-room:

1. That there shall be attained, in a comparatively short time, a temperature of 65°—68° F., and the temperature shall remain unchanged, so long as the children remain in the room.

2. That the temperature of the room shall be as uniform as possible in all parts, therefore the warming must not be by radiation but by conduction by means of the air (convection).

3. That the air of the heated room must remain as much as possible like the atmosphere, therefore it must not be impaired by the heating nor receive foreign admixtures.

4. That the heating apparatus must be easy to serve, its running free from danger, its first cost not too great, and the greatest possible results must be attained from the fuel used.

The attainment of most of the points depends on the form of heater used, and on the ventilation.

Heating is divided into local and central. In local heating, the apparatus is placed in the room to be heated, and this is the form necessarily to be used in most of our school-houses.

The fire-place may be excluded as a means of heating school-houses, although useful for ventilation, because its effect is confined to its immediate vicinity and is attained at a large expense in fuel.

Some kind of stove is the only practicable form of local heater, but the common stove is excluded by our requirements, since it heats by radiation and does not promote an even temperature.

A school-room heater should have an air space between the stove proper and an outside casing, like a furnace, through which air, brought in from out-of-doors through a box under the floor, should flow and conduct the heat through the room. Many forms of such heaters are in use in France and Germany, and three at least are made in this country; but an ordinary cylinder stove can be provided with an external casing and used in the same way.

Central heating is where several rooms are warmed from a central source of heat, and is divided into hot air, hot water, and steam heating.

If we imagine the already described school-room heater transferred to the cellar and the heated air conducted by pipes to the room or rooms to be warmed, we have central hot air heating. If the furnace is large enough to furnish the needed amount of fresh air without over heating, and is so arranged that the heat is evenly distributed to the different rooms, and is so carefully constructed that there is no admixture of smoke or gases with the air, this is a satisfactory and hygienic method of heating. Whatever apparatus is used, it must furnish large volumes of air at a temperature little above that at which it is desired to keep the rooms. Probably the Ruttan apparatus accomplishes this purpose better than any other form of air heater.

Of hot water heating it is unnecessary to speak in connection with school-houses, but steam heating is of wide application. The heating by direct radiation, as it is called where the radiators are set in the room to be heated, is unequivocally to be condemned as a means of heating school-rooms, since it makes no provision for change of air; it is suitable only for the corridors. The indirect method alone will do for a school-room, where the air is taken from out-of-doors, heated in boxes in the cellar which contain the radiators, and discharged through registers into the room above. This method has the advantage over that of the hot-air furnace, that the heat can be distributed over a large building, and, if properly arranged, will heat all parts of it evenly; and is preferable for a school-house of several rooms.

Attempts have been made to admit the air from out-of-doors through the walls of the building into radiators set in the school-room, the so-called direct-indirect method. This may be, in some old buildings, the only practicable method, and if the opening is large enough and is situated near the bottom of the radiator, and the latter is large enough and is boxed at the sides, leaving the top open for the escape of the heated air into the room, may accomplish very fair results. It is a great improvement on the unmodified direct method.

Ventilation is the means by which normally constituted is put in the place of contaminated air. We cannot remove directly the products of respiration from the air of a room, neither can we directly replace a given quantity of bad air with the same amount of good. The only way in which the quality can be improved is by the mixture of good air with the bad, diluting it; just as in a cask filled with colored water and furnished with an inlet and an outlet pipe, if we allow a like amount of colorless water to flow in, it will not displace the whole of the colored, but we must pass in many times as much clear water before the outflow will be colorless.

In order to bring pure air into a room, we must provide for removing the same quantity of air from the room; but the air removed is no more contaminated than that which remains, but is of a uniform mixture with it. In no other way but by this constant mixing of pure air with the bad, and a constant removal of a portion of the mixture, can the air of a school-room be kept within the limits of health. This limit is represented by an increase of 2 parts in 10,000 in the proportion of carbonic acid normally present. This substance, being the most easily measured, and increasing in the same proportion as the other products of respiration, is used as an index of the contamination of the air. The expired air contains 200 times this increase, and as a man expires about 10 cubic feet of air an hour, there are needed 200x10=2000 cubic feet of fresh air an hour for each person. But in a school-room, which is not constantly occupied, it is not necessary to introduce so much air, and about 750 cubic feet per head an hour on an average is considered a fair amount, or a change of air four times an hour, if the room be of proper size.

Difference of temperature is the important factor in natural ventilation, for if the doors and windows of a room be wide open, and there is no difference of temperature and no wind, there will be no exchange of air between outside and in.

Imagine from the bottom of the school-room a canal going to the cellar and there opening into a chimney flue that extends above the roof; also a canal from the open air entering the room; let both these canals and the room be filled with air of the same temperature, and the whole air column remains at rest. Now let the air in the chimney-flue be warmed, it becomes lighter and rises, drawing after it air from the other parts of the system, the room and the entering canal. This is called aspiration, and the method aspiration-ventilation. Any of the methods described under heating will introduce fresh air into the room; the warm air ascends immediately to the ceiling, where it spreads out, then cooled by the walls and windows it sinks to the floor, newly heated air taking its place. There is, however, a constant mixture of the upper and lower strata, and it results from the law of the diffusion of gases that there is scarcely any difference between the air of the different parts of the room, so that it makes no difference, from the point of view of ventilation, whether the outlets be at the top or the bottom of the room; but if they are at the top they will remove the newly warmed air, causing great loss of heat without compensating advantages; it is therefore essential, at least in winter, that the outlets be in or near the floor. The inlets for warmed air may be in the floor or in the walls as most convenient.

The ventilating flue may be heated by the smoke flue, being separated from it only by a thin wall, better by an iron smoke pipe passing up through it, or, if necessary, by a small stove at its base. If steam be used for heating, the ventilating flues should be heated by steam-pipe.

The size of the openings and of the canals is to be proportioned to the amount of air to be moved and the rapidity with which it flows. The latter should not be greater than five feet a second. It follows that the very common inlet or outlet opening of 1 square foot for 50 pupils is insufficient; three or four times that space is needed.

If suitable methods are not provided for heating and ventilating the room, nature unaided will do much. The walls of our houses are porous, and in a windy day with considerable difference of temperature this is an important factor. If the room be heated by a stove, the air consumed to supply the fire aids much in ventilation, as just so much fresh air must get into the room, through the walls and around doors and windows, to supply its place. So in a school of twenty pupils—and too many of our rural schools have less than this number—with an external temperature not much above zero and an internal temperature of 65° F., the air will probably be kept in pretty good condition during the time the room is occupied continuously, if the windows be opened at recess and intermission.

When it is found necessary to open windows during school hours, they should be provided with pieces of board to fit under the lower sash, or pieces set obliquely at the top if the upper sash is lowered, that the entering air may be directed to the top of the room.

If the draft of the room is sufficient, a ventilating opening may be made directly into the bottom of the smoke flue, but this will usually interfere too much with the draft. In an old building a wooden ventilating shaft may be built, extending through the roof, with an opening at the floor. The smoke pipe may enter this box, pass up it nearly to the roof and then turn and enter the chimney. With proper precautions against fire, this will be just as efficient as a brick flue.

One of the best practical evidences of impurity of the air of a room is the stuffy feeling it gives to a person coming in from the open air. As a positive proof of contamination it is necessary to measure the proportion of carbonic acid present. This is done by finding the amount of carbonate of lime formed on shaking a measured quantity of the air with lime water. Wolpert's Tester is a simple and convenient instrument for doing this, though not absolutely exact.

SCHOOL-SEATS.

Upon the question of the proper construction of school-seats and desks, much of the interest in school hygiene has concentrated itself of late years, and the literature of the subject has become extensive. Since the source of spinal curvature, near-sightedness, and a host of other evils is believed to have been found in improper sitting, many new forms of seats have been invented.

The mechanics of sitting is an interesting subject, but we lack time to enter upon it, and must be content with giving the practical results.

The seat should be of the height of the bend of the knee, so that the feet may rest squarely upon the floor; and its width must be equal to the length of the thigh, but the forward edge must not reach so far as to press upon the vessels and nerves behind the knee.

The back of the seat is of vital necessity, since without its support the body cannot be maintained in a proper position without constant muscular effort. This support should be given at the right point; for if the upper part of the back alone be supported, the spine will be bent forward and the thorax compressed. Support to the sacrum is of primary importance, and the back should extend high enough to support the loins, and perhaps the lower part of the dorsal region. The back should start from the seat nearly perpendicularly and should acquire a backward curve as it ascends, following the curve of the spine. Many seats have the back concave at the lower part, so that support is lacking where it is most needed. I know of but two makes of the "Combination" school seats with the proper curve to the back.

The height of the desk should be proportioned to that of the seat, and their difference should be such that the fore arms can be laid upon the desk without raising the shoulders, or the edge of the desk should be at the height of the elbows of the sitting child; the desk will then be at the normal sight-distance from the eyes. This matter of the difference in height of the seat and desk is very important, for if the desk be too low, the body will be bent in writing, and the head will be lowered to bring the eyes near enough for clear vision, with very injurious results; while if the desk be too high, the shoulders, arm, or both, will be raised, with great distortion of the spine, laming of the muscles, interference with action of the heart and lungs, and injury to the eyes.

The distance of the desk is of great importance, that is, the distance between vertical lines falling from the edge of the desk and the edge of the seat. This is of three kinds: Plus-distance, where there is an actual distance between the lines; zero-distance, where the edges of the desk and seat are in the same vertical line; and minus-distance, where the edge of the desk overhangs that of the seat. The minus-distance is that now accepted as the most advantageous for the pupil, and the best preventive of faulty positions in writing. The amount of overlapping is given as from 1 to $2\frac{1}{2}$ inches.

The objection has been raised to the zero, or minus-distance desks, that they do not permit the pupil to stand in front of his seat. With single or double desks, which are now everywhere used in this country, pupils can better stand in the aisles between the rows of desks.

The desk should have a slope of 2 inches in 12, making the angle of vision about 60°. A greater slope would be more favorable to the eyes, but is inconvenient.

Having considered the hygienic requirements of school furniture, let us see how their requirements are met.

Besides the old forms of desks and benches that are still found in most of our rural schools, and that violate in every respect the principles of hygiene, American school furniture—and in this specialty we are far in advance of all the rest of the world—is divided into two general classes, the "Boston" and the "Combination" patterns.

The Boston furniture consists of a desk supported on a piece of ornamental cast iron work at each end, and a chair supported by a cast iron pedestal under the seat. It has the advantages that the seats and desks are independent, and desks of different heights can be set in the same row: and that the pupil can enter or leave the seat more easily than with other kinds. It has the disadvantage that the screws that fasten the chair to the floor are very apt to become loose, owing to the great leverage furnished by the chair in proportion to the small surface standing upon the floor; and the chairs are not so comfortable as the *best* combination seats.

The combination furniture is so called because a seat is combined with a desk, not with its own desk, but with the one behind it; hence two sizes must not be set in the same row, otherwise a seat and desk not proportioned to each other will come together. The seat is usually hinged so that it can be turned up, leaving standing room behind the desk; but this is of doubtful utility, except in sweeping the room. Both these kinds of furniture can be set at plus, zero, or minus distance.

Much ingenuity has been expended in constructing tilting seats that will automatically tip up when the pupil rises. These are dangerous, from the liability of the pupil to forget that the seat is raised, and to injure himself by sitting forcibly upon its edge or on the floor;

they are objectionable from being necessarily more complicated; and they are unnecessary, for reasons already given.

As already stated, most of the combination furniture has faultily-shaped backs, and only two makes, so far as I know, are to be commended.

Considering everything, *pro* and *con*, it is difficult to decide which has the balance of advantages in its favor, the Boston or the best form of the combination furniture; but the former is clearly superior to three-fourths of the combination furniture in the market.

Whatever kind of furniture is used, two or more sizes should be included in each room, and the teacher should see to it that each pupil has a seat and desk proportioned to his height.

Elaborate tables have been constructed, giving all the dimensions of seats and desks for every given height of the pupil; but the few simple rules already given are sufficient for the proper seating of pupils. The results arrived at, from many observations, are formulated as follows:

1. The height of the seat=2-7 the body height.
2. The width of the seat=1-5 the body height.
3. The distance=1-7 the body height.
4. The width of the desk=15–18 inches.
5. The slope of the desk=2 inches in 12.

LIGHTING.

One of the commonest unfavorable results of school life is injury of the eyes. Near-sightedness is very rarely hereditary. When it exists, it has almost always been acquired while attending school; and numerous examinations, both in this country and abroad, prove that it shows a steady increase as we go from lower to higher grades of school.

One cause of this has been already indicated in the faulty construction of school furniture; but a far more fruitful source is found in insufficient and improper lighting. It is safe to say that not one school-room in fifty, in our State, is properly lighted. The suitable lighting of a school-room demands:

1st. That the windows face that part of the sky which affords a suitable light.

2d. That the daylight be kept from the room by no obstructions.

3d. That the windows be of proper height and width.

4th. That the windows be properly arranged.

5th. That the interior arrangements be such that the light is suitably distributed.

1st. If the light comes from the east or south it will be impossible to exclude the direct rays of the sun from the desks without making the light insufficient. Every room should, however, receive the direct rays of the sun for some part of the day. For this reason lighting from northeast or northwest is preferable, giving reflected light only during school hours, but permitting the access of direct sunlight before or after school.

2d. The free access of light to the school-house depends upon the nature of its surroundings. No building should be so near the windows as to cut off more than 20° or 25° of the sky above the horizontal line of the window sills, which requires that it be distant about 2½ times the height above this line. High and shady trees should not be allowed near the windows, neither should vines be trained about them.

3d. The fullest supply of light about the school-house is self-evidently useless unless there be sufficiently large and numerous openings for its admission to the school-room. The windows must be as high and wide as practicable. The window stools should be 3½ or 4 feet from the floor, that the light may strike downward upon the desks; and the top should extend to, as nearly as possible, within six inches of the ceiling. The windows should be arranged in a long side of the room, not grouped, but distributed evenly nearly its whole length, and their width should be such as to provide a sufficient glass surface for the size of the room. In the open country, a glass surface equal to 1-6 the area of the floor is enough, but in a city 1-5 or more will often be required.

4th. One who undertakes to write with the light coming from the right hand will be annoyed by the shadow of the hand falling upon the paper at the very spot where he is writing. On this simple fact depends the necessity that school-rooms be lighted from the left hand of the pupils, as so much school work is now done with the pen and pencil that the direction of the light has become of great importance.

The worst light is that from in front, its rays falling directly into the eyes of the pupils and scarcely at all illuminating their desks. If your school-room has a window facing the pupils, keep its shades constantly closed.

Light from behind alone is unsuitable, since the pupil's work would be in the shade of his body, but light from the rear in combination with that from the left is not objectionable.

Lighting from both sides is very undesirable, although it may be necessary to continue it in many old buildings when the width is greatly out of proportion to the length. In new buildings it should *never* be used, because by the casting of shadows and a peculiar reflection it is liable to prove injurious to the eyes of pupils.

5th. The walls of the school-room should not be white, since they would reflect the light too intensely, nor too dark, since they would absorb too much light. The best color is a bluish gray, what is known as a light French gray. The ceiling may be white, since the rays of light cannot strike it in such a way as to be injuriously reflected upon the desks, or blue. The window shades, if any, should be blue or gray, and the wood work, if painted, about the color of the walls, of a darker shade.

To recapitulate. 1st, lighting from the northeast or northwest; 2d, no obstruction to access of light; 3d, glass surface 1-6 to 1-5 the floor surface, the windows of proper height; 4th, lighting always from the left of the pupils, or left and rear; 5th, walls neither white nor too dark.

But however perfect the light, eyes may and will be injured if fixed upon a book long at a time. When adapted to near vision, the normal eye is in a state of tension, and should be rested by looking, at frequent intervals, at objects not less than twenty feet distant. Much injury is constantly done by teachers in requiring unintermitting attention to books, and "no looking around."

In this, as in many other matters, teachers are capable of doing a great deal of harm, unless they be students of hygiene and apply its principles in their daily work.

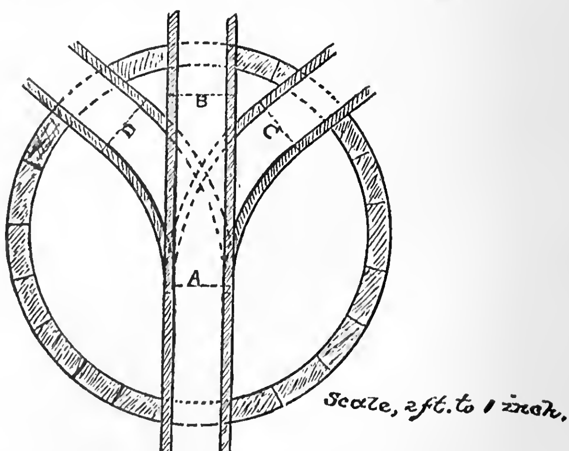
Summer Resorts.

BY THE SECRETARY.

The State Board of Health is pleased to note and mention a special awakening to the importance and weight of sanitary obligations on the part of proprietors of places for summer resorts, and of towns where the attractions of scenery and climate serve to bring a large summer population within their borders. The coming of these visitors annually is such a source of revenue to our State, that legislation is beginning to shape its policy to satisfy their proper wants, and to give to these resorts a protection which shall become a safeguard and shall lead to more extensive development and to permanent good results. It is rare that towns can be aroused to act in the matter of a good and plenteous water supply and sewerage system, until bitter experience has taught a sad lesson, and then the establishment of the once favorite resort in public favor is slow, and in many cases fails entirely notwithstanding the original sources of difficulty have been removed. With exceptional attractions, as at Bar Harbor, Mt. Desert, the place may struggle through to success, as that resort is now doing, because the island has published to the world that her sanitary provisions are to be of the best, and are now approaching completion under the hands of a sanitary engineer of national reputation and experience. We shall note her progress in our next Report. Old Orchard has made extensive moves in sewerage, and is this season introducing a more extensive water supply. A general activity in these directions is everywhere manifest. The proprietor of an isolated and independent summer resort, if he is wise, realizes the value of these measures to promote health and acts upon them even more rapidly and efficiently than the slower moving body of a town. It is of such proprietors and of such a summer resort that the accompanying illustration treats.

Poland Springs, from being the resort of invalids who go there to *recover* health, has also become Maine's largest interior summer resort. Anticipating its growth, its proprietors, in the season of 1885, had their opportunities looked into, and then a system of drainage executed under advice of a sanitary engineer, as shown on the contour plan. The site of the Poland Spring Hotel, on the summit of a rounding hill, made the problem of getting effective drainage a simple one. A short-sighted economy might have brought the sewage in iron pipes down the east slope of the hill 1000 feet away, and 100 feet in elevation below the spring, making an undoubted sanitary success, but a proper regard for certain strong sentiments in the public mind led the proprietors to carry the sewerage down the hill upon the *direct opposite side* from the one upon which the spring is located. The out-fall of the sewer is upon farm lands of the proprietors, 3000 feet from the Poland Spring House, at which point utilization in irrigation is partially arranged for, and which we think could with profit be made more thorough. The conditions under which the sewage runs to waste upon unused land makes no nuisance, and this fact, as we learn from the proprietors, together with the labor problem of providing for increasing number of guests, has delayed the thorough organization for utilization.

Among the simple but very effective appliances that attracted our attention, was a switch man-hole for turning the sewage from one



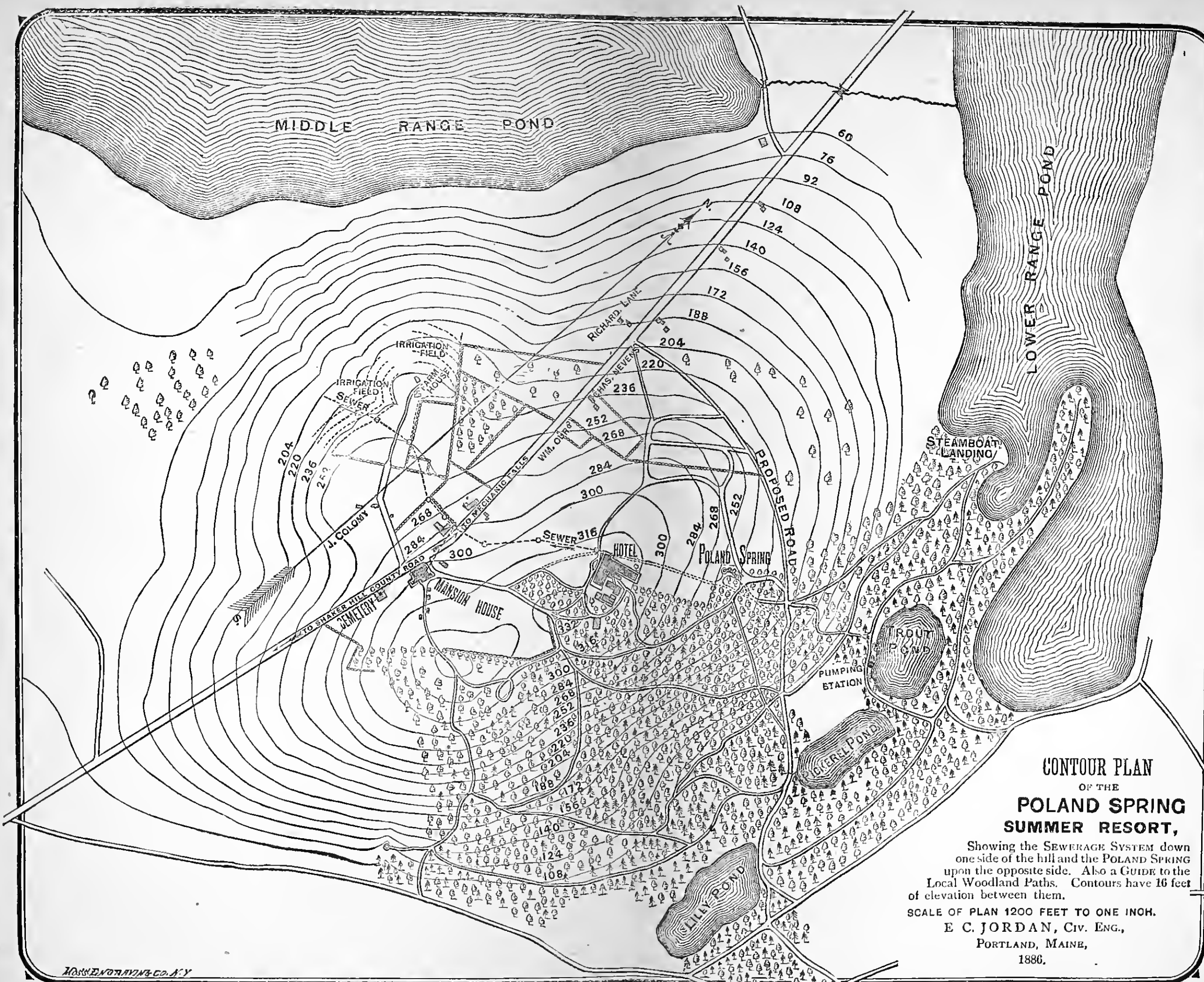
SWITCH MAN-HOLE

AB. AC. & AD represent pieces of vitrefied sewer pipe

Piece AB is removable

The same curved piece can be used in positions AC & AD

place of disposal to another. This, in many cases, has been accomplished by expensive water-gates, built in the wall side by side. The


MIDDLE RANGE POND
LOWER RANGE POND
N.
S.
RICHARD LANE
CHAS. NEVENS
WM. ORR
J. COLOMY
IRRIGATION FIELD
IRRIGATION FIELD
FARM HOUSE
SEWER
SEWER
TO MECHANIC FALLS
TO SHAKER HILL COUNTY ROAD
CEMETERY
MANSION HOUSE
HOTEL
POLAND SPRING
PROPOSED ROAD
STEAMBOAT LANDING
TROUT POND
PUMPING STATION
PICKEREL POND
LILLY POND
60
76
92
108
124
140
156
172
188
204
220
236
252
268
284
300
316
332
CONTOUR PLAN
OF THE
POLAND SPRING
SUMMER RESORT,
Showing the SEWERAGE SYSTEM down one side of the hill and the POLAND SPRING upon the opposite side. Also a GUIDE to the Local Woodland Paths. Contours have 16 feet of elevation between them.
SCALE OF PLAN 1200 FEET TO ONE INCH.
E. C. JORDAN, CIV. ENG.,
PORTLAND, MAINE,
1886.
MOSS ENGRAVING CO. N.Y.

projecting edges frequently collect rags, paper and general waste, and a stoppage and damage occurs. The plan of the one presented is made as follows: on the straight line through the man-hole is a length of sewer pipe with top surface removed. Its bed at the two ends is formed in the cement. In the man-hole is stored a curved piece of pipe of the same size, the bed for which outside of the limit of the straight piece is also formed in the cement. The straight piece is removed, and the curved piece dropped in its own socket to deliver the sewage to the right or left, according as you turn the curved piece end for end. This switch man-hole, which cost only $15 to construct, is far more satisfactory than one noted elsewhere, with gates, that must have cost $100.

As remarked above, we have been pleased to note the general advances that have been made in sanitary provisions at our summer resorts, and as we do not hesitate to condemn unsanitary conditions, we stand ready to commend such as we deem worthy of approval.

GLOSSARY.

This Report has been prepared for the benefit of all classes of persons in the State, and as far as possible it has been the wish to make its language as clear and intelligible as possible. A few technical terms, however, are so inseparably interwoven into the consideration of the subject of public hygiene that the avoidance of their use is impossible, and as it is desirable that the general public should become acquainted with their meaning, and especially to know in what sense they are used in the present work, this Glossary is introduced.

Ætiology. [See Etiology.]

Antiseptics. Agents which prevent or retard putrefaction; or as now understood, those which prevent the development of pathogenic or fermentative organisms. Some of these which, in weaker solutions, act as antiseptics, in stronger solutions, being destructive of the life of the organisms, are also disinfectants.

Bacilli. The plural of bacillus.

Bacillus. One group of bacteria which are filiform, or consist of slender rods.

Bacillus Anthracis. The bacillus of anthrax, the essential cause of the disease.

Bacteria. Unicellular Organisms, microscopic in size, on the border land between the vegetable and the animal kingdom, but now regarded as pertaining to the former.

Bacterium. The singular of bacteria.

Biology. The science of life.

Bovine Virus. Vaccine virus taken directly from the calf or heifer.

Contagion. The specific cause of certain diseases by means of which they may be transmitted. Also applied to the act of transmission of communicable diseases.

Contagious. Capable of being transmitted by contagion; communicable; infectious. But little effort has been made in this Report to discriminate between the meaning of Contagious and Infectious; although their derivation and original application were different, most of the later medical writers of Europe and America use the two words interchangeably. This, at least in works for popular use, is the less confusing way.

Deodorants. Substances which destroy offensive smells. Some, but not all deodorants, are also disinfectants. [See Disinfectants.]

Desquamation. The shedding of the outer skin, usually in scales, after scarlatina and some other diseases.

Diagnosis. The determination of the character of a disease.

Disease Germs. Bacteria; micro-organisms whose reception into the system and multiplication in it, produce the contagious diseases.

Disinfectants. Agents or substances by means of which the contagion of diseases may be destroyed. Often improperly applied to substances which, though useful as deodorants or antiseptics, are nearly or quite valueless as germicides.

Endemic. Applied to diseases which prevail in particular localities or districts, and which are due to local conditions or causes.

Epidemic. Common to, or affecting many people at the same time; generally prevailing. The causes of epidemics were formerly very generally regarded as depending upon an "epidemic constitution of the atmosphere," but of this there has never been collected any satisfactory proof. The more we study epidemiology the more we are led to look to contagion and the laws which govern its diffusion for an explanation of the occurrence of epidemics.

Epizootic. Applied to the diseases of animals in the same sense as epidemic is used with reference to human diseases; affecting many animals at the same time.

Etiology. The causation of diseases.

Exogenous. Produced or generated outside the system.

Exotic. Foreign; a disease introduced from some other country.

Fission. Division; the common method of multiplication with many of the lowest organisms.

Fomites. Substances or articles which are liable to carry the contagion of diseases.

Germicides. Destroyers of germs; disinfectants.

House-drain. That part of the house-drainage system which carries the wastes from the soil-pipe and waste-pipe to the sewer.

Humanized Virus. Vaccine virus taken from the cow-pox vesicle which has been produced on the human arm, usually the arm of a child.

Hygiene. The science and art relating to the preservation of health.

Infection. Contagion; the specific cause of communicable diseases, now known in some diseases, and supposed in others, to be a microscopic organism.

Infectious. Communicable as a disease; contagious. [See Contagious.]

Microbe. Bacterium.

Micrococcus. A genus of the bacteria, consisting of very small, globular or oval, organisms.

Pathogenic. Generative, or productive of disease.

Pathological. Pertaining to pathology; diseased.

Pathology. The knowledge of diseases.

Phthisis. Consumption; pulmonary tuberculosis.

Physiology. The science which treats of the functions of living animals or plants.

Prognosis. The prediction, from the present symptoms of a disease, of its future course or termination.

Quarantine. The enforced isolation of persons and things coming either by sea or land from places where contagious diseases exist.

Sewage. The liquid and other filth conveyed in sewers.

Sewer. A drain for conveying dirty water and filth.

Sewerage. A system of sewers.

Soil-pipe. The pipe which conveys excreta from water-closets and urinals.

Sporadic. Applied to diseases, it means occurring in single or scattered cases, as opposed to epidemic or endemic, in which numbers or many are affected.

Spores. Minute grains or bodies which are formed within many of the lower flowerless plants, and which perform the function of seeds. The microscopic one-celled plants which we call bacteria multiply by fission, and in addition to this, some of them multiply by means of spores.

Sporification. The formation of spores.

Tellural. Pertaining to, or proceeding from, the earth.

Trap. An arrangement on some part of the sewerage system, usually a bend in the pipe in which water stands, by means of which we seek to prevent the return of gases and disease germs into the building.

Tuberculosis. A specific disease usually characterized by the formation of tubercles. Pulmonary consumption is the result of tuberculosis of the lungs.

Typhoid Fever. Meaning literally a fever resembling typhus. The common fever of this country. Formerly typhus fever and typhoid were not distinguished, the one from the other. Typhoid fever is communicable only in a slight degree, if at all, by direct contagion; but there is great danger of its spread from the sick to the well from defective sanitary arrangements and regulations.

Typhus Fever. A dangerously contagious disease rarely found in this country, and when appearing in our State, probably always by importation. [See Typhoid Fever.]

Vaccination. Inoculation with the virus of cow-pox.

Vaccine Virus. The infective material from the cow-pox vesicle used in vaccination.

Variola. Small-pox.

Varioloid. Small-pox modified by vaccination. It is contagious, and as severe cases of small-pox may arise from exposure to its infection as from unmodified small-pox.

Waste-Pipe. That part of the system of house-drainage which conveys the waste-water from sinks, baths, etc.

Zymotic. Characterized by fermentation. Applied to epidemic, endemic and contagious diseases, on account of the similarity between the process of fermentation and that which is started in the organism after its infection with the cause of any of these diseases.

INDEX.