

FIFTH  
BIENNIAL REPORT  
OF THE  
BOARD OF HEALTH  
OF THE  
STATE OF IOWA,  
FOR THE  
FISCAL PERIOD ENDING JUNE 30, 1889.



DES MOINES:  
G. H. RAGSDALE, STATE PRINTER.  
1889.



STATE OF IOWA, }  
OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH, }  
Des Moines, July 1, 1889.

To WILLIAM LARRABEE, *Governor of Iowa:*

SIR—In accordance with the provisions of section 11, chapter 151, laws of Eighteenth General Assembly, the Fifth Biennial Report of the State Board of Health, for the fiscal period ending June 30, 1889, is herewith presented.

J. F. KENNEDY, M. D.,  
*Secretary.*

## MEMBERS OF THE BOARD.

	TERM EXPIRES.
P. W. LEWELLEN, Clarinda (Regular).....	January 31, 1892.
E. M. REYNOLDS, Centerville (Regular).....	January 31, 1894.
HENRY H. CLARK, McGregor (Regular).....	January 31, 1893.
S. B. OLNEY, Fort Dodge (Homeopathic).....	January 31, 1890.
JAY D. MILLER, Ida Grove* (Eclectic).....	January 31, 1891.
JOHN C. SHRADER, Iowa City* (Regular).....	January 31, 1895.
FREDERICK BECKER, Clermont (Homeopathic).....	January 31, 1896.
JAMES L. LORING, Civil Engineer, Dallas Center.....	May 4, 1894.
JOHN Y. STONE, Attorney-general, <i>ex-officio</i> .	
M. STALKER, Ames, State Veterinary Surgeon, <i>ex-officio</i> .	

\* To fill vacancy.

## STATE BOARD OF HEALTH.

[Chapter 151, Laws of 1880.]

AN ACT to establish a State Board of Health in the State of Iowa, to provide for collecting vital statistics, and to assign certain duties to local boards of health, and to punish neglect of duties.

SECTION 1. *Be it enacted by the General Assembly of the State of Iowa,* That the Governor, with the approval of the executive council, shall appoint nine (9) persons, one of whom shall be the Attorney-general of the State (by virtue of his office), one a civil engineer, and seven (7) physicians, who shall constitute a State Board of Health. The persons so appointed shall hold their offices for seven (7) years; *provided*, that the term of office of the seven physicians first appointed shall be so arranged by lot that the term of one shall expire on the thirty-first (31st) day of January of each year; and that vacancies thus occasioned, as well as all other vacancies otherwise occurring, shall be filled by the Governor, with the approval of the executive council.

SEC. 2. The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of the State. They shall have charge of all matters pertaining to quarantine; they shall supervise a State registration of marriages, births and deaths, as hereinafter provided; they 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 the public health; and it shall be the duty of all police officers, sheriffs, constables, and all other officers of the State, to enforce such rules and regulations, so far as the efficiency and success of the board may depend upon their official co-operation.

SEC. 3. The clerk of the district and circuit courts of each of the several counties in the State shall be required to keep separate books for the registration of the names and post-office address of physicians and midwives, for births, for marriages, and for deaths, which record shall show the names, date of birth, death or marriage; the names of parents and sex of the child when a birth; and when a death, shall give the age, sex and cause of death, with the date of the record and the name of the person furnishing the information. Said books shall be always open for inspection without fee; and the clerks of said courts shall be required to render a full and complete report of all births, marriages and deaths to the secretary of the board of health annually on the first day of October of each year, and at such other times as the board may direct. (For which service the clerk shall receive, in addition to the compensation already allowed him by law, the sum of ten cents for each birth, marriage or death so recorded by him, and the further sum of ten cents for each one hundred words of written matter contained in said report, the same to be paid out of the county fund.)—*Chapter 140, Section 1, Laws 1882.*

SEC. 4. It shall be the duty of the Board of Health to prepare such forms for the record of births, marriages and deaths as they may deem proper; the said forms to be furnished by the secretary of said board to the clerks of the district and circuit courts of the several counties, whose duties it shall be to furnish them to such persons as are herein required to make reports.



## CONTENTS.

	PAGE.
1. Members of the Board .....	v
2. Law Creating the State Board of Health .....	ix
3. General Report.....	1
4. Meeting of the State Board .....	4
5. Infectious Diseases .....	9
6. Typhoid Fever .....	33
7. Puerperal Fever.....	58
8. Our Insane.....	59
9. Scarlet Fever in the Horse .....	74
10. Quarantine—Heads of Families .....	75
11. Potable Water.....	77
12. School-house Water Supply.....	81
13. Milk .....	82
14. Tyrotoxicon .....	85
15. The Murderous Nursing Bottle.....	89
16. Meat Poisoning.....	91
17. Rabies .....	93
18. Salicyelic Acid for Preserving Fruit .....	99
19. Transportation of Corpses .....	101
20. Public Summer Resorts.....	103
21. Intra-mural Cemeteries.....	106
22. Kerosene Oil .....	109
23. Safety Burning Fluids .....	114
24. Railroad Accidents .....	115
25. House Plants and Health.....	119
26. Consumption—Its Cure and Prevention .....	121
27. Physiology in Public Schools.....	129
28. Powers and Duties of Health Officers.....	131
29. Decisions—Supreme Court.....	134
30. Decisions—Attorney-general .....	147
31. Decisions—State Board .....	154
32. Legislative Recommendations.....	192
33. Financial Statement .....	194
34. Meteorological Tables .....	195
35. Appendix—Ventilation .....	203
36. Appendix—Impurities in Potable Water .....	213

*Law Creating State Board of Health.*

SEC. 5. It shall be the duty of all physicians and midwives in this State to register their names and post-office address with the clerk of the district and circuit courts of the county where they reside; and said physicians and midwives shall be required, under penalty of ten dollars (\$10), to be recovered in any court of competent jurisdiction in the State at suit of the clerk of the court, to report to the clerk of the courts, within thirty (30) days from the date of their occurrence, all births and deaths which may come under their supervision, with a certificate of the cause of death, and such other facts as the board may require, in the blank forms furnished, as hereinafter provided.

SEC. 6. When any birth or death may take place, no physician or midwife being in attendance, the same shall be reported by the parent to the clerk of the district and circuit courts within thirty days from the date of its occurrence, and if a death, the supposed cause of death, or, if there be no parent, by the nearest of kin not a minor; or, if none, by the resident householder where the birth or death shall have occurred, under penalty provided in the preceding section of this act. Clerks of the district and circuit courts shall annually, on the first day of October of each year, send to the Secretary of the State Board of Health a statement of all births and deaths recorded in their offices for the year preceding said date, under a penalty of twenty-five dollars (\$25) in case of failure.

SEC. 7. The coroners of the several counties shall report to the clerk of the courts all cases of death which may come under their supervision, with the cause or mode of death, etc., as per form furnished, under penalty as provided in section five of this act.

SEC. 8. All amounts recorded under the penalties of this act shall be appropriated to a special fund for carrying out the objects of this law.

SEC. 9. The first meeting of the board shall be within twenty days after its appointment, and thereafter in May and November of each year, and at such other times as the board shall deem expedient. The November meeting shall be in the city of Des Moines. A majority of the members of the board shall constitute a quorum. They shall choose one of their number to be president, and shall adopt rules and by-laws for their government, subject to the provisions of this act.

SEC. 10. They shall elect a secretary; who shall perform the duties prescribed by the board and by this act. He shall receive a salary, which shall be fixed by the board, not exceeding one thousand two hundred dollars per annum. He shall, with the other members of the board, receive actual traveling and other necessary expenses incurred in the performance of official duties; but no other member of the board shall receive a salary. The president of the board shall (monthly) (7) certify the amount due the secretary, and on presentation of said certificate the Auditor of State shall draw his warrant on the State Treasurer of [for] the amount.

SEC. 11. It shall be the duty of the Board of Health to make a biennial report, through their secretary or otherwise, in writing, to the Governor of the State, on or before the first (1st) day of December of each year preceding that in which the General Assembly meets; and such report shall include so much of the proceedings of the board, such information concerning vital statistics, such knowledge respecting diseases, and such instruction on the subject of hygiene as may be thought useful by the board, for dissemination among the people, with such suggestions as to the legislative action as they may deem necessary.

SEC. 12. The sum of five thousand dollars (\$5,000) per annum, or so much thereof as may be necessary, is hereby appropriated to pay the salary of the secretary, meet the contingent expenses of the office of secretary and the expenses of the board, and all costs of printing, which together shall not exceed

(1) As amended by chapter 173, acts Twentieth General Assembly.

*Law Creating State Board of Health.*

the sum hereby appropriated. Said expenses shall be certified and paid in the same manner as the salary of the secretary. The Secretary of State shall provide rooms suitable for the meetings of the board and office room for the secretary of the board.

SEC. 13. The mayor and aldermen of each incorporated city, the mayor and council of any incorporated town or village in the State, or the trustees of any township, shall have and exercise all the powers and perform all the duties of a board of health within the limits of the cities, towns and townships of which they are officers.

SEC. 14. Every local board of health shall appoint a competent physician to the board, who shall be the health officer within the jurisdiction and shall hold his office during the pleasure of the board. The clerks of the townships and the clerks and recorders of cities and towns, shall be clerks of the local boards. The local boards shall also regulate all fees and charges of persons employed by them in the execution of the health laws and their own regulations.

SEC. 15. It shall be the duty of the health physician of every incorporated town, and also the clerk of the local board of health in each city or incorporated town or village in the State, at least once a 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 State Board. They shall also make special reports whenever required to do so by the State Board of Health.

SEC. 16. Local boards of health shall make such regulations respecting nuisances, sources of filth and causes of sickness within their jurisdiction and on board any boats in their ports or harbors as they may judge necessary for the public health and safety; and if any person shall violate any such regulations he shall forfeit a sum of not less than twenty-five dollars (\$25) for every day during which he knowingly violates or disregards said rules and regulations, to be recovered before any justice of the peace or other court of competent jurisdiction.

SEC. 17. The board of health of any city or incorporated town or village shall order the owner of any property, place or building (at his own expense) to remove any nuisance, source of filth or cause of sickness found on private property, within twenty-four (24) hours, or such other time as is deemed reasonable after notice served as hereinafter provided; and if the owner or occupant neglects to do so, he shall forfeit a sum not exceeding twenty dollars (\$20) for every day during which he knowingly and wilfully permits such nuisance or cause of sickness to remain after the time prescribed for the removal thereof.

SEC. 18. If the owner or occupant fails to comply with such order, the board may cause the nuisance, source of filth or cause of sickness to be removed, and all expenses incurred thereby shall be paid by the owner, occupant or other person who caused or permitted the same, if he has had actual notice from the board of health of the existence thereof, to be recovered by civil action in the name of the State, before any court having jurisdiction.

SEC. 19. The board, when satisfied upon due examination that any cellar, room, tenement, or building in its town, occupied as a dwelling place has become, by reason of the number of occupants, or want of cleanliness, or other cause, unfit for such purpose, and a cause of nuisance or sickness to the occupants or the public, may issue a notice in writing to such occupants, or any of them, requiring the premises to be put in a proper condition as to cleanliness, or, if they see fit, requiring the occupants to remove or 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 cleaned at the expense of the owners, or may remove the occupants forcibly, and close up



---

*Law Creating State Board of Health.*

---

the premises, and the same shall not again be occupied, as a dwelling place, without permission in writing of the board.

SEC. 20. Whenever the board of health shall think it necessary for the preservation of the lives or health of the inhabitants to enter a place, building or vessel in their township, for the purpose of examining into and destroying, removing or preventing any nuisance, source of filth or cause of sickness, and shall be refused such entry, any member of the board may make complaint, under oath, to any justice of the peace of his county, whether such justice be a member of the board or not, stating the facts of the case, so far as he has knowledge thereof. Such justice shall thereupon issue a warrant, directed to the sheriff or any constable of the county, commanding him to take sufficient aid, and being accompanied by two or more members of said board of health, between the hours of sunrise and sunset, repair to the place where such nuisance, source of filth or cause of sickness complained of may be, and the same destroy, remove, or prevent, under the direction of such members of the board of health.

SEC. 21. When any person coming from abroad, or residing within any city, town or township within this State, shall be infected, or shall lately have been infected with Small-pox, or other sickness dangerous to the public health, the board of health of the city, town or township where said person may be, shall make effectual provision, in the manner in which they shall judge best, for the safety of the inhabitants, by removing such sick or infected person to a separate house, if it can be done without damage to his health, and by providing nurses and other assistance and supplies, which shall be charged to the person himself, his parents or other person who may be liable for his support, if able, otherwise at the expense of the county to which he belongs.

SEC. 22. If any infected person cannot be removed without damage to his health, the board of health shall make provision for him, as directed by the preceding section, in the house in which he may be, and in such case they may cause the persons in the neighborhood to be removed, and may take such other measures as may be deemed necessary for the safety of the inhabitants.

SEC. 23. Any justice of the peace, on application, under oath showing cause therefor by a local board, or any member thereof, shall issue his warrant, under his hand, directed to the sheriff or any constable of the county, requiring him, under the direction of the board of health, to remove any person infected with contagious diseases, or to take possession of condemned houses and lodgings, and to provide nurses and attendants, and other necessities for the care, safety and relief of the sick.

SEC. 24. Local boards of health shall meet for the transaction of business on the first Monday of April\* and the first Monday in October\* of each year, and at any other time that the necessities of the health of their respective jurisdictions may demand, and the clerk of each board shall transmit his annual report to the secretary of the State Board of Health within two weeks after the October\* meeting. Said report shall embrace a history of any epidemic disease which may have prevailed within his district. The failure of the clerk of the board to prepare, or cause to be prepared, and forward such report as above specified, shall be considered a misdemeanor for which he shall be subject to a fine of not more than twenty-five dollars (\$25).

SEC. 25. All laws in conflict with this act are hereby repealed.

---

\*Amended by Chapter 63, Acts 23d G. A.

## GENERAL REPORT.

Many years ago STERNE said beautifully and no less truly than beautifully:

"Oh, thou blessed health! Thou art above all gold and treasure; 'tis thou who enlargest the soul and openest all its powers to receive instruction and relish virtue. He that hath thee hath little more to wish for, and he that is so wretched as to want thee, wants everything with thee."

More recently PARKES, one of the most eminent sanitarians of England, said:

"It has been proved over and over again, that nothing is so costly in all ways as disease, and that nothing is so remunerative as the outlay which augments health, and, in doing so, augments the amount and value of the work done."

To secure and to preserve this blessed health, and to prevent disease are the objects of the creation of health boards, and of all health laws.

Since 1880, Iowa has been in line with other States, then comparatively few in number, in this beneficent work of caring for the lives and health of the people. It is safe to say that no sentiment has grown so rapidly, and become so firmly implanted in the convictions of the people; and laws and provisions for the attainment of no other object have been accorded so generous an acquiescence, as those pertaining to the general health. This is not strange. Indeed, it would be passing strange if it were otherwise.

Nothing is quite so expensive as sickness and death; nothing leaves so little to live for as the removal by death of the loved ones of our homes, especially if such removal was by a disease, or accident, easily preventable. The object of all health legislation is to ascertain the nature and causes of disease; to distinguish those that are preventable, and the best methods of such prevention; to protect by quarantine and other recognized efficient means the

*General Report.*

susceptible and unprotected from wanton and reckless exposure; and to instruct the people upon all phases of sanitary work.

Preventive medicine and sanitary science may be likened into a gigantic tree, whose roots are strong and vigorous; whose branches, though of comparatively rapid growth, are for all time; and whose leaves and fruit are not so much for the healing of the nations, as for the preservation of the health and promotion of the happiness of all mankind!

The sentiment of all sanitarians, and of all health laws is: "PREVENTION IS BETTER THAN CURE." Dr. W. S. Robertson, one of the most eminent sanitarians of the State, and the honored president of the Iowa State Board of Health from its organization to the time of his death, in an appeal to the legislature for additional health legislation said: "Your State Board of Health asks not of you the enactment of laws which so often thrill the body politic by the possession of place, patronage and power, but simply that you enable it still further to engage in the *PATERNAL work of saving the lives and promoting the health of the people of Iowa.*" \* \* \* The motives for the needed work are the highest of man's best nature, since 'the greatest good of the greatest number of people' is all that is asked."

A reference to the special part of this report will give some idea of the wide range of subjects that have been under consideration by the Board during the last biennial period.

Since my last report many important discoveries, the result of conscientious and enthusiastic, though very pains-taking investigation, have been made in the domain of preventive medicine. These discoveries, and their practical advantages, have been noticed from time to time in the MONTHLY BULLETIN—the official organ of the Board. Perhaps one of the most important, is the settled conviction, the result of repeated experiments, and of extended observation, amounting to positive demonstration, that Consumption, the most fatal, and the most widely diffused of all diseases afflicting the human family, is the result of infection—caused by a special microbe or bacillus, and hence a purely preventable disease. Attention is especially called to this part of the report.

*General Report.*

Soon after the convening of the last session of the State legislative assembly, a case of Small-pox occurred in Jasper county—an importation from California. Soon after cases also appeared in Polk, Sac and Wapello counties. Two deaths only occurred, and the disease did not spread beyond the families originally affected in each locality.

During the Spring and Summer of 1889, cases of Small-pox appeared in Pottawattamie, Ida, Greene, Boone, Dickinson, Marshall, Clinton, Story and Ringgold counties—nearly all the result of exposure by a German immigrant woman who was removed from a railway train during the eruptive stage of the disease, and put in quarantine at Galva, in Ida county. As a result of the efficient action of the local boards of health, together with a personal visit made by the secretary of the State Board, no epidemic occurred at any point, and almost in no instance did the disease spread beyond one case in each locality.

The general health of Iowa has been exceptionally good during the last two years. No epidemic of any kind has occurred with the exception of Diphtheria in and about Rochester, Cedar county; and at Oxford Mills, and surrounding country, in Jones county.

The publication of the MONTHLY BULLETIN, five thousand copies of which are distributed monthly, though a considerable tax upon the limited resources of the Board, has been an efficient and most valuable aid to the Board in securing a more intimate relationship between the state and local boards and as a prompt and economical means of conveying needed information to such boards, and to the people generally.

The newspapers of the State, and especially of Des Moines, have greatly supplemented the work of the State Board, in promptly and cheerfully republishing liberal extracts from the BULLETIN, beside publishing from time to time interesting health items not published in the BULLETIN.

An interesting part of our report is that referring to the pollution of our public streams—which in the case of the Iowa River, has led to the destruction of the fish, and of nearly all animal life for many miles—beside endangering the health, and life of those who



*Meetings of the State Board.*

live contiguous to it, and in many ways converting a beautiful water-way into a nuisance.

Without, however, calling special attention to any other topics in the report, it is submitted in the hope that its brevity and the great importance of the subjects treated, will insure a careful perusal, and thereby secure throughout the State, a more general appreciation of the benevolent work and aims of the Board.

## MEETINGS OF THE STATE BOARD.

At the semi-annual meeting of the State Board of Health, held on the 18th of November, 1887, the general condition of the public health was fully considered, and the causes for the unusual prevalence of Scarlet Fever, Diphtheria and Typhoid Fever, discussed. The Board has, in their judgment, done all that is in their power to protect the people against these and other contagious diseases, and to prevent their spread, wherever they appeared. It remains with local boards, with whom is vested ample power and authority, to accomplish results. The State Board is an advisory, not an executive body,—but with co-operation of local boards, contagious and infectious diseases may be both prevented and controlled in any community. The State Board therefore urges upon local boards that more active measures be enforced to this end, and further, that upon the appearance of these diseases, notice be promptly given to the secretary of the State Board.

The subject of school text-books on Physiology and the effect of alcoholic stimulants on the human system, was fully discussed in the report of the committee appointed at the last meeting. The committee reported that inasmuch as the law requiring this subject to be taught in the public schools had been in force for two years, and that therefore nearly all the school districts were supplied with

*Meetings of the State Board.*

books, it would be injudicious to recommend a radical change of books, but that authority should be vested somewhere to supervise the text-books to be used, to prevent dissemination of error, and the next legislature will be asked to make such amendment to the law as will secure this result.

The Committee on Rules and Regulations recommended a more rigid quarantine in case of Scarlet Fever and Diphtheria; that the quarantine be extended to forty days instead of thirty-five. Also denouncing the practice of calling Scarlet Fever "Scarlatina", thereby deceiving the public into the belief that the latter is not dangerous. They also recommended a rigid enforcement of the rules of the State Board regarding public funerals of persons dying from Diphtheria and Scarlet Fever, believing such funerals to be most prolific sources for spreading these diseases.

The report of the committee was unanimously adopted, and the secretary instructed to urge upon local boards through THE MONTHLY BULLETIN the importance of prompt and vigorous action in all cases on the appearance of contagious disease.

A communication was received from Governor Larrabee announcing the extensive prevalence of Diphtheria, Scarlet Fever and Typhoid Fever throughout the State, and requesting the State Board to use all its power to prevent its further spread, and to diffuse such sanitary knowledge among the people as will tend to prevent the development of the virus in localities hitherto free from such pestilential influence. The communication was referred to a special committee, who reported that in their judgment the Board had done and was doing all in its power to accomplish the results desired by the Governor. It has prescribed rules and regulations in accordance with the most advanced ideas of sanitarians, and has distributed them by thousands wherever it was known they would be of practical use or benefit, and is continually doing so, yet the more immediate duty of enforcing the provisions of the health law, devolves upon local boards who are vested with unlimited power to do so. The State Board can do but very little without the co-operation of local boards, hence the prevalence of infectious diseases in any community, if continued, may be ascribed to the dereliction of duty by

*Meetings of the State Board.*

local boards. The State Board is ready and anxious all times to perform its whole duty so far as it can.

The report of the committee was adopted unanimously as the expression of the entire Board.

At the annual meeting of the Board, May 29, 1888, a communication from Mr. J. Givin, Superintendent of the Chicago, Rock of Island & Pacific Railway, asking for a more specific construction of Rule 6, for the transportation of corpses, was referred to a special committee, who recommend the amendment of the rule so as to read as follows:

"Rule 6.—All disinterred bodies will be deemed infectious and dangerous to the public health, and if removed, the same precautions as set out in Rules 2 and 5 must be observed."

The report was adopted.

To avoid conflict of diagnosis, and prevent misleading the people, the Board adopted the following resolutions:

*Resolved*, That the State Board of Health requests all physicians in this State to abandon the use of the terms "Scarlatina" and "Scarlet Rash", as they are misleading, and often a great source of trouble in enforcing regulations for the prevention and spread of Scarlet Fever.

*Resolved*, That all local boards of health and health officers in this State be requested and directed to disregard all distinction in forms of Scarlet Fever, and to treat all suspicious cases as coming within the regulations for quarantine of contagious diseases.

Realizing the importance of national co-operation in the work of quarantining against contagious diseases, the Board unanimously adopted the following resolutions:

*Resolved*, By the State Board of Health of Iowa, That we hail with joy the rapid progress of sanitary science and preventive medicine, as shown by the fact that nearly every State in our Union, as well as many of the cities, towns and townships of each State, have organized local boards for the protection of their respective localities against the invasion of infectious and contagious diseases.

*Resolved*, That for the better protection of our whole land, especially against the importation of those dreaded exotic diseases, Cholera and Yellow Fever, as well of Small-pox, we earnestly urge our representatives in Congress to favor the passage of the bill now pending in Congress, entitled "A

*Meetings of the State Board.*

bill to prevent the introduction of contagious and infectious diseases into the United States, and to establish a Bureau of Public Health." (H. R., Bill 1536, 50th Congress, 1st Session.)

*Resolved*, That the establishment of such a Bureau of Public Health, in connection with one of the already existing departments of government, would, in our opinion, with the ample means at the disposal of the national government, be productive of great good, by affording through our consuls at foreign ports, an opportunity to obtain prompt and reliable information in regard to the existence and extent of infectious diseases, by timely notice to our government of the departure and destination of vessels from infected districts, by collecting and tabulating weekly or monthly vital and mortality statistics from the various states and cities of our country, by issuing weekly or monthly, and furnishing to all state boards, and to the health departments of our principal cities, a bulletin, showing the existence, location and extent, as well as fatality, of any contagious diseases that may be present in any locality in the United States, and the measures adopted for their suppression, by supervising the erection and maintenance of quarantine stations at such points and in such numbers as may most successfully guard our borders against the introduction of pestilential diseases, by conferences and co-operation with state and local boards of health and with foreign powers, relative to practical sanitary work, and by scientific research and experimentation relative to climatic conditions, meteorological changes and all morbid influences, would so clearly enable the government to arrive at the causes of such preventive diseases as would lead to the adoption of the most intelligent and well-directed measures for their suppression.

*Resolved*, That a copy of these resolutions be furnished to each Iowa representative in Congress.

At the semi-annual meeting, held November 29, 1888, the following communication was received from the Governor:

"EXECUTIVE OFFICE,  
DES MOINES, November 19, 1888."

DR. J. F. KENNEDY, Secretary State Board of Health, Des Moines:

DEAR SIR—In view of the recent outbreaks of Diphtheria in different parts of the State, it becomes the duty of your Board to exercise the utmost vigilance to prevent the spreading of this terrible disease. It occurs to me that a great deal of good could be accomplished if, as soon as information is received by your Board that Diphtheria has made its appearance in any part of the State, and threatens to become epidemic, one of your members would at once resort to the infected place to assist the local health officers in tracing out, if possible, the cause of the disease, and in taking prompt and proper measures to prevent its spreading. I also trust that you will not relent your



*Meetings of the State Board.*

efforts to impress upon the local boards of health the importance of a strict enforcement of all laws and regulations relating to the prevention of epidemic diseases.

(Signed) Very respectfully, WILLIAM LARRABEE."

The communication was referred to a special committee, whose report will be found on another page of this volume.

In view of the large number of deaths reported from Membranous Croup, Cronpous Diphtheria and Diphtheritic Croup occurring in communities where Diphtheria is prevalent, it was the unanimous opinion of the Board that the practical effect of isolation, quarantine and disinfection in all cases of "Membranous Croup" or "Diphtheritic Croup", would be not only to greatly lessen the number and restrict the spread of Membranous Croup itself, but also lessen the number of cases of Diphtheria. The Board therefore adopted the following resolution:

*Resolved*, That Membranous Croup be and the same is hereby included in the rules and regulations of this Board for the restriction and prevention of Diphtheria, and for sanitary purposes is to be deemed and considered as dangerous to public health.

A resolution was adopted authorizing the Secretary, upon notice received of the outbreak of epidemic or contagious disease, to notify some member of the Board, whose duty it shall be to visit the infected locality, investigate the cause and assist the local board in its removal, and to make such further orders and regulations as may be deemed necessary in the premises.

The committee to whom was referred the subject of a milk standard, reported the following as the standard of pure milk for the purposes of the State Board, and the same was adopted:

Water (Maximum).....	86.87
Butter Fat (Minimum).....	3.50
Milk Sugar (Maximum).....	4.93
Salts (Maximum).....	0.60
Ash (Maximum).....	0.70
Casein (Maximum).....	3.98
Solids ..	13.13
	100.00

Specific Gravity, 1029—1034.

*Infectious Diseases—Diphtheria.*

At the annual meeting, held May 1, 1889, the subject of contagious diseases was thoroughly discussed, and, as an additional means to aid in prevention of the same, rules and regulations directed to public school teachers were adopted, and ordered printed for distribution. The pollution of rivers and lakes, transportation of corpses, and quarantine, were duly considered, and the result will be found in another place.

## INFECTIOUS DISEASES.

## DIPHTHERIA.

In October, 1888, an outbreak of Diphtheria of serious nature was reported at Rochester. Owing to mistaken diagnosis, efforts to conceal the pernicious custom of treating Membranous Croup as non-contagious, and the laxity of the local board, the disease assumed alarming proportions, and an appeal was made to the State Board for assistance. Dr. J. C. Shrader visited the place, and the following is his report:

IOWA CITY, October 18, 1888.

DR. J. F. KENNEDY, *Secretary State Board of Health, Des Moines, Iowa:*

DEAR SIR—I have the honor to report the receipt of your communication of October 10th, and also the letter of Dr. Atkins, of Rochester, Cedar county, Iowa. I was not able to report in person until yesterday, when I proceeded to visit Rochester and surrounding country, and would respectfully report: Rochester was the original county seat of Cedar county, and is situated on the east bank of the Cedar river, in a wooded country, and a sandy, porous soil, and is some eight miles from Tipton, the present county seat. About the first of September Diphtheria made its appearance in a brick house in the town. The father, mother, and one child have died of the disease, which spread through the town and into the surrounding country. There have been in all, as near as I could learn, about thirty cases, occurring within a radius of six miles, mostly within two miles of the village. I saw twelve cases, some convalescing, some yet very sick. In one family of eleven (Thomas Wilkinson's) all had it. There had been two deaths; one boy of

*Infectious Diseases—Diphtheria.*

fifteen had been taken two days before, and was, at time of visit, dangerously sick. The disease is Diphtheria, of a severe type. There had been nine deaths, showing a death rate of about thirty per cent. The public schools were closed September 18th. At that time there were three cases in town; the disease commenced to spread rapidly soon after that date. Quarantine had been attempted, and fairly well carried out. The doctors claimed that it had been very difficult to get nurses to care for the sick, inasmuch that they were compelled to relax their established rules to prevent the sick being seriously neglected. Disinfection had been resorted to in all cases, they claimed, by the use of burning sulphur, chloride of lime; in fact, the most of the best disinfectants had been used after the cases terminated either by death or recovery. The board of health had been in session, but not until their regular meeting on the first Monday of October. This meeting should have occurred at least three weeks sooner.

Dr. Atkins, of Rochester, and Dr. D. Donnelly, of Tipton, have been indefatigable in their care and attention upon the sick. Other doctors have seen and attended upon a few cases, but I saw none of these cases, and so cannot speak further in regard to them. I visited and carefully inspected the premises where the disease made its appearance, in the family of John Kester, who has since died, also his wife and one child. The house, a brick, is situated on the northwest corner of a block. East of the house is an old blacksmith shop full of filth. There is a dense row of cedar trees running eastward from the blacksmith shop to a barn and cow-stables, a distance of some eighty to a hundred feet; there was also a hen-roost adjoining. All of the premises described were very filthy. I do not think the manure and accumulated filth had been removed since these buildings had been erected, some twenty years ago. The well is situated about ten feet from the east side of the house. It is said to be about thirty feet deep, and dug in the loose, sandy soil. There is also a water-closet, without vault, twenty-five steps from the well. The lot is covered with apple trees, and some other trees, while there is a thick undergrowth of currant bushes, small cedars and weeds, so that during the summer months the sun cannot get to the ground. The well is situated in the lowest place on the lot, and there is good drainage from all the accumulated filth into this well, there being no protection at the top to prevent the surface drainage into it.

Now, it is perfectly clear to me that this well was the source from which all this disease, and so many deaths, can be directly traced. The children from this house were attending the school, and upon inquiry, I learned that some of the children of Thos. Wilkinson, the family who have suffered so much, were attending the school in town and sitting in the same seat with one of John Kester's children, thus in this instance, at least, tracing the disease to the Kester well. Afterward I learned that water had been obtained at this well and taken to the school-house for the children to drink. I thereupon issued the following order:

*Infectious Diseases—Diphtheria.*

TIPTON, IOWA, October 17, 1888.

Dr. D. Donnelly and Dr. L. P. Atkins:

DEAR SIRS—You are hereby ordered to proceed to the house formerly occupied by John Kester, in the town of Rochester, and cause the well on said premises to be effectually closed, so that the water thereof cannot be used for any purpose whatever; and to remain closed until the premises are thoroughly renovated, the well cleaned and filled around with clay or cement so that there can be no surface drainage into it whatever.

(Signed)

J. C. SHRADER,

Member of the State Board of Health.

It is unfortunate that the disease was not diagnosed upon its first appearance, and an examination instituted at once to ascertain the source of the infection, and thus have prevented many cases of sickness and several deaths.

The disease has been decreasing for the last week, and the new cases are of a milder character. All of which is respectively submitted.

J. C. SHRADER.

Subsequently four additional cases developed, but there were no more deaths.

During the same month, a serious outbreak of Diphtheria occurred at Oxford Junction, in Johnson county. Dr. Shrader went there on request of the health board, and the following is his report:

IOWA CITY, November 2, 1889.

DR. J. F. KENNEDY, Secretary, State Board of Health, Des Moines, Iowa:

DEAR SIR—Your letter to me of October 30th, also letters from Dr. Geo. R. Moore and John G. McConahy, Recorder, both of Oxford Junction, Jones county, Iowa, were duly received October 31st, and according to request and your instructions, I at once started for that place, arriving there early in the morning of November 1.

I first walked out by myself, taking a general survey of the town, and then made myself and business known to Mayor A. Stratelek, who took special pains to give me all the information he could, and afford all the means at his command for investigation of the causes and spread of the terrible outbreak of Diphtheria from which they have been suffering.

Oxford Junction is situated in the valley of, and about three quarters of a mile north of the Wapsie river, and north of the railroad. It has a population of about 1,000 inhabitants; was laid out twelve to fourteen years ago. From the railroad north, for a fourth of a mile, or more, the ground ascends, then slopes to the north, for considerable distance. The natural drainage is good. The soil is loam and sand, underlaid with magnesian limestone; the soil varying in depth from three to fifteen feet. The water supply is from wells



*Infectious Diseases—Diphtheria.*

and cisterns—mostly wells that are from fifty to sixty feet in depth. Water found in crevices of rock filled with gravel. Dr. Moore has a well in the business part of town, sixty feet deep, tubed, thus shutting off the surface drainage. He informs me there has been no deaths from persons using water from this well. With a few exceptions, the town presented a clean appearance. The lots, streets, and most of the alleys had been cleaned. As near as I could ascertain there had been in town and vicinity about one hundred and seventy-five cases in all, and thirty-nine deaths, or about 22½ per cent of fatal cases.

There were two cases in November 1887, when the disease subsided for a time, then made its appearance again, and again subsided, when finally, a great number were taken sick, with a mild form of sore throat, that was considered a simple tonsillar inflammation and required but little treatment to effect a cure, many cases, perhaps, not having any treatment, except some domestic remedies. There were perhaps at least forty of these mild cases before death occurred. In this instance there was a public funeral. Soon the disease began to assume a more serious form, and the mortality became very great, but it was not until a number of deaths occurred, that any precautions whatever were taken to arrest the progress. Children from houses where the disease existed, were constantly on the streets playing with other children from houses where the disease had not made its appearance. People were visiting from house to house, without any regard whatever to the disease. In fact, it was stated to me by some of the citizens, that a child was sick with the disease in the building in which the post-office was located; that a door between the sick room and the post-office was frequently left open while there would be congregated there twenty to thirty persons in waiting, while the morning mail was being distributed. For a time every facility was offered for the spread of the disease, viz., the free communion of the people, including the children of the town, one or more public funerals; a disagreement among the physicians as to the nature of the disease; no health officer; no cards posted to warn the people of the location of cases; no quarantine; and no proper disinfection.

Finally some diphtheria cards were put up, quarantine was fairly established, and in most cases disinfection of clothing, bedding and houses. Within a very short time after these precautions were taken, the disease began to subside, showing conclusively that with proper care, and attention to the most ordinary rules of sanitary science, the disease can be restricted and soon stamped out. After getting at all the facts I could, I saw the mayor of the town and the trustees of the township in which the town is located, and issued the following order to each, varying only so as to be applicable:

HON. A. STRATELER, Mayor, and Trustees of Oxford Junction, Iowa:

GENTLEMEN—You are hereby ordered to immediately convene as a board of health and proceed to elect some competent physician as health officer of your town, and to adopt rules and regulations necessary to protect the citizens of your town from the ravages of diseases, of whatever nature, that are

*Infectious Diseases—Diphtheria.*

dangerous to the life and health of your people, insisting and enforcing a thorough and efficient quarantine of all such cases as are dangerous to the public health; and also in completely disinfecting all premises, clothing and persons that have been infected; and perform such other duties as may properly come before you as health officers, for the proper protection of your people.

Respectfully,

J. C. SHRADER, M. D.,

*Member of the State Board of Health.*

OXFORD JUNCTION, IOWA, November 1, 1888.

Dr. Moore promised to accept the position of health officer of the town, and I have entire confidence that he will faithfully perform his duties as such. The disease was already subsiding at the time of my visit, and I have no doubt it will soon be stamped out of existence.

QUERY.—Could the spread of this disease in town and surrounding country have been prevented?

Have the legally constituted authorities done their duty in this matter?

Is any one responsible for the financial distress of the people caused by so great an amount of sickness?

Could this sickness and these deaths have been prevented by proper and well directed efforts in the commencement of this epidemic?

Let those specially interested answer.

In conclusion, I would say that the disease was probably carried there from some town on the line of railway. That after the first cases in November, 1887, the disease was held in abeyance until house-cleaning the following Spring, when the clothes that had been in use the previous Autumn were brought out, when it again made its appearance; or it may have again been brought into the town, or there may have been, and probably was, some filthy cess-pool in the town, where it was generated. Be this as it may, it has been a terrible lesson; and it is to be hoped that the lesson so deeply engraven in the hearts of so many parents may not soon be forgotten; that it may stimulate them to look out for their water supply; to keep their houses clean and well ventilated from cellar to garret; to allow no open cess-pools or other sources of filth near their houses; and so far as possible, strictly avoid coming in contact with persons suffering from contagious diseases, physicians and nurses alone excepted; and that other localities throughout the State may profit by this unfortunate experience.

Respectfully submitted,

J. C. SHRADER, M. D.

Dr. Shrader procured samples of water from the well, which was the water supply of the family where the disease first appeared. They were submitted to the chemist of the State Board, who made the following report of the result of his analysis:



*Infectious Diseases—Diphtheria.*

DES MOINES, IOWA, October 25, 1888.

Secretary of Iowa State Board of Health:

DEAR SIR—The water which you sent me on the 22d inst., for analysis, contained the following:

	Parts per 100,000.	Grains per U. S. gal- lon.
Total solids .....	79.80000	42.77709
Loss by ignition .....	26.20000	15.27931
Chlorine .....	3.14355	1.85232
Free ammonia .....	.00800	.00465
Albuminoid ammonia .....	.02800	.01632
Nitrogen as nitrites .....	2.56000	1.49294
Nitrogen as nitrates .....	3.24000	1.88950

This water is but little better than liquid filth.

FLOYD DAVIS, Chemist.

The foregoing reports of Dr. Shrader need no comment. Such neglect and malfeasance in office by local boards, is nothing less than criminal. The statute regarding their duty is mandatory. There is no defense to such wanton dereliction of duty.

At no time since the creation of the State Board was Diphtheria so prevalent as during the winter months of 1888-9, yet in but few localities did it become epidemic, and wherever it assumed serious proportions, its spread was traceable to neglect of duty of health boards, and the utter want of knowledge or realization of the horrible nature of it, by the people, and even physicians, who either ignorantly or willfully, sought, either to secrete it, or mask it under the name of "Membranous Croup," or "Sore Throat."

In November, 1887, the following communication was received from Governor Larrabee:

STATE OF IOWA, EXECUTIVE OFFICE,  
DES MOINES, November 15, 1887. }

To the Honorable, the State Board of Health, Des Moines, Iowa:

GENTLEMEN—Infectious diseases, especially Diphtheria, Typhoid and Scarlet Fever, appear to be prevalent this Fall to an unusual degree throughout the State.

I take this opportunity to request that your Board exercise whatever power the law confers upon it to guard against the further spread of these diseases,

*Infectious Diseases—Diphtheria.*

and at the same time diffuse such sanitary knowledge among local boards and the people generally as will tend to prevent the development of the virus in localities hitherto free from such pestilential influences.

Very respectfully,

WM. LARRABEE.

The communication was referred to a special committee, who made the following report:

MR. PRESIDENT—We, your committee, appointed to consider the communication of his Excellency, Governor Larrabee, in relation to the existence and dissemination of infectious diseases within the State, have the honor to submit the following report:

We commend the efficient work of the secretary of this Board, and his assistant, in the manner in which they have conducted the affairs of the office.

The people of the State are to be congratulated that there has been no case of Small-pox reported since our last semi-annual meeting.

Your committee think that in view of the prevalence of Typhoid Fever in the State during the present Autumn that all outbreaks of the disease, with the causes where ascertainable, should be promptly reported to the secretary of this Board, the physicians attending those cases, or the proper health officers of local boards of health where the disease exists, in order that proper measures may at once be adopted to arrest and stamp out the disease, and that instructions may be sent as to the most efficient preventives for arresting its progress, and removing its causes.

The same recommendations are also made in regard to Scarlet Fever and Diphtheria.

Your committee also think that the spread of infectious and communicable diseases is often due to the following causes:

1. A desire on the part of physicians to shield their patients and their friends from quarantine and isolation.
2. Mistakes in diagnosis, and indifference to sanitary precautions and regulations.
3. Insufficient and inefficient isolation and quarantine, for a sufficient period.
4. A want of rigid adherence to the rules of this Board in regard to public funerals of all persons dying of infectious diseases.
5. From physicians calling Scarlet Fever "Scarlatina," intending thereby to make the people believe it a less dangerous disease.

These are one and all to be condemned by this Board, and the physicians of this State are called upon to do all in their power to correct these several abuses.

Your committee would recommend that the law in regard to reporting births and deaths shall be so amended that all persons specified in chapter 151, laws of the Eighteenth General Assembly, shall make a report on the first day of each month of all births and deaths occurring in the previous

*Infectious Diseases—Diphtheria.*

month in their families or houses; or, where attended by a physician or midwife, he or she shall be required to make said report to the clerk of the district court of the county on the tenth of each month. All who are delinquent and fail to make said report, shall be reported by said clerk to the county attorney, whose duty it shall be to prosecute the same in the name of the State, as provided by law. Where physicians persistently neglect or refuse to make those reports, the State Board of Medical Examiners may, on presentation of the facts, revoke their certificates. It shall be the duty of the clerk of the district court of each county to make a report on the 15th of each month of all marriages, births and deaths reported for the previous month to the secretary of the State Board of Health.

In regard to the communication of his Excellency, Governor Larrabee, relative to the prevalence of contagious and infectious diseases in this State, and calling attention to the work of the Board in limiting their spread, would say:

The Board has most diligently, and they think effectively, endeavored to educate the general public in the best of methods of prevention by isolation, disinfection, quarantine and general hygienic measures. They consider, however, that more stringent measures are necessary, in order to bring about the desired results, by enlargement of the powers of the Board, and a greater control over local boards of health. As the law now stands, the State Board has only advisory powers, without authority to enforce their decisions.

To this end, your committee recommend that an appeal be made to the General Assembly, to amend the law so as to make the work of the Board more efficient for the preservation of the public health, and to confer such additional powers as will make their recommendations and decisions binding on local boards and the people, and that a penalty be provided for the violation of the rules of this Board.

We also recommend that the directions in circulars regarding the prevention of Diphtheria and Scarlet Fever, be changed as regards isolation and quarantine so as to make them more rigid, and consequently more effective, in preventing the spread of these diseases, requiring forty days as a minimum of quarantine.

Your committee also recommend that the Committee on Legislation take proper steps to have amended section 13, chapter 151, laws of 1880, so as to make it obligatory upon townships, towns and cities to organize local boards of health, and to report such organization to the secretary of the State Board.

*Resolved*, That we heartily commend the following wise and timely circular issued by Governor Larrabee to the various state institutions, respecting the removal of causes of sickness and sources of danger from fire and other casualties, and demand with all the legal power vested in this Board their faithful observance:

*Infectious Diseases—Diphtheria.*

NOVEMBER 16, 1887.

DEAR SIR—This season of the year requires special vigilance on your part to protect the lives and property intrusted in your care. Decaying vegetation readily breeds disease. All rubbish should therefore be removed from the premises; cellars, closets and dark corners should be carefully cleaned, and wells and cisterns should be well secured against surface drainage. The constant fire in the stove, grate and furnace, fanned by high autumnal winds; the dryness of the atmosphere; the parched condition of the roofs, and the scarcity of water—all combined to increase the danger of a conflagration. I would therefore suggest that smoking be prohibited on the premises of your institution; that chimneys be cleaned whenever this is feasible, that officers, watches and guards should be admonished to increase their watchfulness during windy weather; that lights and explosive oils be trusted only to cautious and responsible persons; that apparatus for extinguishing fire be carefully examined and repaired, if found deficient; in short, that every possible precaution be taken for preventing, and every possible provision be made for extinguishing fire. As the property of the State is, as a rule, not insured, the responsibility of those in charge of public institutions is great indeed.

Very respectfully,

WILLIAM LARRABEE.

The report of the committee was accepted and adopted.

At the November meeting of the State Board, 1888, the following communication was received from the Governor:

"EXECUTIVE OFFICE,  
DES MOINES, November 19, 1888."

DR. J. F. KENNEDY, *Secretary State Board of Health, Des Moines:*

DEAR SIR—In view of the recent outbreaks of Diphtheria in different parts of the State, it becomes the duty of your Board to exercise the utmost vigilance to prevent the spreading of this terrible disease. It occurs to me that a great deal of good could be accomplished, if, as soon as information is received by your Board that Diphtheria has made its appearance in any part of the State, and threatens to become epidemic, one of your members would at once resort to the infected place to assist the local health officers in tracing out if possible the cause of the disease, and in taking prompt and proper measures to prevent its spreading. I also trust that you will not relent your efforts to impress upon the local boards of health the importance of a strict enforcement of all laws and regulations relating to the prevention of epidemic diseases.

(Signed)

Very respectfully,

WILLIAM LARRABEE."

Recognizing the full import of the suggestions of the Governor, the State Board adopted the following resolution:



*Infectious Diseases—Scarlet Fever—Small-pox.*

*Resolved.* That upon the outbreak of epidemic or contagious diseases reported to the secretary of this Board, he be authorized and directed to immediately notify some member of the Board, whose duty it shall be to proceed to the infected locality and investigate the causes of said outbreak, and assist in its removal by active co-operation with the local boards of health, and issue such orders as may be necessary in the premises.

In view of the large number of deaths reported from Membranous Croup, Croupous Diphtheria and Diphtheritic Croup, occurring in communities where Diphtheria is prevalent, and the generally accepted opinion that these diseases are etiologically and pathologically identical with Diphtheria it was ordered by the State Board that Membranous Croup be included in the rules and regulations of the Board for the restriction and prevention of Diphtheria and for sanitary purposes to be deemed and considered as dangerous to public health and subject to the same quarantine regulations as Diphtheria.

## SCARLET FEVER.

Scarlet Fever has prevailed as an epidemic during the biennial period. There have been outbreaks in a large number of counties, and in many instances unnecessarily prolonged by reason of the neglect of local boards. The most prolific source of trouble with this disease is the reprehensible practice of physicians to call mild forms of it "Scarlatina" and "Scarlet Rash," thereby misleading the people, and deceiving them into false security. Mistaken diagnosis, and the consequent delay and exposures is also a great source of danger. To guard, so far as possible, against this, the State Board has prohibited the use of the terms "Scarlatina" and "Scarlet Rash."

## SMALL-POX.

During the biennial period Small-pox has appeared in the State. In January, 1888, a gentleman contracted the disease in California, and brought it to his home, near Colfax, in Jasper county, and three of his family were infected, with no deaths. He stopped at a hotel in Ottumwa. Soon after, a man residing in Ida county, stopped at the same hotel, occupying the same room occupied by the Jasper

*Infectious Diseases—Typhoid Fever.*

county man. From him his family became infected, resulting fatally in one of his children.

In September, 1888, the disease was brought to Council Bluffs by a railroad passenger, resulting in fourteen cases, with two deaths. In the same month a traveler brought the disease to a hotel in Monticello, Jones county. He was removed to a pest-house, where he died. Several inmates of the hotel became infected, but without fatal results.

In October, a resident of Ainsworth, was infected while traveling in the west. Five of his family were infected from him, resulting in the death of a small child. Another case, of a man, exposed to this family, resulted fatally.

In January, 1889, six cases were reported in the family, at Waverly, Bremer county, of a man who had been traveling in the west. All recovered.

In June, 1889, a German family of immigrants, infected with the disease, were discovered on a railroad train near Galva, in Ida county. They were side-tracked at once, and rigidly quarantined. From this family, one case developed among railroad employees, at Boone, one at Spirit Lake, two at Clinton, one at Marshalltown, one at Nevada, with one fatal at Clinton. The case at Spirit Lake was fatal, though probably from other causes. At Jefferson, in Greene county, were four cases in one family, the origin of which was probably the immigrant family at Galva.

In this latter outbreak, with exposures on a crowded passenger train, extending nearly across the State, from the disease at the full period of eruption, so prompt and vigilant were the local health boards in vaccination and quarantine, the disease was confined in each locality to the family in which it appeared, and was stamped out in less than thirty days. An important fact, firmly established during this outbreak, was the prophylaxis of vaccination.

## TYPHOID FEVER.

In November, 1888, an outbreak of Typhoid Fever was reported at Alden, in Hardin county. There were eight cases in two families,

*Infectious Diseases—Typhoid Fever.*

who used water from the same well. There was one death. The use of the water was suspended and the disease at once subsided.

In September, 1888, a serious outbreak of this disease was reported at a hotel in De Soto, in Dallas county. Suspicion attached to the well which furnished the water supply, by reason of its proximity to privies and stables. An analysis of the water confirmed the suspicion, to-wit:

Total solids.....	21.939	16.4456
Loss by ignition.....	7.184	.0402
Chlorine.....	5.743	1.4579
Ammonia.....	.026	.0005
Nitrogen as nitrites.....	Trace	Trace
Nitrogen as nitrates.....	.327	.3332

The second column is the standard of water permissible for potable use, the quantities being the maximum in grains per U. S. gallon.

During the year 1888, several cases of Typhoid Fever occurred at the State Institute for Deaf and Dumb, at Council Bluffs. At the request of Superintendent H. W. Rothert, a special committee of the State Board was appointed to investigate the sanitary condition of the buildings, and suggest such remedies as they deemed necessary, which the committee did. A second committee was appointed to ascertain to what extent the recommendations of the former committee had been executed. That committee made the following report to the State Board at the May meeting, 1889:

*Mr. President and Gentlemen of the State Board of Health:*

Your committee to whom was referred the report of Mr. Loring and Dr. W. H. Dickinson on the sanitary conditions of the Deaf and Dumb Institute, would most respectfully report:

That Dr. J. C. Shrader, a member of the committee, has visited said Institute, and after making a careful examination of the premises, finds that many of the causes of complaint referred to in the report of the committee have been removed.

The trustees and superintendent immediately went to work to place the institution in as good a sanitary condition as possible, and have done all that was possible with the means at their disposal.

The matter of better ventilation has received particular attention. The soil pipes from the water-closets have been thoroughly trapped, and pipes

*Infectious Diseases—Typhoid Fever.*

leading therefrom extend some ten feet at least above the roof of the building. There are now no tile soil pipes within the building. The sewer near, and extending within the building at one point, has been taken up; it was found in bad condition, but has been replaced in a substantial manner, thus rendering the drainage perfect and preventing the noxious gases from entering the building. Some of the basins in the water-closets have been replaced with more modern and a better class of goods.

I was assured all the defective, or rather the old style basins, would have been removed had the finances justified the expenditure.

The registers have been carefully looked after, and the ventilating flues cleaned where necessary, so that the ventilation from this source seems now to be in as good a condition as they well can be under the plan adopted by the architect when the building was constructed.

We especially commend the action of the Board in providing better hospital accommodations. We are happy to state that the hospital is now supplied with as good accommodations as is possible under the circumstances.

The upper story of the main building has been thoroughly overhauled. The rooms are large, airy, well ventilated apartments; the floors are laid with hard pine flooring, finely finished; the walls and ceilings newly plastered and whitewashed; a good elevator has been put in; hot and cold water in every room; the water-closets of the latest design; two large rooms especially set apart for contagious diseases, and these as completely isolated from the others as is possible under the circumstances.

There has been a ventilator put in the sewer some distance from the building at the point marked "cess-pool" in the report of the original committee.

It is contemplated to change the direction of the main sewer so that it will debouch into the creek, many rods below the present outlet.

There has not been any sewer connections made with the water-closet near the school house, but I am informed that it will be done as soon as possible.

After considering what the board of trustees and superintendent have done since the first report was made, we must consider their action as prompt and commendable. There seems to be a sincere desire on their part to place the institution in as good a sanitary condition as possible, that there may be no cause of sickness or sources of filth that may engender disease about the premises.

The inmates look healthy, happy and contented; entire harmony seems to prevail throughout all the different apartments. The superintendent and his excellent wife seem to be devoted to their work, and the results are plainly visible in the perfect cleanliness of all parts of the institution, and it is indeed a happy home for this unfortunate class of human beings.

Your committee would recommend that an appropriation be made by the next legislature to extend and render more perfect the system of sewerage. To erect a building on the cottage plan for a hospital, separate and apart from the other buildings. This is especially needed should there be an outbreak of any of the contagious diseases in the institution. They could then be more perfectly isolated and better cared for.



*Infectious Diseases in Public Schools.*

In April, 1889, sixty cases were reported at Oakland, Pottawattamie county, of Typhoid Fever, the source of which was a polluted well.

## CONTAGIOUS DISEASES IN SCHOOLS.

As great diversity of opinion exists among teachers and school boards regarding the importance of protection of public schools against contagious diseases, the State Board, at its May meeting, in 1889, issued the following rules and regulations to school teachers, superintendents, and principals in the public schools in Iowa:

What is to be done in case of the appearance of any such disease in a child attending any public or private school in the State, is so essential that its consideration will precede the description of the diseases themselves.

1. Don't close the school. By so doing a great wrong is inflicted upon the well. The children meet on the play-ground and intervisit, and the teachers are more apt to visit the afflicted scholar. Teachers *must not visit sick children*, and must carefully guard against exposure to these diseases.

2. Send the pupil or teacher so affected home at once, and, unless the other children in the family go from home to live, they must also be excluded. Report the name of the pupil or teacher, together with the supposed character of the disease, to the principal or superintendent of the school; or, if in a country district, to the school board, *at once*, as well as to the parents of the child. Such a child, or teacher, must not be, under any circumstances, re-admitted to the school, except upon a certificate from the attending physician, or a health officer, showing complete recovery, thorough disinfection of his or her person and clothing, and the disinfection of the home.

3. In case of an outbreak of Small-pox in any community, or a threatened outbreak, every child attending the schools, and every teacher must be examined relative to having been successfully vaccinated, and if not so vaccinated, must be excluded from the schools until so protected.

4. If a person is ascertained to have attended school when affected with either Diphtheria, Measles, Scarlet Fever, Membranous Croup, Whooping Cough, or Small-pox, the local board of health must immediately close the room wherein such person attended, and direct its proper disinfection.

5. In all cases of doubt the public must have the benefit of the doubt. It is infinitely better to isolate and quarantine a suspicious case for a few days, and find a harmless mistake had occurred, than to allow such an one to attend the school, and, after many had been wantonly exposed, find that a fearful and fatal mistake had been made. Prevention is inexpensive and sensible—exposure is always dangerous, and hence senseless.

*Infectious Diseases in Public Schools.*

## EARLY SYMPTOMS OF CONTAGIOUS DISEASES.

## SMALL-POX.

This disease, though highly contagious, is comparatively rare, owing to the fact that vaccination is a safe preventive. Its early symptoms are so nearly similar to that of some other diseases, that only an experienced physician can properly diagnose it. Vaccination and re-vaccination are better in this disease than rules for diagnosis.

## SCARLET FEVER.

This disease is also called *Scarlatina* and *Scarlet Rash*—both of which names are misleading, inasmuch as they are often used to express some harmless form of eruption. They are as equally dangerous and contagious as, and are identical with, Scarlet Fever. They are all Scarlet Fever. The disease is often sudden in its attack. There is nausea, vomiting; hot, dry skin; full, rapid pulse; high temperature, headache, flushed face; whitish-coated tongue, with little reddish projections through the coating; very fine rash in the roof of the mouth, sore throat and pain in swallowing. Rash usually appears within the first twenty-four hours; first, about the neck and face, and thence extends over the entire body. It is light red, uniform smooth patches (so-called *Scarlatina*), or a multitude of fine, red points, close together (so-called *Scarlet Rash*). All these symptoms may not be present, nor in the order named. The characteristic symptoms are: *Vomiting, high fever setting in early, sore throat, whitish furred tongue, and appearance of fine rash within twenty-four hours.*

## MEASLES.

This disease comes on like what is commonly called a "cold in the head." Eyes watery and red, watery discharge from the nose, fever, hoarse, dry, husky and painful cough; an eruption in the roof of the mouth, with or without sore throat. The eruption does not appear before the second or third day—first in the forehead and face—is in patches, and of a dull red color; and the skin has a roughened feel to the touch. The earliest initial symptoms are: *Watery eyes, sensitive to the light; discharge from the nostrils, sneezing; rough, dry cough, with pain under the breast bone; the late appearance of the eruption, its occurring in patches, with interspersed spaces, of healthy skin at intervals and the roughened feel, and swollen appearance of the skin.*

## ROTHELN, OR GERMAN MEASLES.

This disease in early symptoms occupies an intermediate place between Scarlet Fever and Measles, without possessing the dangers of either. Hence, it is better to mistake it for Scarlet Fever or Measles and treat it as such,



*Infectious Diseases in Public Schools.*

than to mistake either Measles or Scarlet Fever for Rotheln and treat them as such. It is highly contagious, and should be treated by isolation, quarantine and disinfection. The common symptoms are sore throat, watery eyes and nostrils, slight fever, an eruption appearing early on the neck and upper part of the chest, rapidly spreading over the body, and soon subsiding. There is very little constitutional disturbance. Its characteristic symptoms are: *Moderate amount of fever, early appearance of a fine rash resembling the so-called "Scarlet Rash," with early disappearance of the same, and more or less swelling of the glands of the neck.*

## DIPHTHERIA.

This disease is specially characterized by precursory symptoms. There is more or less languor, impaired appetite, slight fever and restlessness for some days before the throat symptoms manifest themselves, and if Diphtheria is prevalent in a community, a child manifesting such symptoms should receive prompt attention, and should excite serious apprehension. In addition to these premonitory symptoms, the pulse is rapid and rather feeble, the throat and soft palate are red and moderately swollen; there is pain on swallowing fluids rather than solids; putrid breath and the appearance upon the tonsils of whitish or ash-colored spots, which rapidly coalesce and form a thick, leathery, ash-colored membrane. If the air passages become involved, there is a croupous cough and breathing. The characteristic symptoms of Diphtheria are: *Languor and debility; redness, soreness and swelling of the throat; fetid breath, ash-colored spots running together; rapid, feeble pulse, and croupous symptoms of the extension of the membrane into the air passages.*

## MEMBRANOUS CROUP.

This so closely resembles Diphtheria when the latter invades the air passages, that the terms "Membranous Diphtheria" and "Diphtheritic Croup" are often used to designate either or both "Croup" and "Diphtheria." Hence, many regard the disease as identical in origin and pathological effects. It is apparent that under the name of "Croup" widespread epidemics of Diphtheria have occurred; hence, Membranous Croup is included in the rules and regulations of this Board for restriction and prevention of Diphtheria, and for sanitary purposes, is to be deemed and considered dangerous to the public health.

## TYPHOID FEVER.

This disease closely resembles Diphtheria in its initial symptoms. There is languor, a tired feeling lasting many days, headache, wakefulness, frequently diarrhea, tongue red, especially at tip and edges, and tendency to bleeding at the nose, with fever, which gradually increases toward evening. There are no throat symptoms.

*Quarantining Mild Cases of Scarlet Fever.*

The above named diseases are all contagious, or infections, and depend upon a specific poison for their origin and spread, unless it be Membranous Croup, and ALL, under the rules of the Board, *must* be isolated, quarantined, and the persons and things exposed disinfected. In Typhoid Fever all the matter from the bowels, kidneys, or vomited from the stomach, must be disinfected, as positively dangerous. Upon the outbreak of either, especially of Diphtheria and Typhoid Fever, the teacher, especially in country districts where the local health board is too often ignorant or neglectful of their duty, should suggest, and so far as possible, insist upon a careful inquiry into the source and healthfulness of the water supply. In nearly all such cases the drinking water is found contaminated, and its early discovery may prevent many other cases occurring.

The greatest prevalence of Scarlet Fever and Diphtheria in any community, has come from mild cases, scarcely recognizable, where there was little or no restraint of children, who were permitted to go to church or school, mingle with each other; the premises not quarantined, and children permitted to enter, so that before danger was apprehended the disease spread over a large area; or possibly not until some malignant and fatal case had developed. Hence, the great importance of quarantine in all suspicious cases, at least until the question is settled.

A very dangerous habit, is that of female school teachers kissing their pupils at each closure of school. Infectious diseases are often conveyed from mouth to mouth by a kiss, and especially is this true of Diphtheria. It is a practice that should be abolished, at least in the school-room, per force if necessary.

## QUARANTINING MILD CASES OF SCARLET FEVER.

The following correspondence fully explains itself:

..... IOWA, March 14, 1889.

J. F. KENNEDY, *Secretary State Board of Health:*

DEAR SIR—We are having quite a number of cases of Scarlet Fever in our town and surrounding country. The disease thus far has been mild—so mild in fact that the most of the people seem to have little or no fear of it, and even go so far as to say that it is not Scarlet Fever, or some of them would have died out of as many cases as we have had. I think some of the cases are not reported, and others overlooked, especially cases of sore throat—thus furnishing us continually with unlooked for, and often times unknown

*Quarantining Mild Cases of Scarlet Fever.*

sources, of contagion. These cases of sore throat are what annoy me most, and how to manage them with equal justice to all concerned. The diagnosis, in many cases, is very doubtful. I do not want to treat a case of Tonsillitis for Scarlet Fever, and in the course of a few weeks, or months, be called to treat the same person with a well marked type of Scarlet Fever. How can these cases of sore throat be most satisfactorily managed? What is the usual custom? Can you give some pointers in the differential diagnosis of common sore throat and a Scarlet Fever sore throat, without eruption.

Yours, etc.,

....., M. D.

REPLY:—

OFFICE OF THE IOWA STATE BOARD OF HEALTH,  
DES MOINES, March 16, 1889.

—, M. D.: *My Dear Doctor*—I have read your letter with interest and fully appreciate the difficulties to which you refer. The best possible, because the only *safe* way, is to isolate and quarantine, at least for a few days, all suspicious cases. There are often cases of simple Tonsillitis that for a day or two resemble Scarlet Fever. Allow me, however, to say that *I do not believe there can be a case of Scarlet Fever without desquamation*. That (desquamation) is the special diagnostic sign of Scarlet Fever. As that does not begin for several days, and as in the meantime many exposures might take place, I recommend, and the Board orders, that all such suspicious cases be treated as dangerous—that the community, rather than the affected, be given the benefit of the doubt. In no other way can efficient preventive measures be carried out.

After two or three days' quarantine and careful observation, if it be found that the disease is *not* an infectious one, then the quarantine can be raised by the action of the local board, not upon the motion of the attending physician. It is the duty of the attending physician to report the facts to the local board, whose duty alone it is to raise a quarantine once established.

Very respectfully,

J. F. KENNEDY, *Secretary*.

....., IOWA, March 18, 1889.

J. F. KENNEDY, SECRETARY, ETC., *Des Moines, Iowa*;

DEAR SIR—Yours of the 16th inst. at hand. I do not wish to trouble you too much, nor ask questions for any other purpose than to get practical facts.

You say we cannot have a case of Scarlet Fever without desquamation. Can we have, or are we likely to have, desquamation without an eruption on the skin? I have never observed it. Yet, I have seen cases of sore throat, without eruption, followed in the same family by well marked cases of Scarlet Fever with no other known source of contagion. And again, I have noticed in many families, the smaller children, say from two to ten years of

*Quarantining Mild Cases of Scarlet Fever.*

age, would have the fever with eruption followed by desquamation, whilst the other children, and adults would be, some of them, at least, sick with fever and sore throat, without eruption, or desquamation. Now it has appeared to me that many of these cases of sore throat in larger children and adults, without eruption or desquamation, are capable of furnishing the contagion of Scarlet Fever, and smaller children become infected from them, and have a well marked type of the disease, eruption and all the attending sequel.

Should all cases of Scarlet Fever be isolated for thirty-five days, or do you think that in a mild case of Scarlet Fever, time may be cut down to twenty-one or thirty days? Our local board seems to think that in mild cases it is unnecessary to quarantine for thirty-five days, and consequently in their rules and regulations they say, "they shall be isolated until they are well," and, the result is, many of the families who are sick, think in ten days or two weeks they are well, and want the doctor sent around to let them disinfest and get out.

In mild cases of Scarlet Fever, it does seem to me that many of them would be perfectly safe to turn loose on the public in thirty days, but it seems to me also, that the *local board* should have a minimum time stated for isolation, and not have a doctor called short of that time to examine them with a view to raising the quarantine.

Yours, etc.,

....., M. D.

REPLY:—

IOWA STATE BOARD OF HEALTH,  
OFFICE OF THE SECRETARY,  
DES MOINES, March 20, 1889.

DR. .... DEAR DOCTOR—Your letter of March 18th is at hand, and I have carefully noted what you say in regard to the symptoms, and the difficulties in the diagnosis of Scarlet Fever at times, and especially of desquamation as a characteristic sign of the disease.

It is possible that there have been many cases of Scarlet Fever where there has been no eruption and no discoverable desquamation, and yet that desquamation may occur without eruption has been attested by very good authority. Let me cite you, perhaps the best authority we have upon Scarlet Fever, that of Prof. Thomas, of Leipzig, Germany, in his very exhaustive treatise upon Scarlet Fever as found in Ziemssen's *Cyclopedia*, Vol. II. After speaking of desquamation as always present in the usual form of Scarlet Fever, he says, on page 237:

"The cases of *Scarlatina* without eruption: These attacks, it should be noted, are sometimes followed by more or less well marked and extensive desquamation" showing that at times even without the eruption desquamation may occur.

On page 252, after speaking of the very slight case where there is little constitutional disturbance, but slight if any throat symptoms, and no eruption; and of the difficulty of diagnosis in such cases, he says: "In the



*Quarantining Mild Cases of Scarlet Fever.*

absence of satisfactory etiological evidence, the scarlatinal nature of the attack is proved by the subsequent occurrence of the *characteristic desquamation, even when there has been no previous trace of an eruption, and by the appearance of a moderate amount of dropsy and albumenuria.*" (The italics are mine.)

Again, under the sub-head "Diagnosis," on page 285, he says: "In cases where an early diagnosis is impossible, the doubt will be cleared up at a later period, by the occurrence of desquamation, particularly the occurrence of desquamation in the palmar and plantar regions, or perhaps by the appearance of albumenuria, with or without dropsy, or other symptoms of Nephritis."

The statement made in my former letter regarding the importance of desquamation as a diagnostic sign in Scarlet Fever was based upon a statement made to me several years ago, by an eminent and well-educated physician of this city whom I had called in consultation in one of those very mild cases of Scarlet Fever so difficult to diagnose. Since then it has been one of the most valuable, because an always present sign. I am glad to find, on looking up the authorities, since receiving your letter, so strong an indorsement as is given in the foregoing quotations from Prof. Thomas.

I fully appreciate all you say in regard to Scarlet Fever occurring in families among children where the only apparent cause—the only source of infection discoverable, were slight fever and sore throat, without fever or noticeable eruption or desquamation occurring in the person of one or more of the adult members of the family.

Still, Doctor, notwithstanding the great importance of desquamation as a diagnostic sign, and one so generally if not always present in Scarlet Fever, I would not have you, on a failure to discover its presence, turn loose any one presenting other, however slight signs, or symptoms of the disease. Speaking of just such cases, Prof. Thomas well says: "Such attacks generally disappear in a few days, but they should receive the same attention which is paid to the unmistakable disease; every throat affection during a Scarlet Fever epidemic is suspicious!"

In regard to the length of quarantine, I must say that the rules of the State Board of Health requiring quarantine for forty days in *all* cases of Scarlet Fever and Diphtheria, is binding upon all the State, whether adopted by local boards or not. No period short of this is safe. There must of necessity be many cases where even the period of forty days is not safe. It is important, however, to adopt some period, and the Board after much deliberation, and in accordance with the results of the most careful and extensive observations by those who have had ample opportunities, and who have made preventive medicine a special study, have accordingly made the period forty days. To have named twenty or thirty days would have been just as arbitrary and not as safe. I would therefore recommend the following: In all suspicious cases, isolate and quarantine until no doubt exists as to the true character of the disease. This may require ten days or two weeks. If the disease be found not an infectious one, release at once. If in the meantime it has proved to be Scarlet Fever, or any infectious disease *however mild*, quarantine for the

*Quarantining Mild Cases of Scarlet Fever.*

specified time. No other course promises so nearly absolute safety, unless it be a more extended period. I know such a quarantine is very inconvenient, and seems arbitrary, yet this fact is to be borne in mind, if such a quarantine were rigidly enforced in all contagious and infectious diseases, its necessity would seldom occur. To have an attack of any contagious disease is a great misfortune, and generally is the result of somebody's carelessness; to have such disease in a mild form so as to recover fully, and in a short time, is certainly a source of congratulation, and should inspire its subject with gratitude so profound as to lead to a cheerful compliance with those rules that experience has proved are best calculated to protect others from an attack that may be malignant in form; or though similarly simple in form, may prove fatal from complications that are too often liable to supervene.

Quarantine is nothing more than a forced or voluntary compliance with the golden rule "Whatsoever ye would that men should do unto you, do ye even so unto them."

I am respectfully,

J. F. KENNEDY, *Secretary.*

....., IOWA, March 15, 1889.

J. F. KENNEDY, M. D., *Secretary State Board of Health:*

DEAR SIR—For the guidance of a number of local boards will you be kind enough to answer the following question at your earliest convenience:

When an undoubted case of Scarlet Fever is quarantined, is it obligatory on the board to keep up the quarantine for forty days, or may they let the patient out when the physicians say there is no danger? The case in question is a teacher, and when released will go into the school-room.

Yours, etc.,

A..... B.....

OFFICE SECRETARY STATE BOARD OF HEALTH, }  
DES MOINES, March 16, 1889. }

Mr. ....:

DEAR SIR—In reply to your question I have to say, no party having Scarlet Fever should ever be released from quarantine until the expiration of the forty days fixed by the State Board. In Scarlet Fever there is always a desquamation, that is, a scaling off of the scarf skin. These scales are regarded as most infectious agents, the most common and effective means by which the disease is propagated. Often this scaling off process is delayed—I think seldom fully completed before the seventeenth day.

It would be especially unwise to thus release a teacher and to allow him or her to go into the school-room and thereby endanger the health and lives of children who are specially susceptible to the disease.

Respectfully,

J. F. KENNEDY, *Secretary.*

325765

STATE LIBRARY COMMISSION OF IOWA  
Historical Building  
JAN 25 1890

*Quarantine in Diphtheria.*

## QUARANTINE IN DIPHTHERIA..

The subjoined correspondence is of such a practical character that a careful perusal, especially by health officers and local boards of health throughout the State, is especially recommended. It affords a practical illustration of the questions requiring solution, and often involving litigation. The interrogator is an attorney as well as the mayor of his city:

....., Iowa, March 10, 1889.

J. F. KENNEDY, M. D., *Secretary State Board of Health, Des Moines, Iowa:*

Will you please send me a copy of your latest regulations regarding length of quarantine in cases of Diphtheria. You will also oblige me by answering the following questions:

*First.* In houses where all the inmates under fifty years of age have already had the disease (Diphtheria) and are fully recovered from it, and the house and clothing have been thoroughly disinfected, what is the object of the forty day quarantine?

*Second.* Will Diphtheria disease-germs be destroyed by a quarantine of forty days?

*Third.* Can Diphtheria disease-germs be destroyed effectually and entirely by burning large quantities of sulphur, so that the fumes will come in contact with infected clothing, for several hours, and washing wood-work, ceiling, etc., in a solution of corrosive sublimate, one drachm to a gallon of water?

*Fourth.* Suppose A to be a man of forty years of age, with a family of small children, all of whom have had the Diphtheria and are fairly convalescent, will he be permitted after thorough disinfection of his person, say by washing his body, hair and whiskers in a strong solution of carbolic acid, changing his clothing for clothes never near the infection, to leave the quarantined premises for the purpose of continuing his avocation, providing he does not again return to the quarantined premises, but eats and sleeps elsewhere?

*Fifth.* In a family where the members come down one after another, when does the forty days begin to run, at the time of the coming down of the last patient or at the time when the last patient is fairly recovered?

I ask you these questions in order that I may do my whole duty in this matter of quarantine and that I may have a better idea of your desire and opinion of the matter.

Yours truly,

....., Mayor.

*Quarantine in Diphtheria.*

## REPLY:—

IOWA STATE BOARD OF HEALTH,  
OFFICE OF THE SECRETARY,  
DES MOINES, MARCH 21, 1889.

....., Esq., Mayor, ..... , Iowa:

DEAR SIR—In reply to your letter of March 16th, and in answer to the interrogations contained therein, I have to say:

1. The object of forty days' quarantine in the case you speak of, is to insure a greater amount of safety than can be done by a shorter period. Free ventilation and time alone have a great deal to do in destroying the activity of any disease-germs, notably those of Diphtheria. Even for some time after all the inmates of a house have recovered, there are excretions from the lungs, skin, bladder and bowels that possess more or less the infectious principle. Disinfection alone, however thorough, will not always destroy these disease-germs, but disinfection, time, and the beneficent influences of plenty of fresh air combined, will secure the greatest safety practicable. The selection of *forty* days is an arbitrary one. Sixty days would have been much better. Experience has demonstrated, time and again, that a period less than thirty-five or forty days is too great a source of danger to be permitted. Then again, the quarantine for such an extended period is not alone, nor principally, against the parties affected so much as against the premises. To throw open premises where infectious diseases have existed, immediately after recovery, even after proper disinfection and ventilation, would be a great and unnecessary exposure to any susceptible persons who might enter. Hence, it is important to select *some* period, and the Board exercised its best judgment in naming forty days. In England, the provinces of Canada, and in nearly all the states of the Union, the period is either thirty-five or forty days.

2. No. That is, not in every case, perhaps in a few by quarantine alone; but proper disinfection, ventilation, and forty days, combined, would insure comparative safety, perhaps in most cases perfect immunity. The germs producing Diphtheria are generally regarded as short-lived—compared with those of Scarlet Fever. There are many cases on record where Scarlet Fever has been produced, after two or three years, by wearing clothing previously worn by persons who had been affected by the disease, and where disinfection had been neglected.

3. Sanitarians differ in regard to the efficiency of sulphur fumes as a disinfectant in Diphtheria. It is difficult to have the fumes in a sufficiently concentrated form, remain long enough in contact with clothing and articles of furniture to destroy the disease germs. Hence, because of its unreliability, the State Board has abolished its use. Better, and I should say, only satisfactory results, are attained from washing the walls, ceiling, and wood-work, after sulphur fumigation, if used, with a solution containing at least two drachms of corrosive sublimate to the gallon of water.

Clothing or bedding that cannot be washed or boiled, should be either burned, or subjected to a dry heat of not less than 230 degrees Fah.; or, what



*Quarantine in Diphtheria.*

is better, to steam at a temperature of 230 degrees Fah. Boiling for an hour will destroy all known disease germs.

4. Yes, especially if he were not teaching children in a close room, or if his occupation did not bring him in personal contact with children.

5. The Board has no rule, so far as I am aware, covering such a case, but for the reason I stated in the first answer, I should not hesitate to say *forty days from the time the last patient was taken down.*

I am very respectfully,

J. F. KENNEDY, Secretary.

The annual slaughter of children by Diphtheria is frightful to contemplate. This and Typhoid Fever are especially filth diseases. Rotting garbage, bad drainage, develop the germs of Diphtheria, while the specific poison of Typhoid Fever originates in decomposing human excrement. The local board, or the individual to knowingly tolerate either, is morally, if not legally, guilty of manslaughter, in the death of every human being caused thereby. Human laws may be violated with impunity, but laws of nature never—they are immutable. The penalty may be delayed, but come it will, as sure as night follows day. The nasty, reeking drain; the kitchen slops; the filthy pig-pen and stable, the privy vault and defective sewer, will breed the germs that will take the life of the "little ones," and populate the grave-yards. The grave-yards, and defective sewers, and cess-pools will propagate the Typhoid germ that respects neither age nor sex.

Sanitary science has demonstrated beyond successful contradiction, that Diphtheria can be nearly if not entirely prevented by cleanliness in our environments. In the city of Pullman, built and maintained upon correct sanitary principles, the disease is unknown.

Experience demonstrates the necessity for such legislative control as will secure the best hygienic results.

*Typhoid Fever—Its Preventable Causes.*

## TYPHOID FEVER.

## ITS PREVENTABLE CAUSES.

The following paper on Typhoid Fever and its preventable causes, by Prof. Robert Bartholow, M. D., LL.D., Professor of Materia Medica, Therapeutics and Hygiene in Jefferson Medical College, Philadelphia, and one of the most learned and revered men in his profession, gives so exhaustively, clearly, concisely and authoritatively withal, the best means of preventing Typhoid Fever, it is deemed worthy of a place in this report, and of earnest perusal by every citizen of the State:

GERMS [MICRO-ORGANISMS; MICROBES:] ARE THEY CAUSATIVE OF SPECIFIC DISEASES? FORMER THEORIES OF TYPHOID GENESIS.

Only within a comparatively short period has it been held that Typhoid Fever is produced by some special poison. It was not until the agency of the minutest living bodies in Nature was known (microscopic organisms, "Animalcules" in common language), that the character of the Typhoid poison began to be understood. It was held until recently that the Typhoid-producing agent was developed in the course of "crowd-poisoning," which is a necessary result of the aggregation of human beings in masses. Human ordure in cess-pools, under conditions not known, was supposed to be an important poison, or a source of poison-generating material. Sewer gas also, was considered to have the same morbid or pathogenic power. That the noxious matters generated by the conditions of crowd-poisoning were active in the genesis of Typhoid was considered proven by the fact that as density of populations increased, so the number of fever cases increased. It was observed in this country that in the sparse settlements within the Malaria zone, malarial fevers first occurred; but when the density of the



*Typhoid Fever—Its Preventable Causes.*

population became sufficient, Typhoid supplanted malarial fevers to a considerable extent. In the progress of scientific knowledge it has been found that another explanation must be given, and the theory of a Typhoid poison only becomes tenable by the discovery of morbid germs—micro-organisms or microbes (bacteria or bacilli).

The modern scientific definition of Typhoid and similar maladies, is that they are specific diseases arising from a special cause, are continually reproduced according to the original type or pattern, and are self limited in duration. Modification of symptoms, or of the external form, or of the whole morbid complexus may be imposed by the surrounding conditions—by race, climate, social state and other circumstances to a limited extent; but the typical form persists, the essential changes of structure are always to be found, and in these, conformity in essentials to the original is preserved. What is true of the disease in its symptoms and in its morbid changes, is also true of its germ, in that the life-history of special organisms is correspondent in all important details, and they continually reproduce themselves in conformity to the laws of their being. It should be distinctly recognized that each special germ produces its own kind, and not another kind. The old phrase "like produces like" continues eternally true. Also in the vegetable kingdom forms are constantly reproduced through all time although they may be modified somewhat by their environments. A grain of wheat, sown in suitable soil, produces wheat only. The same law governs the germs of disease; they produce their own kinds of disease, and these diseases, age after age, manifest themselves by the same external symptoms and internal changes of structure. In the natural history of Typhoid Fever we have a typical illustration of the same law. The first accurate description of this fever is equally descriptive of the fever of our day, and no modification is necessary, because a new discovery—the Typhoid germ—has now to be reckoned with.

It is understood, therefore, that Typhoid Fever is a special or specific form of fever and that its real source, its germ, or seed, or special organism, always produces its own kind. The product

*Typhoid Fever—Its Preventable Causes.*

developed by the growth of its germ may take on some peculiarities of form, but remains typical always in respect to essential features. The soil in which the germ is planted may not be adapted to it—may be cold, barren and otherwise hostile; the germ may be stunted or blighted in its course of development; but if it grow at all, it will be found to present always, in some recognizable shape, the true characteristics.

The Typhoid germ has been the subject of many investigations. The first announcement of the discovery of this special micro-organism that attracted attention was that of Klebs.<sup>(1)</sup> Since then many others have been "discovered," but no satisfactory proof of such "discovery" has yet been offered. Until its toxic power has been demonstrated by the method to be hereafter described, a final conclusion is not possible. Before any given germ supposed to be causative of any special disease, can be admitted to universal recognition as such, various essential powers must be shown to exist. If the tests to which it is not submitted are not satisfied, or are not complied with, the supposed germ is not genuine, how near soever it may appear to be so to the eyes of the prejudiced observer.

To test the nature of any pathogenic or disease-producing microbe, it must be cultivated, *i. e.*, grown in or upon some suitable soil, as on a fresh section of a raw potato, on a surface of gelatine, or on some other material suitable for the purpose. Careful microscopic observation can then ascertain the form and character of the growing organism and can then be properly figured. The infective or non-infective character of the organism can be demonstrated only by crucial experiments on animals—by inserting it into the tissues of animals. Although a decision is not finally reached regarding the micro-organism causative of Typhoid, the fact of its existence is no longer denied by bacteriologists and pathologists in general.

(1) Archiv für experimentelle Pathologie und Toxologie, Vol. I.

*Typhoid Fever—Its Preventable Causes.*

IS THE MODE IN WHICH THE RESULTS CAUSED BY MICRO-ORGANISMS  
ARE STUDIED CORRECT?

The results produced by the infection of animals will be found to correspond to those found in man by the same parasitic form of pathogenic microbe; the germ whose character is to be ascertained is cultivated on a prepared surface, as mentioned above. Some viable and active specimens of significant form are put under the most favorable conditions as to soil, temperature and moisture, and allowed to proceed to full development, carefully guarded against all interferences. When full growth is attained, the "culture," as it is called, is studied by its action when introduced into the tissues of a warm-blooded animal. Placed under the skin, in the substance of the cornea or other parts, or thrown into the blood currents, it must develop as did the original from which it was obtained. In the new organism in which it has been placed, it must grow into the same forms and cause the same changes of structure as those its spontaneous development in other animal structures had brought about.

The objection is urged that the results of studies in animals cannot be applied to explain phenomena occurring in man. It has long been known that the effects of medicinal agents on warm-blooded animals are entirely applicable to man, and the actions of many of the most important of them now in use have been explained in this way with entire fidelity. Proofs have greatly multiplied, and the fact must now be admitted that for the most part, the actions of pathogenic micro-organisms on the functions and tissues of warm-blooded animals, also correspond fully to those occurring in man. It is true that some yet resist the demonstration, or do not exactly conform, and morbid conditions are not produced in a shape that can be referred to the manner in which the original germ affects the human system. Thus the "*comma bacillus*," the parasitic organism which Koch finds to be the cause of Cholera, has not thus far acted in an entirely satisfactory manner, but the evidence of the disease-producing powers of germs [microbes] rests now on a vast body of unquestionable facts. As doubts should not be felt in any

*Typhoid Fever—Its Preventable Causes.*

quarter, that preventive measures may thereby be made truly efficient, some of the examples that cover all disputed points may well be mentioned. Probably the most conclusive example of disease produced by infective microbes is *Tuberculosis*, or tubercular consumption. It has long been supposed that *Tubercle* had infective quality—that when inserted into the tissues of animals it produced its own kind, or developed into the disease *Tuberculosis*.

Several years ago a French pathologist, VILLEMAIN, showed by experimental evidence that the substance called *tubercle*, had infective property—for when inserted into the skin of the rabbit, it will spread through this animal, and when it is examined after death, the matters developed from it have the same composition and structural form as its progenitors, the true tubercle. It was presently said, however, that rabbits have a scrofulous constitution, and any irritation of their tissues results in a general infection, or a general *Tuberculosis*. The real nature of this matter was therefore involved in doubt, until Dr. Robert Koch, of Berlin, made the invaluable discovery of the *Bacillus Tuberculosis*. Now, the *Bacillus Tuberculosis* is as well established as any scientific fact can be, and it is nowhere denied that Tuberculosis consists in the reception, growth and development—*pollution*—of the bacillus. To free the human race of this greatest of all scourges, it is necessary to destroy this parasite, and thus stop finally its destructive mission. In prevention rather than cure, therefore, lies safety and immunity from the worst evil that besets humanity.

In relapsing fever, a spiral bacillus has been found in vast numbers in the blood during the existence of fever. [*Spirochete plicatilis*.] A peculiar parasite gives to vaccine virus its power to infect the system and thus prevent subsequent action of the same organism. Malarial infection consists in the presence and development of a microbe whose special seat is the red blood globule, as has lately been demonstrated by Laveran. The poison of Scarlet Fever is also a parasite, which we now know is often conveyed in milk. Recent investigations render it highly probable that Yellow Fever is due to a peculiar form of germ which is found within certain climatic areas, and is supposed to be spread by a mosquito that



*Typhoid Fever—Its Preventable Causes.*

conveys the blood containing it from person to person. Again, it is a parasite that induces the remarkable disease known as *Chyluria*, which consists in the diversion of blood and chyle to the urine, resulting in extreme poverty of the blood, among other symptoms. This organism has been detected in the blood, carried by certain mosquitoes in whom it has been seen in an active, living state. Instances of disease produced by parasitic or micro-organisms, by *disease germs* or microbes, might be indefinitely multiplied if necessary; but enough has been given to show the important causative relation of such germs which have been discovered in recent times. What has been thus demonstrated in respect to the maladies mentioned is considered true of Typhoid; but the special organism which is its real source remains to be differentiated from other forms. That Typhoid is due to such an organism is not doubted by the bacteriologist of the time, as the mode of development, character and self-limited duration of this fever, place it among the groups of special diseases now known to be produced by germs; but the real parasitic form, demonstrated to be such by actual "cultures," and by infection set up by the artificially grown organism, remains yet to be determined beyond reasonable doubt.

HOW MICRO-ORGANISMS COME TO DEVELOP INTO PATHOLOGICAL ACTIVITY—THE TYPHOID GERM.

To understand the nature of pathogenic organisms, the relation of ordinary forms to certain familiar processes should be made clear; and in so doing we shall find that a discovery apparently not related to disease-prevention has become the foundation of all that has since been developed on the subject of Antisepsis, or disease-producing processes by micro-organisms.

This discovery was made by Pasteur, who found that *all fermentations are correlative of the growth of living organisms.* (1) This

(1) In the active and rather unseemly discussion over Pasteur's Hydrophobia virus, the world seems forgetful of its obligations to the great master for his discoveries in the processes called fermentations. Until he discovered the relations of micro-organisms thereto, practically nothing was known of the causes of the fermentation—of the ferment. To international jealousies may be partially traceable the influences that have obscured this phenomenal merit—for at the very time he was making the

*Typhoid Fever—Its Preventable Causes.*

important truth is the real basis on which rest the measures now instituted for the prevention of disease that are of the highest importance. This fact can be best comprehended by the examination of certain familiar processes. For example: vinegar is a result of the fermentation of the material producing it, as malt, cider, etc. In cider vinegar, which is formed by the fermentation of apple juice, there is exhibited in action a living organism. Unless some of the ferment-producing yeast plant and the "Mother," as it is commonly known, be added to cider, ordinary decomposition may ensue. Although putrefaction is a form of fermentation, it is not the form which is desired by the operator; but by adding some portion of the organism—the mother—at the right time, the fermentation is turned in the right direction and vinegar is formed. As Pasteur showed, therefore, there is a peculiar and distinctive organism for every form of fermentation, for lactic fermentation, for butyric, and numberless other kinds, including animal and vegetable decomposition.

To bring about the resolution of matter, or the re-arrangement of the atoms of matter, which seems to be the function of these special organisms, the atmosphere must contain great stores of them. The familiar examples of fermentation above mentioned which take place without the body, illustrate exactly processes going on within it—for in the atmosphere are vast stores of all kinds of germs, and these can readily find admission to the mouth, and with food and drink pass down into the intestine. If these aerial germs, whether morbid or of innocent character, find in the conditions present in the intestinal canal a suitable soil for their growth, and if they escape the destructive action of the digestive juices, they will develop according to the laws of their being.

The data now exists for showing that certain microbes introduced into the intestinal canal, if the conditions there be favorable to their

announcement of his discovery the most famous chemists in Germany was trying in vain to solve the problem. That all fermentations are correlative of the growth of living organisms is the truth that became the foundation of all that Lister has done, and all that has followed in the subject of bacteriology and antiseptic sanitation and therapeutics. The economic value of Pasteur's discovery is so enormous that any figures correctly showing it would seem to be reached by some vast flight of imagination rather than by the sober processes of the mathematician.

*Typhoid Fever—Its Preventable Causes.*

growth, produce noxious substances—*organic poisons* having affinity with such vegetable alkaloids and poisons as *Conine*, *Strychnine*, *Picrotoxin* and others. The poisons which may be thus formed in the intestines have been designated *Ptomaines*. They differ in lethal activity, and in respect to the symptoms they cause, there is a wide range in the degree, persistence and duration of their action. It is to be observed that the *Ptomaines* are produced in the course of the normal growth and development of organisms admitted to the intestinal canal from without. Are the results produced by pathogenic organisms acting on the tissues of the body directly, or are these results due to the formation of noxious substances by such organisms? It is certainly the latter which is true in many, probably in most cases; in other words, it is not the organism itself that causes the ill effects, but an agent which it produces in the course of its own development. There are many illustrations of this fact about which there can be no doubt.

All the world knows that "vinegar will not come" in the absence of the vegetable growth—the *Torula cerevisia* and the "Mother" as it is termed in common language. It can now be said that the organisms existing in the atmosphere, which bring about the various fermentations, find their way into the intestinal canal, where, the digestive juices not causing their destruction, as probably they usually do, or they may do, the mucus, muco-pus, etc., the warmth and moisture of the parts, favor the development of these bodies, the contents of the intestines being the material suited to their nutrition. Certain organic poisons, *Ptomaines*, as has been stated, and as we know are under some circumstances thus produced, and it may therefore be said that the germs manufacture poisons as the *Torula* produces alcohol and vinegar. Such *Ptomaines* or poisons after their formation may be absorbed into the general system and cause characteristic symptoms which we call "disease." It follows that "disease" may be a special kind of disturbance of the human system, produced by the intervention and toxic action of the newly manufactured poison. To this morbid complexus, or bundle of symptoms, we give a name to distinguish it from other similar collections of symptoms. One microbe or germ causes one kind of

*Typhoid Fever—Its Preventable Causes.*

poisoning; another gives rise to a different morbid action. Some of them develop quickly and others more slowly. The effects caused by one may be very transient; those of another protracted. Something may depend on the soil in which the germs are sown; in one case all the conditions may be favorable, in another but in part suitable to the parasitic growth. It is probable also that in the healthy state the juices of the intestinal canal are powerful enough to destroy microbes, or that such a state of things exists that their germination cannot take place. We find that a chemical process, or a fermentation of the same character as that occurring within the human body, sometimes develops under appropriate conditions in foods without the body; for instance, the fermentation in milk resulting in the production of Tyrotoxin, a highly poisonous substance which sets up in the human system a complexus of symptoms like Cholera Infantum. It is in a high degree probable, as suggested by Dr. Vaughan, that this poison produced in milk by a special organism is the one factor producing the disease, which then becomes a simple poisoning by a chemical irritant. A most gratifying circumstance must we regard it, that this great discovery, one of the great ones of our time, was made by one of our own countrymen, to whom all honor be due! Prof. Victor C. Vaughan, M. D., of Ann Arbor, University of Michigan. This discovery is momentous in another aspect: It is the fertile mother of a numerous progeny of discoveries, every one of which will prove to be remarkable, for if one characteristic disease is produced by a poison of the origin above indicated, why not many others? For example, Asiatic Cholera, which, as Virchow has shown, has a morbid anatomy like that of arsenical poisoning. It follows that the pathogenic organism may produce a poison of peculiar powers, as we find it proved that some of them do; but that the action of these parasites may also be direct is in a high degree probable.

## GENESIS OF TYPHOID.

In the present state of knowledge, it may be assumed that a special poison is produced by the Typhoid germ or microbe. It elaborates this poison after securing admission to the intestinal



*Typhoid Fever—Its Preventable Causes.*

canal, ever producing its own kind in accordance with the law of its being, as is the case with all kinds of minute organisms.

Whether the infective quality be in the microbe or germ, or is a poison produced by it, as Tyrotoxicon, for example, is a question yet awaiting final answer. The reasons for supposing the latter postulate to be true have been stated. We are, therefore, prepared to admit that the disease-producing material—the *Materies Morbi*—is a product of the germ in its state of growing, as alcohol is a product of the Yeast plant; as Tyrotoxicon of the organism working in milk; and as Ptomaines are developed in the intestinal canal. A method of filtration has been devised to separate the micro-organisms or microbe from the substance in which it floats or is imbedded—an obviously dubious thing under any process yet attempted. The method in question is filtration through unglazed or biscuit porcelain under pressure, and it is said apparently to accomplish the object.

We have the high authority of Dr. Burdon-Sanderson in favor of the results thus obtained, and as they are confirmatory of the conclusions above expressed, we may hold it to be highly probable at least, that disease germs produce their special poisons by their own functional action. The solution of this question is of minor consequence, however, for the presence of the microbe is necessary in any case, and it is to the parasite that we must direct attention if we would devise successful methods of prevention.

## POWER OF RESISTANCE TO DESTRUCTIVE AGENTS POSSESSED BY GERMS.

The viability of disease-producing microbes, or their power to resist hostile influences of all kinds, and especially the possession of these properties by the spores (ova or eggs), are questions of great practical importance from the point of view of prevention or "*stamping out*," as the rapid and wholesale destruction of morbid agents has been aptly termed. If the micro-organism or microbe (bacterium or bacillus), be destroyed and its spores remain, no permanent results are accomplished, for in a single spore or ovum is reserved the potentiality of millions of microbes. Experiments with chemical poisons to ascertain the destructibility of spores,

*Typhoid Fever—Its Preventable Causes.*

made by Koch and others, have demonstrated that they possess unexpected resistance power, which varies, however, with different species. It does not suffice merely to kill *some* of the spores; the destruction of *all* must be assured by means adequate to the killing of the most resistant. Hence, it is necessary to ascertain what agents are powerful enough to destroy or inhibit the action of disease germs and yet spare the tissues of the body.

Probably the state of the system has the most important influence on the destiny of bacteria—of Typhoid germs for example—for of the many who must take into their bodies morbid germs during the existence of a Typhoid Fever epidemic, only a part are actually brought to a bed of sickness. This fact may be stated in another form, and it may be, more correctly—that all persons receiving Typhoid germs may be actually infected, but in so small a degree that they are unconscious, or but feebly conscious of anything amiss. There are "walking cases" of Typhoid, as all the world knows. During a Typhoid epidemic it is understood that many suffer from Diarrhea unaccountably, or from a mere feeling of physical and mental depression—of *malaise*, as our French colleagues entitle it, a mere indisposition without distinctive features. It may be supposed, as is generally held, that many persons are insusceptible to the germs of disease, for, although much exposed, they pass through long lives unscathed. This insusceptibility varies indefinitely, or it may exist at one period of life and then unfortunately be lost, or a new and greater susceptibility be acquired at other times. The conditions that determine susceptibility or insusceptibility cannot be defined in the present state of knowledge. There are certain periods of life when the human body cannot be infected: the infantile period; old age. At the extremes of life, the Typhoid germ can make no impression because of the absence of necessary conditions. The essential lesions to constitute any one case of Typhoid, are thickening, ulceration of glands situated in the lowest part of the small intestines [Peyer's patches], and similar changes in what are known as the "solitary glands." At the earliest period of life these glands are not sufficiently developed, and in old age they are too much wasted to furnish a nidus

*Typhoid Fever—Its Preventable Causes.*

(or nest) for the reception and growth of the parasite. It is not possible to indicate the precise period when these glands acquire full development or become too much wasted [atrophied] to take on the Typhoid infection.

CONDITIONS NECESSARY TO DEVELOP THE INFECTIVE PROPERTY OF  
TYPHOID GERMS.

Beside their power of resistance to hostile influences, Typhoid germs appear to have considerable longevity. Deposited in soil that is congenial, or under conditions that favor their preservation, they remain viable though dormant for many years, to be roused into new activity by causes of various kinds. We know that human filth, cess-pools, old wells, unhealthy excretions of the human body, decaying animal and vegetable matter of all kinds, are materials that favor the preservation of disease germs; especially is this true of the complex excretions and waste products of dense populations. Climate apparently has but a limited influence. Intense cold merely suspends activity, or inhibits action without destroying the power of the organism. As sparse populations grow into denser communities, the malarial poison is supplanted by that of Typhoid. This does not imply an antagonism, only that as the local conditions which produce the malarial germs are removed by cultivation, the Typhoid germ finds in this changed state of things, especially the increased population, the opportunity for its own growth and active life.

The Typhoid germ acts the more promptly, the more fully the people of the given locality are brought under the influence of the complex condition known as "crowd poisoning." However, the infirm, those depressed by mental and moral causes, the chronically ill, do not necessarily become the subject of Typhoid infection. Rather the robust and those at the most vigorous period of life are the unfortunate subjects selected out of the whole number for the action of the germ.

It was said formerly that Typhoid is not contagious, that it is not communicable to nurses and attendants, to physicians and relatives. Truly said, but not in the sense formerly supposed. They do not

*Typhoid Fever—Its Preventable Causes.*

"catch" the disease because the germ does not come into proper relations with them, or, if taken into the system by some vehicle, it encounters a hostile reception; the intestinal canal does not furnish a suitable soil—a nidus or nest—where it can establish itself and grow into full proportions and multiply. It is probable, also, that the general state of one to become infected must be favoring, or, in the phrase that is now current, the system must become susceptible to the action of the poison.

HOW THE TYPHOID GERM COMES INTO RELATION WITH MAN.

The Typhoid germ or microbe has exhibited various peculiarities in respect to its independent existence, that have complicated the question of causation. Some of the most common and perplexing questions are these: the long time that may intervene between epidemics; the rise of epidemics in remote places without any known source of infection; annual epidemics; sporadic cases apparently occurring spontaneously, etc. It is probable that the disease germs produced by the multiplication of the original infecting germs are not immediately possessed of an infective power, but that some days must elapse before they can grow into it. Modern investigations have reduced to logical order and exact method many thing in this connection that formerly seemed capricious and anomalous.

The avenues by which a pathogenic [disease-producing] microbe or its spores gets into the human body are quite numerous: It may enter by the air, the water or the food. The mechanism by which the air breathed is charged with organisms is simple enough. Typhoid stools thrown into a roadway or on dry ground, will presently become sufficiently desiccated to form a light powder which the winds will transport over long distances. The dust thrown up by the volcanic disturbances in Ceylon, was found abundantly in our atmosphere, showing how widely minute particles may be distributed in air currents. Cholera germs and spores have been carried long distances by prevailing winds, and so we may suppose that the Typhoid microbe goes, or its spores go into the air for transport in the direction of prevailing winds, or of wind-storms



*Typhoid Fever—Its Preventable Causes.*

against the direction of the usual air currents. Having the extraordinary viability or power of existence before described, the desiccation of these organisms by the air does not impair their pathogenic power, and hence in lodging in the nose or throat, they are in a position to be carried into the stomach with food or drink, to develop their proper activity in their new dwelling place.

The ordinary mode of transport is by drinking water. In the United States, except few and merely local police regulations, no laws have been made, or enforced, to prevent pollution of water courses. Small streams fed by springs in remote townships, and rivers and lakes hard by great cities, are alike unprotected, and the only limitation to the poisoning of potable waters is the will of those living on their banks. The English government is far wiser. An efficient Health Administration has been put into operation to care for the Hygienic condition of the people. The result is that Typhoid Fever has almost disappeared from amongst them. For weeks and months not a single case will occur in London! In this country sumptuary laws are highly unpopular, and as they are confounded with hygienic regulations, the passage of the necessary acts has not been effected in any of the States. The increasing foulness of the river waters is, however, exciting alarm, and as people now begin to appreciate the necessity for proper laws, we may hope to secure them. Until this is done, epidemics of Typhoid will continue to appear in spite of local police regulations.

Within the past five years some notable examples of poisoning in which whole communities have been stricken down, have been witnessed. No more striking example has been brought to light than that of the town of Plymouth, in the mining regions of Pennsylvania. An extensive development of Typhoid, with numerous deaths, occurred. Although the symptoms and external conditions were those of Typhoid Fever merely, it was assumed by the frightened people and their demoralized officials that a new and formidable malady—"a scourge"—had fallen upon them. An unprejudiced examination by a medical commission from Philadelphia soon demonstrated the nature of the disease. Whatever modifications appeared in the cases—and it is more than doubtful if any such

*Typhoid Fever—Its Preventable Causes.*

occurred—were ascertained to be due, not to any change in the nature of Typhoid, but to the influence of unsanitary conditions on the bodily forces of those attacked.

The cause of the epidemic in question was clearly ascertained. A small hamlet several miles above on the same water course, had a case of Typhoid Fever some months before, and the stools were thrown into the water of the creek. The original case, the source of all the infection, had come from some other place and the patient was taken to his home in the hamlet referred to, and there were no other cases in that region, or in the town afterward visited by the epidemic. The connection between the two events was clearly established by the medical commission. Few incidents of this character have been more clearly made out, and hence it has peculiar value, as evidence of epidemics caused by contamination of potable water.

Some of the most clearly traced examples of Typhoid epidemics, originated by the transport of germs and spores from other points, have been made out in England by following up the source of poisoning in some sharply limited epidemics, such as have followed on the route of a certain milkman. The elements of the problem were these: A case of Typhoid in the family of a milkman; the occurrence within a few days or weeks of cases of Typhoid in the families supplied by this man, while the neighboring families without exception were free from infection. On investigation by the health authorities, it was ascertained that water from the common well supplying the family, had been used in washing out the milk cans, and some of the water remained when the milk was poured into them. The well water was contaminated by the Typhoid stools which were found to enter the well through an unexpected channel. Many examples of the same kind have been ascertained with complete fullness of detail, so that doubts can be no longer entertained regarding this mode of infection. It is the most frequent, and the most dangerous mode through which the Typhoid germ can reach man.

The unfortunate results of ignorance are well exhibited in some of the modes in which disease germs get into human food. Nurses,

*Typhoid Fever—Its Preventable Causes.*

attendants and families of the sick, having no knowledge on the subject, and of uncleanly habits, will carry under the finger nails, or in the crevices of the skin, disease germs and spores which may be attached to bread or other foods used by a household. Such large bodies, relatively, as the ova of the tapeworm have been thus conveyed; self-infection may thus occur, and general infection of a community may have its original source in the same way with entire facility.

It is not improbable that a paper currency becomes a carrier of contagion, a convenient vehicle for infection. Few if any persons in this country do not have a United States note, and the denomination of one dollar is just as convenient a receptacle for germs as one of a hundred dollars. As such articles are carefully stowed away after handling, any germs or spores passed to them from the fingers must have a good chance for preservation and for auto-infection, as well as for transference to food or drink that will reach other persons.

Using the word contagious in its common or popular signification, it is clear that Typhoid cannot be included among the diseases properly so designated, such as Small-pox.

## THE SUSCEPTIBILITY AS AFFECTED BY MAN'S ANATOMY.

The condition of the system that renders it friendly to pathogenic parasites cannot be defined in a series of abstract propositions, nor are such statements needed in a paper of this character and scope, if feasible. The facts known in respect to susceptibility have been sufficiently set forth. However, some further mention of the manner in which the development of the organisms has been affected after their lodgement may be necessary, to put in a clearer light the origin and nature of the preventable causes.

From the time of the reception of the disease germs until sufficient disturbance of the system occurs, to be evident in symptoms, is a period called in medical language "*the period of incubation.*" That this is a fitting term, in the progress of science, has been fully established. During this period we may suppose the microbes pass down the intestine until the lower *ileum* is reached. This division

*Typhoid Fever—Its Preventable Causes.*

of the bowel extends to the first part of the large bowel—the *cæcum*. Anatomical arrangements may have some influence in determining the seat and character of the changes induced by the Typhoid germs. As has been stated, the essential alterations of structure are those involving the glands of the lower small bowel. The *cæcum*, the first part of the large bowel, is fixed in the right flank by its attachments to the muscular framework of the body, and can change in size with the amount of its contents, but cannot move from its position. The lower end of the small intestine is fitted into the *cæcum*, and hence its mobility is also limited. Between the two is placed a valvular arrangement, the *ileocecal* valve. Beside these anatomical dispositions, the groups of glands of the mucous membrane constitute a soil which favors the stay of the Typhoid microbe when it descends to that point. We might indulge in speculations as to the form of disturbance of function that might have resulted were these germs to have established themselves in another part of the canal, but it is not profitable to do so. Our present concern is to note the results that are due to the disorder in function, and even suspension of function, caused by the germs in Peyer's patches and in the solitary glands.

It can hardly be doubted that the colonies of glands in the lower intestine are excretory in function. They remove excrementitious matters which have somewhat to do with the coloring of the stools, and hence it is that, in certain states, they add peculiar matters to the contents of the bowel, for it is not until this part of the canal is reached, that these exhibit, in some degree, the characteristics of human feces. It follows that if the glands are so far damaged that they do not continue to functionate, the matters they should excrete remain in the system. If the Typhoid microbe produces a special poison, the condition of the system in Typhoid is the result of the combined operation of the two: of the retained excretion and the new poison. If this be true, and little doubt of its truth can be felt, Typhoid fever may vary from its typical manifestations somewhat as one of the two may predominate. In some cases but a small number of Peyer's patches are altered. In that event, many of the glands continuing to functionate, a considerable discharge of



*Typhoid Fever—Its Preventable Causes.*

the excrementitious matters peculiar to these bodies may go on during the whole course of the malady and thus lessen the gravity of the symptoms. That the function of the glands, so numerous in the lower ilium, is to excrete the products of the putrefactive decomposition of the animal matter, has been clearly shown. The irritative overgrowth, or swelling of the gland elements, and the changes in the character of their products, and the form of the Diarrhea that accompanies these changes, are conclusive. It seems to be certain that the changes effected by mercurials in the stools are due to action on the excretory functions of these organs. As the first change in the glands occurring in the initial disturbance set up by the Typhoid process has the character of an irritative overgrowth, it is probable that the effect is to increase excretion, but this is soon succeeded by suppression of function, with the consequences above mentioned.

## GENERAL PREVENTABLE CAUSES OF TYPHOID.

Typhoid has been considered above all others a filth disease. Recognized as such, especially by their own experts, the English Sanitary Administration has sought to exterminate it by removing the filth upon the presence of which it seemed to depend for existence. As their highest authorities regarded human ordure as the special cause, their efforts were directed to the improvement of closets, latrines and sewer connections, and to providing for the poorer houses such arrangements as would secure ready discharge of human excrement into the sewers. Sustained efforts were made to procure from parliament authority for a complete sewage system for the chief towns. London is the most thoroughly equipped of all cities of our time with a sewage system, and a proper sanitary administration. The practical result has been not only that cases of Typhoid now rarely appear, except that, in the accidental modes above mentioned, small localized epidemics happen, but it has the lowest death rate of any large city, not only for Typhoid, but for all maladies.

The opinion that Typhoid owes its existence to the accumulation of human excretions is thus vindicated, not on the ground once

*Typhoid Fever—Its Preventable Causes.*

supposed, but owing to the presence in such excretions of Typhoid germs. The opposed fact is also true that the cities least provided with arrangements for the disposal of filth are most afflicted with Typhoid, as for example, Lisbon, Portugal.

From the foregoing important facts regarding the agency of human ordure in causing Typhoid, we are conducted to the momentous conclusion that to prevent Typhoid Fever the most effective means consists in destroying all the excretion of every one of the cases. It is not sufficient to make use of deodorants and ordinary disinfectants; but to utilize such agencies as will not only destroy the parasite, but its spores also. Of all the Typhoid refuse, the stools require the most thorough treatment to render them harmless. All other excretions and emanations of these subjects, and all objects used with and about them require the most thorough antiseptics to effect the destruction of adherent germs and spores. Nurses and attendants should be obliged to pay the most careful attention to every point whence the disease germs may escape to outside objects and persons.

*It is a subject worthy of the deepest consideration by all legislators, whether the time has not arrived for imposing severe penalties on those who permit the escape of Typhoid germs and spores from fever cases?*

The connection of human excretions [ordure, etc.], with the perpetuation of Typhoid having been demonstrated, the necessity for disposal of it in such receptacles as would prevent further poisoning of human beings, has been fruitful in plans and schemes of sanitation in every aspect. This subject, however, pertains to means of prevention rather than as a part of the statement of causes that may be prevented. Of all plans that have been proposed, the most feasible has been the connection of local deposits with the sewage system. In this way a large city—London, as the most conspicuous example,—may be freed from the cause of evil; but are not the people of other cities and towns thereby more certainly put in danger of contamination? In some parts of our country we can see the ill effects of this system in full detail: for example—the Ohio river flows between, and furnishes the supply of potable

*Typhoid Fever—Its Preventable Causes.*

water to many cities and the sewage of all the towns on its banks finds a way ultimately into the river, even if there are no sewers to conduct it thither directly. The more important of the towns and cities are provided with inlets and sewers, indeed a complete sewerage system, with all the modern contrivances for insuring the deposition of their foulness in the water to be used by all the towns below.

The power of flowing water to rid itself of organic impurities is admitted, but there are reasons to believe, as has been set forth, that micro-organisms are not thus readily disposed of. The resistance to hostile influences is possessed by these bodies in varying degrees, but some of them have been proved to possess a very persistent viability. That Typhoid germs, or their spores, are carried unharmed many miles by mountain streams has been ascertained by facts of the most conclusive character. As mountain streams, near their sources especially, contain but little organic matter, and are also well charged with oxygen, they offer least protection to organism, whilst rivers flowing through populous communities are abundantly provided with organic matters, in which microbes can find complete protection. Masses of decomposing animal and vegetable matter will not only lodge them, but furnish protection, in which their productive activities may be safely carried on. The oxidizing process, which, in flowing water is the agency for its purification in respect to organic matter, can hardly do more than remove the material helping the growth of micro-organisms. Mechanical agitation can do but little injury to them when they are lodged in solid masses of organic matter which can successfully resist the processes of oxidization as well as all modes of physical disintegration, and which are to be finally separated only by subsidence. These facts show conclusively that flowing water cannot be freed from germs by the processes, and in the space of time, now held sufficient by some, and hence, the potable waters of rivers supplying cities cannot be considered exempt from causes of disease; on the contrary, they are a constant menace to the health of the inhabitants, and sometimes become the active vehicles of toxic matters.

*Typhoid Fever—Its Preventable Causes.*

The gases passing off from sewers have been supposed to possess infective properties, and, in popular opinion, play a large part in disease production. It is clear that there must be a revision of beliefs to conform to existing facts. That sewers give off offensive gases—compounds of hydrogen with carbon, sulphur and phosphorus—is entirely true, and that the prolonged breathing of such gases, and the diminished supply of oxygen thereby occasioned, have ill effects on health, cannot be disputed, but specific diseases are not thus produced. The real effects of such gases consist in deterioration of the blood, and of the nutrition in general, and consequently, derangement of the functions dependent thereon; but such a complexus does not agree with the symptoms of some specific or special malady. It is a morbid state, not Typhoid, not Yellow Fever, not Pneumonia; but the way to the development of some special malady is prepared thereby—facilitated by the fermentative decompositions continually taking place. That the action of sewer gas and other gases of decomposition is promotive of disease by lowering the general vitality of a population, may be regarded as probable. The reason for such conclusion is found in the state of the gland patches, and solitary glands of the small bowel under such conditions: They become rather prominent, softened, and are prepared to ulcerate by reason of an over-production of their excretion pressing on their retaining envelope. This must be regarded as a state favorable to the reception of those microbes whose favorite habitat is in these glands, or whose nidus they readily become. That sewer gas does not produce Typhoid is therefore certain, but that the conditions produced by sewer gas favor the growth and development of the parasitic organism of Typhoid may be regarded as true.

We have practical illustration and proof of the views above expressed regarding the pathogenic character of sewer gas. Parent-Duchatelet, an eminent French sanitarian, has given the figures to show the effects on health of the occupation of sewer cleaning. He finds that the men engaged every day in traversing the great sewers of Paris do not suffer with affections peculiar to their employment, and that their standard of sanitary condition is quite equal to that



*Typhoid Fever—Its Preventable Causes.*

of persons of corresponding age, and of occupations not unsanitary in their environment, whence it follows that sewer gas is not so actively toxic as is generally supposed, and that a special disease is not produced by its action on the human body. We may conceive that its more active toxicity in the case of city people is due to their lowered vitality when exposed, and hence that other morbid influences are concerned with it.

The question of sewer-gas poisoning must be regarded from another point of view. Although sewer gas cannot of itself cause Typhoid, it may well be believed that in the upward rush of gas and vapor from water pipes having sewer attachments, disease germs may be carried along, and it may thus happen that Typhoid germs are conveyed into a house through the sewer communications. No one observing a street sewer inlet on a cold morning can doubt the reality of this mode of transmitting germs; but that infection often happens in this way is hardly credible, since the organic matter to which they are adherent or in which they are imbedded, must largely prevent this mechanical action of the gases.

The number of cases of Typhoid in a given locality where it has appeared from time to time, and the occurrence and severity of epidemics are influenced by some causes, the character of which cannot be determined accurately. The causes in question are largely climatic and physical, and have to do with the development of the Typhoid germ. It has been observed that the amount of rain-fall and the state of the streams and rivers affect the number and pathogenic activity of the germs, probably by the amount of organic matter reaching the potable waters. When the water supply is low, Typhoid increases; when high, decreases. This fact has been established for Munich, certainly, and is in the main true of this country, with some limitations to be presently stated. In and soon after periods of drought, we find that cases of Typhoid become more numerous, but when the rivers are persistently high the number of cases grow smaller. When the water supply is low the relative proportion of organic matter is greater, but when in the course of a prolonged drought, small rain-falls of sudden and considerable force happen, the rushing waters carry the accumulating organic matter

*Typhoid Fever—Its Preventable Causes.*

in more or less active decomposition into the water-courses and hence a considerable increase in the amount of this matter must take place for the time being. Restricted rain areas in a defined water-shed may thus add quantities of decomposing matter to the water supply of communities so situated as to be dependent on the supply coming from such districts. In referring an increase of Typhoid to the lowered water supply, such conditions as localized rain areas must be taken into account. Beside an increase in the activity of germs, it must also be remembered that the rain flood will carry with it any germs newly added to the soil or surface water.

The relation of the potable waters to the number of Typhoid cases, as set forth above, should not be confounded with the "Ground-water" [Grundwasser] theory of Pettenkofer, the celebrated Munich sanitarian. He holds that the rise and fall of the ground-water [surface water] has an intimate relation to various epidemics, especially of Cholera. As first put forward by the Munich sanitarians, Buhl especially, the statement that Typhoid Fever flourishes when the surface waters are low, is affirmed to be a fact in respect to the epidemics of that locality, but is not proposed as a working theory for general application.

The manner in which the decomposition or ordure, and the influence of human excretions generally affect man has been sufficiently set forth. It should be considered further how climatic influences act on these processes, to promote or retard them, to favor or prevent the development of the Typhoid germ.

The mean annual isothermal, isochimenal and isothermal lines have little influence over the genesis of Typhoid. In Norway and Sweden, in the most northern of the provinces, in Finland, in European Russia, up to the latitude of the permanent snow-line, Typhoid levies its tolls on the human race. In the most southern parts of Portugal and Spain it is equally at home, nor does it spare the most beautiful islands of the Mediterranean. On this side of the ocean, cases occur from Labrador to the Central American States, and as far as Montevideo. Severe epidemics have occurred in the coldest parts of Siberia and Finland. These facts indicate the powerful viability

*Typhoid Fever—Its Preventable Causes.*

of the germ, as has been set forth, and also prove that the mere decomposition of animal excretions cannot produce it *de novo*—a conclusion arrived at by independent examination of other data.

Beside the influence of age in modifying certain anatomical structures, referred to in another place, age has also some effect in lessening or increasing the susceptibility to the action of the Typhoid germ. The greatest number of cases occur between the ages of twenty and thirty years. This decennium has twice the number of victims compared with those nearest in age, according to the estimate of the best medical statisticians. Or to state the same fact in another form: from the ages of fifteen to thirty there are eighty per cent of the whole number of cases. The relative proportions decline from the period of fifteen to thirty in both directions. Hence it may be said that the susceptibility to Typhoid is the greater the nearer the age to the most vigorous period of life.

The same principle holds in regard to sex: men are more liable than women, but the difference is not very great. Other diseases lessen the proneness to attacks: pregnant women are almost, but not entirely exempt, and chronic diseases that keep the bodily strength at a low point exercise some protective influence, and lessen the susceptibility. These modifying influences must not be confounded with morbid states that increase the gravity of Typhoid when it does occur in the subjects of such conditions. Thus, Chickahominy Fever, a Typhoid occurring in soldiers whose tissues were depraved by evil personal and camp hygiene, had the more of a destructive character, because their constitution forces had been undermined by the composite toxic influences in question.

As the occurrence of Typhoid procures immunity to a less or greater extent from future seizures, it is classed among the specific infections, with the eruptive fevers as Measles, Scarlet Fever and others, having the property to so impress the system that no subsequent exposure will cause a recurrence; but it does not have the same degree of power to exempt as those named. It is not common to find a second case in the same individual; but by no means unprecedented. The reason for exemption in a partial degree is

*Typhoid Fever—Its Preventable Causes.*

probably the changes which were made in the glands of the intestine when the first infective microbes began their growth about and in them.

## CONCLUDING OBSERVATIONS.

If the data above set forth are based on a true estimate of the conditions which have to do with the development of Typhoid, and there can be no doubt as to the accuracy of the statements, the means and methods by which the occurrence of the fever may be restrained or prevented follow as a necessary consequence. A correct summary of the conclusions reached will make more clear the nature of the methods which should be utilized for this purpose.

Typhoid is a separate and distinct morbid entity—a specific [in general sense] disease, self-limited, and always conforming in its essential characteristics to the original model.

Its cause is a disease germ—a microbe or micro-organism—which reaches man by air, or food, or drink.

When in the intestine, coming to the lower end of the ilium, or small bowel, it finds in the glands situated there its proper pabulum—or food suitable to its growth.

The disturbances of the human system [the symptom-complexus] which we call Typhoid Fever, is caused by the injury done at the point where the growth and reproduction of the parasite are going on, namely, in the groups of glands imbedded in the mucous membrane there, called "Peyer's patches," and also in the solitary glands and other organs; or by the production of some poison which, entering the system, causes all the symptoms of the fever. The latter—the peculiar poison produced by these microbes—may be the more probable, because by a similar process as Dr. Vaughan has proved, *Tyrotrozin* is produced, and this poison acts on the human system in a way identical with Cholera Infantum. Whether the direct effect of the changes induced in important excretory glands, or of a poison generated by them, it is certain that the presence of these parasites is necessary to the result.

The multiplying germs are found in the stools of Typhoid Fever, and not only organisms complete in their development, but spores



*Puerperal Fever—Its Prevention.*

having a greater power of resistance to destructive agents, and having the potentiality of indefinite millions of parasites. It is probable that some preparation is necessary to put the germs in a state for action, and these changes occur most readily under circumstances most unfavorable to health.

The proportion of infected persons in any community depends, first, on the number of germs present in food, air or water; secondly, on the susceptibility of those who receive the germs. Susceptibility may be an original fault of the organism: it may consist in an abnormal state of the small intestine, especially the lower ilium, whence it becomes an adaptable home—a nidus for the parasite; or it may consist in the preliminary influence of filth, the emanations from ordure, inhalation of sewer gas, etc. That organic matter from human bodies can have an influence is probable, because the parasites are found to have close relations with such materials, especially when decomposing.

Certain climatic and terrestrial causes also, influence to some extent, the activity of the Typhoid germ, but do not prevent its development under any circumstances of heat, cold, or character of soil. It is true, nevertheless, that the Typhoid parasite has its preferences, but these are only partial in operation, and do not act in such force as to prevent its lodgment and multiplication wherever civilization creates the conditions shown herein to be influential.

## PUERPERAL FEVER.

### ITS PREVENTION.

During the year 1888, a large number of cases of Puerperal Fever were reported, and in some localities there were plain indications of gross carelessness. In nearly every case the result was fatal. Few diseases excite in a community greater alarm and fearful forebodings than this, and yet it is an unnecessary, and easily preventable

*Our Insane.*

disease. This disease can be traced, more directly than all others, to septic poisoning, and probably no disease is so exclusively disseminated by the physician and midwife as this. It is a disease that does not come within the purview of quarantine law. Hence, it depends upon the medical attendant, by the practice and enforcement of personal cleanliness, and by the free use of antiseptics and disinfection, not only to themselves, but to their patients, that this disease can be prevented, or stamped out, whenever it makes its appearance. A repetition of cases in a community, would be sufficient warrant for investigation by a local board, to ascertain the cause and prevent further spreading thereof.

## OUR INSANE.

There is nothing that more forcibly and eloquently illustrates the principles of Christianity, and so practically demonstrates faith in the brotherhood of man, as the humane and well-directed efforts that are made to take care of those who are so unfortunate as to become temporarily or permanently mentally deranged.

A late visit by direction of the Governor, to the hospitals at Independence, Mt. Pleasant and Clarinda, revealed the pleasant fact that Iowa has reason to be proud of her care for this unfortunate class.

At all these institutions, a more liberal appropriation would greatly aid the superintendents in their well-directed and efficient efforts to care for those under their charge.

It is perhaps not the province of the State Board of Health to criticise or commend, or to recommend or suggest any improvements, and yet, inasmuch as the law creating the State Board of Health gives it a "general supervision" of the lives and health of the people of the State, it is pertinent here to indicate a few changes that it is believed would be greatly to the advantage of the inmates.

*Our Insane.*

At Independence, the wards are greatly over-crowded—especially on the female side. Everything is scrupulously clean; the classification of the patients is good, and with additional room for the female patients, much better results could be accomplished. Quite a number of women were found there on the fourth and fifth floors—attic wards. No man or woman should be kept above the third floor. There should be constructed there in the near future, additional cottages, similar to those now in use by the men, capable of accommodating at least one hundred each.

All the hospitals should have elevators. With proper guards to prevent accident many who are doomed to remain in their rooms, could be given two or three times weekly, if not daily, "outings," and such exercise as would prove an important factor in their treatment.

Each hospital should have a small, detached infirmary, or hospital, for the treatment and proper isolation of patients affected with contagious, or infectious, diseases. Should Measles, or Small-pox, or cases of venereal diseases occur, there should be better facilities for their proper treatment, without danger of infecting others. Such a building should be entirely separated from the main building, and should be so constructed that either, or both sexes, could be successfully quarantined in their respective quarters.

At both Independence and Clarinda, especially the latter, additional groves should be grown, and better facilities provided for protection from the sun during the outdoor sports and exercise of the patients. The superintendents fully appreciate this, and are planning for relief. But the groves can only be brought to them by the slow process of growth.

Mt. Pleasant was particularly fortunate in the acquisition lately, of a fine grove, and additional grounds where picnics are held daily by the inmates, under the supervision of their attendants—the patients from the various wards attending.

Without instituting any invidious comparisons, it may not be amiss to say that a visit to the three institutions in succession will demonstrate the fact that liberal appropriations, and time, are

*Our Insane.*

requisite to secure these facilities and advantages, that experience has taught are necessary to the best results.

The management in all our hospitals is excellent, but Clarinda is sadly in need of help, that will doubtless be specified in detail, in the report of the superintendent. The other wing, with the contemplated additions to both wings, should be constructed within the next biennial period, so as to relieve the over-crowded condition of the other hospitals, as well as to afford a better classification of those already under treatment.

A chapel and amusement hall combined, is needed at both Mt. Pleasant and Clarinda. The one at Mt. Pleasant is wholly inadequate, being too small, and improperly arranged. The one at Clarinda exists only in the hopeful anticipation of the superintendent.

The trustees of all the institutions should reside within the territory assigned to each hospital. The reasons for this are so obvious as to need no argument.

The General Assembly should, in the near future, make provision for the location of another hospital somewhere in the northwest. The site should be selected, groves planted, the grounds graded, if necessary, so that when the building is ready for occupancy, there should be such advantages in the way of small fruit, groves, walks, drives, and drainage, as only can be secured by time as well as money.

It is pertinent here to supplement, and emphasize what the superintendents may say in regard to the great importance of early treatment in cases of insanity. It has been satisfactorily demonstrated that insanity is a disease of the brain, and not merely a perverted imagination, or demoniacal possession. These institutions are not designed to be asylums so much as hospitals for the proper treatment of such cases. Careful observation shows that of those sent to these hospitals within a fortnight after the attack comes on, especially in cases of acute mania, fully seventy-five per cent are permanently cured. On the other hand, where the case has lasted for one year or more, subsequent to the outbreak of the



*Our Insane.*

disease, scarcely ten per cent are permanently cured, though many are greatly benefited.

Attention is especially requested to the following article by Dr. Gershon H. Hill, superintendent of the hospital at Independence, on "The Prevention of Insanity," read before the Iowa State Medical Society, and unanimously commended by that body to the State Board of Health for publication:

Since this paper is practical rather than theoretical in its character, and since much of the subject-matter is familiar, platitudes may be pardonable.

Paradoxical as it may seem, there are no citizens in our commonwealth more zealous in their endeavors to prevent epidemics and diseases of every kind than those whose living and prosperity depend upon the amount of sickness prevailing among the people.

The State Board of Health was created to promote the sanitary condition of the people of Iowa. By so doing, happiness is increased, and life lengthened. The total loss of life in this country, from causes well known to be preventable, is certainly over one hundred thousand annually. If we were to consider theoretical possibilities, rather than actual probabilities, these figures might be doubled.

An equal amount of sickness, which does not speedily terminate in death, constantly prevails in the United States from causes which we have good reason to think are preventable.

In former times, insanity was not considered a physical disease, but due to the mysterious influence of the moon, or an infliction by an offended deity. Mental alienation could only be prevented by appeasing the wrath of an unseen agent. Almost the only kind of treatment given for this "shameful disorder" was starvation, or some form of corporal punishment.

In these, the closing years of the nineteenth century, we find a radical change. Now it is understood that the mind can only act through the instrumentality of the brain; hence, if there are alterations in the perceptive or reasoning faculties, if the sensibilities and the will are abnormal, so that the individual is evidently not himself, it must be inferred that the nervous centers are diseased.

The citizens of Iowa are deeply interested in the subject of insanity or such generous provisions would not be made for those disabled by mental derangement. Furthermore, it is realized by observation that this, the worst of maladies, may visit individuals or families who are least expecting it. In 1870, one person in one thousand six hundred and nine of the whole population in Iowa was insane; in 1880, the proportion was one insane to six hundred and thirty-nine sane persons; if we include the feeble-minded with the insane in the census of 1880, there was one unsound mind for every three hundred thirty-four sound ones. In 1890, when the next general census is taken, the percentage of the insane will be still greater.

*Our Insane.*

Sixteen per cent of the population of the State of Iowa are foreign born, but of the insane more than thirty-two per cent are foreign born, hence natives of this country are not half so likely to lose their reason as those who come to us from across the Atlantic. Therefore, we can prevent insanity somewhat by restricting immigration.

In determining the methods by which insanity can be prevented it is necessary to consider the causes of this disease which it is possible to avoid.

When the causes of insanity are collected and compared, we find that they are either predisposing or exciting, physical or moral, inherited or self-induced.

In studying the development of almost any case of insanity we learn that a combination of causes brought about the result.

As a rule, then, when one cause is specified, it is not the sole or exclusive cause, but the apparent or most prominent one. In general terms, the predisposing causes of insanity are physical, such as heredity, a weak, nervous system, or an unbalanced mind; while the exciting causes are moral, such as religious excitement, grief, domestic or pecuniary trouble.

In every child we expect to find more or less family resemblance. As the mind develops, characteristics of parents and other relatives are certain to crop out. Applicants for life insurance are considered poor risks and are refused policies if their ancestors were short-lived, or consumptive, or insane. No disease is more certainly hereditary than insanity. At Independence there are twenty-eight persons who are related as sisters, brothers, brother and sister, mother and daughter, aunt and niece or as cousins. There are twenty-nine other patients there who have had relatives in that institution in times past. There is a still larger number who now have or have had relatives in other hospitals for the insane. Furthermore, a great many patients have insane relatives who have never been sent to an asylum, or if so, the fact is not recorded. Of the patients admitted to the Independence Hospital during the past year, more than one third are known to have insane relatives. Since it is evident that heredity is a fundamental and most frequent factor in the problem under consideration, this disease can, to a considerable extent be prevented by prohibiting marriage in persons who have epilepsy, or who have been insane, or who inherit a marked tendency toward mental derangement. Where either parent was insane before the individual was born, or where there have been several near relatives in the family of either parent who have suffered from mental derangement, it is fair to infer that a person so situated is liable, and even likely, to become insane.

It is not an unfrequent occurrence for persons who have been insane, and patients in the hospital, to get married. In one instance, a young man who had been in the hospital for the insane, married a young woman who had also been a patient there; beside, the sister of the man, and the father of the woman, died insane. In this case, the marriage was solemnized by a minister of superior worth and intelligence in the county where the persons live. The license was obtained from the clerk of the court, who was also one of

*Our Insane.*

the commissioners of insanity, and knew that he was issuing a marriage permit to persons who had both been insane. Probably the officiating clergyman also knew that these persons had recently been insane. Since the ages of this man and woman were sufficient, and they were qualified to make a civil contract, the clerk could not refuse to issue a license to them. Ministers are authorized to marry any couple provided with a license obtained in the county where the ceremony is performed. Therefore, such unions are not prevented by our present statutes.

Since insanity is not only an hereditary, but recurrent disease, should not the law be so amended as to require the clerk to refuse a license, when he ascertains that either of the applicants is an epileptic or has been insane? The Code of Iowa already declares that marriages are illegal and may be annulled where either party is impotent, insane, or idiotic at the time of the marriage. I believe that the addition of such an enactment as I suggest, would not only have a legal restraining influence, but would do much toward educating public sentiment, and deterring engagements to marry persons who have been insane. Furthermore, if it is clearly and generally understood that the children of an epileptic, or a syphilitic parent, or one who is an habitual drunkard, are liable to become deranged, some cases of insanity would be prevented.

Another important method by which insanity can be prevented, consists in not allowing insane husbands and wives to go home from the hospital unless they recover. The object of such detention would be to prevent insane persons from having children. The chapter concerning the care of the insane in the Code of Iowa, states that "the relatives of any patient not susceptible of cure by remedial treatment in the hospital, and not dangerous to be at large, shall have the right to take charge of, and remove such patient on consent of the board of trustees." The majority of the insane do not realize that they are of unsound mind, consequently they feel that it is unjust to oblige them to remain in the hospital, away from home and relatives, especially for an indefinite length of time. Furthermore, for the same reason, they cannot believe that any restrictions should be placed upon them after they get home. If, however, the hospitals become crowded, chronic cases must be sent home, or to the poor-house.

In 1880, nine hundred and thirteen insane persons were being cared for in the two State institutions; now the three institutions have excellent accommodations for more than twice that number. Nine years ago only thirty-six per cent of the insane were in the State institutions; now the proportion of the insane who are in the hospitals is probably sixty per cent. Although the number of the insane may have increased twenty per cent during the last nine years, the provision made by the State has increased one hundred per cent, consequently a much smaller proportion of the insane is now cared for at home and on the county poor farms. In so far, then, as the State of Iowa makes provision for all her insane, she reduces the chances for the transmission of this disease.

Beside persons who inherit insanity, others are predisposed to this disease because they are not regularly and amply endowed. Their minds are

*Our Insane.*

shallow, or narrow, or not firmly balanced. These susceptible ones must not be imposed upon, nor neglected. They should not assume the most responsible positions in society; but, on the contrary, should rely upon friends to remove obstructions from their pathway.

The next cause of insanity which may be prevented is intemperance. Dr. Edgar Sheperd, of Colney Hatch Asylum, is of the opinion that, directly or indirectly, forty per cent of the British insanity springs from intoxicating drinks. In the hospital at Independence not more than five per cent of the cases of insanity have been caused directly by intemperance.

The most encouraging feature of the question under consideration is the fact that the citizens of Iowa are preventing insanity to a considerable extent by enforcing the prohibitory liquor law. Since this is an agricultural State, without any large cities; since our percentage of foreign-born population is smaller than in most northern States; and since public sentiment is now overwhelmingly in favor of obeying the laws we have on this subject, the small amount of insanity which will hereafter manifest itself on account of intemperate habits, formed and strengthened here in Iowa, will place us in an enviable position as compared with other States and countries.

Again, the laws we have for the prevention of illicit sexual intercourse restrict the insanity caused by prostitution and syphilis.

The insanity caused directly by the use of stimulants, in Iowa at least, is restricted almost exclusively to men; so it is with cases caused by injuries to the head. On account of occupation, the sterner sex is more exposed than women to accidents which injure, not only the head, but often other parts of the body. The same is true of sunstroke. This cause of insanity is quite frequent in Iowa and other agricultural States. However, I am of the opinion that cases are not so likely to occur now as formerly, since we harvest much less small grain, and since more labor-saving machinery is used in the harvest-field, hay-field, and in other kinds of work done in hot weather. Of course, the best way to avoid insanity thus caused, is to guard carefully against receiving these injuries to the brain. When, however, the head has been injured, the patient should refrain from his usual pursuits and keep quiet until all symptoms of the damage done are gone. The fall, or the blow, may produce concussion of the brain, even when there is no well marked external injury to the head. If the mind is thus affected, so that the patient is unconscious, confused, or delirious, a physician should be called to determine the gravity of the injury, and if possible to prevent the lesion from becoming permanent. Although the recovery from such accidents may be speedy and complete, yet mental derangement, which develops in after years, in certain cases, can only be accounted for by attributing it to an injury to the head. May not the epilepsy, which begins in infancy and continues through life, be due to injuries the brain receives at birth, rather than to the irritation of teething or worms?

Not a few cases of insanity are the result of poor health. This condition of the body may be general in its character, and manifested by anemia, or nervous debility. Furthermore, some organ may be diseased, producing weakness of body and morbidness of mind.



*Our Insane.*

Overwork in this country and in this generation, not only leads to various diseases and death, but it may be the prime cause of dethroning reason. This is more particularly true when the occupation is largely mental. Not many citizens of our commonwealth ever experience extreme poverty and want, but we as a people are ambitious and proud. We are not satisfied to lead a humble life, with only enough of food, clothing and shelter for present needs, "we want the earth." We not only struggle for existence, but strive for luxury, wealth, political and social preferment; we live fast, because we go by steam, do business by electricity, and turn night into day; we earn our living with our nerves, not our muscles; we exercise our minds more than our bodies. The development of the body and the preservation of the physical powers must not be neglected. Man's ability to continue in intellectual pursuits, and to stand competition, depends not a little on the endurance which thorough physical development gives.

Children do not become insane unless they are epileptics. The same may be said, for the most part, of persons in their teens, and yet, this is the formative period of life. During these tender years conditions of the body and mind may become established which make the nervous system permanently weak.

Bad habits are more injurious to the young than to persons who are mature.

During boyhood, parents should guard sons against the use of tobacco and the choice of vicious companions. For their daughters, they should consult the family physician, if at puberty the change peculiar to their sex is not promptly and fully established. Nervous debility, hypochondria, hysteria, and more profound forms of mental disturbances may thus be prevented. Pupils in the high schools are in more danger of losing their health, and ultimately their minds, from social dissipation and late hours, than from too much study.

Other things being equal, the single are more likely to become deranged than the married, consequently this domestic relation may be considered a preventive of insanity. Almost the only indications to the contrary are the injuries incident to child-bearing. The mother may be prostrated by having children too often, especially when she has the sole care of the little ones, and multifarious household duties beside.

During pregnancy, the wife should receive kind attention, and be kept in a cheerful frame of mind. During and after labor, she should be provided with a good nurse and a good physician. While in child-bed the mind is exceedingly susceptible, therefore, the mother should be kept in quiet seclusion. Occasionally women become deranged by being talked to on the subject of religion, or otherwise agitated during this critical period. Delicate mothers who have fat, strong babies, may not only become anemic and nervous from prolonged lactation, but melancholy and delirious.

The climacteric period in a woman's experience, known as "the change of life," is often attended by considerable constitutional disturbance. During the months and years of this trying and unstable condition, she should not overtax her strength, and should receive more or less medical attention.

*Our Insane.*

The only remaining physical causes of insanity which I will mention are the tobacco and the opium habit, masturbation, and excessive sexual indulgence. They are injurious to the health and impair the nervous system, but of themselves seldom produce insanity. Not many who come to the hospital have used tobacco excessively, and those who practice masturbation may do so because they are impaired in health; as the effect, rather than the cause of their morbid condition.

The moral causes of insanity are such as pertain to education, disappointed affections, jealousy, pecuniary embarrassment, domestic trouble, fright, anger, political or religious excitement.

By examining the statistical tables in hospital reports, which name the supposed or assigned causes of insanity in those admitted, it is found that in three fourths of the cases, physical causes are chief, while in the fourth, the moral causes are most prominent.

The disease which will eventually attack a person largely depends on latent proclivities. A judicious man does not ignore his weak points, whether they be physical or mental, but appreciates them. If they cannot be cured, he adapts his habits and life-work to them. Children who are indulged to the fullest extent, in the course of time, become supremely selfish. As men and women they are likely to be unreasonable and intolerant.

Again, persons who do not restrain their tempers, may occasionally go to the extreme, and for the time being, get positively "mad."

The despondent individual may gravitate into a confirmed hypochondriac, or a case of profound melancholia. One having a nervous temperament may yield to his inclinations until he not only becomes habitually restless in body, but unstable in mind.

Persons who know they are predisposed to insanity may escape mental derangement by avoiding the exciting causes, such as poor health, employment exclusively mental and involving great responsibility, also such domestic and social conditions as are likely to habitually agitate the mind.

Again, we can forestall this disease by giving heed to the premonitory symptoms. The earliest and most frequent of these is inability to secure sufficient sleep. This trouble may be manifested by difficulty in going to sleep, or by failure to obtain sound sleep, consequently the nervous system is not renewed in strength. If insomnia is the result of over-taxing the mind, a respite must be insisted on; if due to vascular fullness of the brain, the mind must be diverted and relaxed a few hours before it is time to retire. Other premonitory symptoms are uncomfortable feelings in the head, a persistent, but usually not severe, pain in the brain; a dullness of the perceptive faculties; an impairment of the memory; an inability to think rapidly and clearly; restlessness of body and mind; an undue manifestation of emotion; unwonted carelessness in habits; an uncalled-for change in disposition and tastes; a strange desire to speculate; a disregard for external appearance, also for the opinions and feelings of others. When a person discovers any of these morbid conditions in himself, or notices them in a relative or friend, he should take warning and seek relief.

*Our Insane.*

Hard work is wholesome, vigorous and persistent mental activity is ennobling, but energetic and ambitious people must learn when to "put on the brakes" and remember that "man is mortal."

Insanity does not necessarily imply nonsensical talk, well marked mental excitement or complete loss of self-control; it simply means more or less unsoundness of mind. Since this condition may come gradually and insidiously, the precursors of this disease should be recognized and acted upon. Rest is the panacea. It must not, however, be postponed until convenient to take it, but be secured when needed. Everybody should remember the Sabbath day, not only to keep it holy, but to rest the body from accustomed labor, to turn the thoughts away from worldly affairs at regular and frequent intervals.

Tendencies to become moody, to allow the mind to dwell on one subject, to get "cranky" (crooked), are counteracted by mingling in good society. Sociability begets cheerfulness, amusement turns the mind away from self, and contact with all kinds of people increases one's common sense. Human adaptability is thus acquired.

The insanity which comes, in a new country, to the farmer's wife is not so much the result of over-work as it is due to a monotonous life, an unattractive home, a lack of near and congenial neighbors, an absence of church privileges.

A liberal education develops all the faculties of the mind, it makes a man level-headed; it broadens the comprehension; it enables one to be independent in thought and act; it certainly prevents insanity. Intellectual superiority naturally creates self-respect, and self-respect encourages self-control; the habitual exercise of self-control enables one to preserve equanimity during the crisis of life.

The self-prevention of insanity, so far as self-management and control are possible, is then a great duty. If he who has fallen a victim to insanity could unroll the complete map of his former life, from the beginning to the end of his course, and patiently retrace the roads and by-paths by which he has arrived at his present mental condition, he might have to blame a neglected education, ill-regulated passions, vice, and consequent misery; or, if free from these causes, he would probably have to blame what I might best express as the complete mismanagement of his mental functions.

Regular and exemplary habits, a noble aim in life, and a character built upon fixed moral principles, are safeguards against mental alienation. A reasonable belief in the doctrines of the Scriptures, and a uniform endeavor to live in accordance with the precepts of the Savior of mankind, tend to preserve rather than weaken the mind. By keeping the commandments we escape most of the vices and embarrassments of life, and with promises of the Good Book, we are comforted and strengthened in its unavoidable tribulations.

Preservation is, indeed, better than cure. Grand and god-like is it to restore the reason which has fled. It is still grander, and more god-like, to preserve the reason, and to hinder it from fleeing. Every step that you take in the path of preventive medicine will be a step in advance. The further

*Our Insane.*

you progress, the greater will be your power to discern and diminish the many causes of the disease which you try to prevent; and the more truthfully you will be able to sing, in the language of Oliver Wendell Holmes:

"And lo! the starry folds reveal  
The blazoned truth we hold so dear:  
To guard is better than to heal,  
The shield is nobler than the spear."

The following article by Mr. L. F. Andrews, Assistant Secretary of the State Board of Health, was prepared with great care, and is deserving of a careful reading and serious consideration. As Iowa is essentially an agricultural State, it is pertinent to ascertain whether or not the statements made, are sustained by the facts, and if so, what can be done in the way of prevention.

"There is no disguising the fact that insanity is alarmingly on the increase in Iowa. It is a matter worthy the earnest consideration of every thoughtful mind, both as to cause and possible prevention.

The expense consequent thereto is becoming a serious burden to the people. It is impossible for the State to keep pace with it in providing asylums for the cure and maintenance of those afflicted.

The first asylum in Iowa was established in 1860; the second in 1872. During the period from 1860 to June 30, 1887, there were admitted to these asylums ten thousand three hundred and seventy-two persons. From 1860 to 1870, one thousand nine hundred and forty-five persons; from 1870 to 1880, four thousand six hundred and four persons; from 1880 to June 30, 1887 (seven years), three thousand eight hundred and twenty-three persons.

In 1880, the United States census gives the total population of Iowa as one million six hundred and twenty-four thousand six hundred and eleven.

The proportion of insane to total population in 1870 was one to one thousand six hundred and nine; in 1880 it was one to six hundred and thirty-nine, an increase of two hundred and forty-two per cent, while the increase of population was but thirty-six per cent.

The total increase of insane population in 1880 was two thousand five hundred and fifty-four, of whom but one thousand and seventy-six were in the asylums, or less than one half.

In 1885 the census report gives the population as one million seven hundred and fifty-three thousand nine hundred and eighty. In that year there were in the asylums one thousand and fifty-two persons, and according to the ratio of previous years the total insane would be three thousand and fifty-six, or one to five hundred and seventy-three of the total population.

At the ratio of increase of population of three per cent from 1885, the total population in 1887 would be one million eight hundred and fifty-nine thousand two hundred and eighteen. In 1887, there were in the asylums one thousand four hundred and eighty-nine, with a total increase of four



*Our Insane.*

thousand four hundred and ninety-four, or one to four hundred and forty-three.

From 1880 to 1887 the increase of population was twenty-one per cent, while the increase of insane was forty-three per cent.

A noticeable feature is the increase of insane among the agricultural population. Unfortunately, the classification in the reports of the asylums is not sufficient to give an exact statement. The asylum at Mt. Pleasant reports all cases among women under the general term of "domestic duties." So, also, does the asylum at Independence from 1873 to 1881, when a more distinct classification was adopted, and which may be made a fair basis of estimate for the State at large.

During the period of 1884 and 1885 there were admitted to the Independence Asylum one hundred and eighty-three farmers and one hundred and seventeen farmers' wives and daughters. For 1886 and 1887, there were two hundred and nine farmers and one hundred and fifty-three farmers' wives and daughters, an increase of seventeen per cent in four years.

In 1882-3, there were admitted to the Independence Asylum one hundred and eighty farmers; in 1884-5, one hundred and eighty-three; in 1886-7, two hundred and nine farmers' wives and daughters; in 1882-3, eighty; in 1884-5, one hundred and seventeen; in 1886-7, one hundred and fifty-three; others' wives and daughters, in 1882-3, seventy-one; in 1884-5, seventy-seven; in 1886-7, seventy. Domestics in 1882-3, twenty-six; in 1884-5, twenty-eight; in 1886-7, twenty-five. Per cent increase from 1883 to 1887, farmers, thirteen and ninety-three hundredths; farmers' wives and daughters, forty-seven and nine-tenths. All other women, decrease three and twenty-two hundredths per cent.

During the period of 1880 and 1881 there were admitted to the Mt. Pleasant Asylum one hundred and fifty-one farmers and two hundred and eight classed as "domestic." Assuming the same ratio of the latter to farmers as shown at the Independence Asylum, we have a total of two hundred and eighty-one. For the period of 1886 and 1887, there were admitted one hundred and ninety-eight farmers and one hundred and eighty farmers' wives and daughters, a total of three hundred and seventy-eight, making an increase of twenty-four per cent.

In 1880 the total agricultural population was three hundred and three thousand five hundred and sixty-seven. Assuming that the agricultural insane in the asylums is two thirds of the total insane, the insane of the agricultural population is one to four hundred and five. And this is probably below the fact, as the United States census fixes the ratio at thirty-six per cent, or less than one half.

Allowing an increase of agricultural population of three per cent we have, in 1885, an agricultural population of three hundred and forty-nine thousand one hundred and two. There were in the State of this population, one thousand and forty-two insane, or one to three hundred and three.

Deducting the agricultural population in 1880 from the total population and we have one million three hundred and eleven thousand and forty-four.

*Our Insane.*

Deduct the agricultural insane from the total insane and we have of the insane one to nine hundred and fourteen of non-agricultural population, against one to three hundred and ninety-three of the agricultural population.

In 1887 the estimated population, at a three per cent increase, was one million eight hundred and fifty-nine thousand two hundred and eighteen, and the farm population three hundred and sixty-seven thousand three hundred and sixteen. Following the ratio of the census report, the insane of the agricultural population was one thousand three hundred and fifty-six, or one to two hundred and eighty-two, or an increase of forty-seven per cent from 1880.

The cause of this increase of insanity is a pertinent inquiry. Generally, as applied to the total population, it may be ascribed largely to the unwarrantable and outrageous importation of diseased paupers from Europe, who gradually drift into the asylums. The reports of the asylums show the least insanity among the professions, and the least causes among those disorders incident to professional life, as nervous diseases, so that as to farmers there must be some other cause. It is fair presumption that the farmers have not yet learned to live in accordance with hygienic laws. Their dwellings are generally in bad location, poorly drained, improperly ventilated, and badly heated, necessitating alternate freezing and heating. There is undue exposure in inclement weather. There is want of physical comfort, and social enjoyment is neglected. Their diet is restricted and badly prepared, thus burdening the blood and digestive organs with indigestible food, and deranging the whole digestive system. The wives and daughters have fewer comforts, less protection from severe and sudden atmospheric changes, less recreation and social enjoyments than those who live in towns. There is a never-changing daily tread-mill round of toil, broken only by a few short hours of sleep, fewest in the most enervating season of the year. With everything conducive to health at command, and with nothing necessarily prejudicial, except the isolation, the statistics show that the physical and mental force of those who live on farms is below that of those who live in towns. It is probably true that, to isolation and overwork of farm life, is due much of this condition. Solitary confinement—complete isolation—of the criminal is more dreaded, and kills faster than hard work.

The records of our insane asylums will show that the ratio of increase of insane is greater than that of the population; that the ratio of recoveries of the total number admitted is less than twenty-five per cent; so that our asylums are but little less than places where these unfortunate beings may be isolated from society, kindly treated, and guarded against injury to themselves or others.

It must be apparent to every reflective mind that the multiplication of asylums secures no reduction in insanity. The seventy-five

*Our Insane.*

per cent of incurables increases every year, and it becomes a serious question what to do with them.

With all this lavish expenditure of money for the care and cure of insanity, comparatively nothing has been given to prevent insanity; for it is undoubtedly a preventable disease.

The Commissioners for Lunacy for Scotland say:

It is impossible to come to any other opinion than that insanity is, to a large extent, a preventable malady, and it appears to us that it is in the direction of preventing its occurrence, and not through the creation of institutions for its treatment, that any sensible diminution can be effected in its amount. Lunacy is always attended with some bodily defect or disorder, of which it may be regarded as one of the expressions, or symptoms. We must, therefore, attempt to prevent its occurrence in the same way as we attempt to prevent the occurrence of what are called ordinary bodily diseases: and if it be admitted that to a large extent preventable diseases exist among us in consequence of the ignorance of the people, it is clear that we can convert the preventable into the prevented, by the removal of that ignorance through a sounder education. In short, we can only hope that preventable diseases will be diminished in amount when the education of men is so conducted as to render them both intelligent and dutiful guardians of their own physical, intellectual and moral health. To this, and not to any machinery, however good it may be, for the treatment and care of insanity, can we reasonably look for any diminution in its amount.

Says one who had long experience in one of the Massachusetts hospitals for insane, and who is an expert in mental diseases: "Lunatic hospitals do not prevent insanity, because they do not seek to enlighten the people on its predisposing causes, its hereditary tendencies, its relations to intemperance, poverty and crime, and therefore do not improve the community in this respect."

To what source, then, shall we look for reform in this matter? What presents greater encouragement than the sanitary movement now going on throughout the civilized world? Great advancement has been made during the last decade even, in ascertaining the causes of diseases having their origin in filth, bad air, impure water, foul gases, poison from decaying vegetable and animal matter. It has been discovered that the spread of infectious and contagious diseases can be completely controlled by isolation and disinfection. To carry into effect these discoveries, it is necessary to

*Our Insane.*

employ "sanitary legislation," organize boards of health, and educate the people in all the various methods to prevent disease.

The more thoroughly sanitary science is applied, the more will it serve, not only to prevent disease, but aid in curing it. The more we improve ventilation, drainage, and sewerage; the more we improve the quality of potable water, and the greater the regard given to dietary habits and physical exercise, the higher will be the standard of health in a community, the greater good will be accomplished.

Says Dr. H. I. Bowditch, in his treatise on "Public Hygiene in America."

We stand now at the very dawn of the grandest epoch yet seen in the progress of medicine. While philosophically, accurately, and with the most minute skill, studying by means of physiology, pathological anatomy, chemistry, the microscope, and above all, by careful clinical observation, the natural history of disease and the effect of remedies, our art, at the present day looks still higher: viz., to the *prevention* as well as the *cure* of disease. And this is to be done by sanitary organizations throughout each State,—the nation, the laity, and the profession joining hands in this most noble cause.

"If by such means one third or more of the sickness and suffering consequent thereto can be averted: if the rate of mortality can be very sensibly diminished, public health everywhere greatly improved and human life prolonged, glorious triumphs are indeed being achieved.

For the prevention of insanity pursue the same course as with other diseases. Study the causes, educate the people therein, and by the united effort of education and legislation it will be accomplished. If intemperance is a cause, remove the cause. If heredity be a cause, let there be a more general education in the principles of physiology, that all classes may have a more correct knowledge of the laws of life and health, so that every individual may understand their own weaknesses, and guard against them, and thus, in the process of time, the constitution will become greatly improved, and the hereditary influences greatly reduced. If high-living and excesses be a cause, let it be known. If over-pressure, and cramming in public schools be a cause, the sooner that be stopped, the better.

It should be the persistent policy of legislation, and of every State, to adopt and execute some systematic means for preventing



*Scarlet Fever in the Horse.*

insanity, for economic reasons, if for no other. It is expensive as well as folly to go on investing millions of dollars in asylums for the care and cure of the insane, without some effort to remove the cause. Public economy, as well as public weal, and an advancing civilization, demand that something shall be done in this direction.

## SCARLET FEVER IN THE HORSE.

OFFICE OF THE STATE VETERINARY SURGEON,  
AMES, September 6, 1887.

DR. J. F. KENNEDY, *Secretary State Board of Health:*

DEAR SIR—Sanitarians in various parts of the country have recently had their attention directed to a supposed case of Scarlet Fever affecting a horse in Cedar county, Iowa.

The announcement to the public that a case of Scarlet Fever had been detected in the horse, naturally created a spirit of inquiry on this subject. Our sanitary boards, I think, had entertained some fear of danger from this source. If the horse is capable of receiving and communicating this alarming disease, then the field of the sanitarian is greatly extended. I have received a number of inquiries as to the genuineness of this case, and the probable danger to be anticipated.

I will state that I did not see the case, neither was it examined by any one having official connection with the office of State Veterinary Surgeon, or of our State Board of Health.

The article giving the account of the case was a somewhat sensational one, partaking somewhat more of an advertisement than a dispassionate, scientific paper. I have made several efforts to have the veterinarian, who diagnosed the case, furnish me with a written statement of the history and symptoms, but have as yet, been unsuccessful.

*Quarantine—Head of Families.*

Permit me to state first, that there is no occasion for anxiety or alarm on this subject. It has been known for a long time that the horse is occasionally affected with an eruptive fever, closely resembling Scarlet Fever of the human patient. It is called Scarlet Fever of the horse, but is not in any sense recognized as a contagious disease.

It most frequently manifests itself as a sequel to some other debilitating disease, but occasionally develops as a primary affection. Horses have been known to develop this eruptive fever when Scarlet Fever was prevailing to a great extent in the community, but it never assumes the epizootic type extending from animal to animal, nor has it ever been known to be communicated from horse to man.

It is not considered as due to specific virus, but is quite as likely to make its appearance independent of any pre-existing cases of Scarlet Fever, as where this fever is prevalent.

It is misleading to designate this affection as Scarlet Fever, inasmuch as it is regarded, I believe, by all authorities on comparative pathology, as non-contagious.

M. STALKER,  
*State Veterinary Surgeon.*

## QUARANTINE—HEAD OF FAMILIES.

Over and over again the question is asked: "Should heads of families be quarantined in infectious diseases?" An uniform answer cannot be given. In no two instances are the circumstances alike. The sole purpose of quarantine and isolation is protection against infection. As a general rule it is safest and best to quarantine an entire family—especially in Small-pox and Scarlet Fever, yet there are many instances where a quarantine of the father, who is the bread-winner for the family, would be not only vexatious,

*Infectious Diseases in Public Schools.*

but unnecessary. The local board, with its health officer, especially where the health officer is the attending physician, are the only competent and proper authority to decide who, and under what circumstances, such persons may be exempt from quarantine.

When a patient is completely isolated from other parts of the house, and other members of the family, there can be no objection to giving the father, if he does not resort to the sick room, and especially if his business does not call him among children, nor into gatherings of people, as much liberty as is given the attending physician, who goes into the sick room, takes off his overcoat, in immediate contact with the patient takes its temperature, returns the thermometer to its case, with or without disinfection, perhaps without even wiping it, puts on his overcoat and in a few moments visits another family where are children susceptible to the disease. To rigidly quarantine the father and not the physician would be an absurdity. Consistency should govern in health matters as in other things.

The safest, and only safe plan is, for local boards to have special supervision of each infected family, and then, in the interest of the public health, establish and maintain quarantine, impartially and rigidly. Simply giving notice and posting danger signals are not enough. If, in their judgment, any member of a family can be safely relieved from its restrictions, let the board so declare, and upon what conditions, but this must be done by the board in session. It cannot be delegated to a committee, say the Supreme Court. Neither can individual members of a local board direct a health officer or a physician to "go ahead and do the best he can to stop the disease." The order or instruction must come from the board, in session, and be of record.

*Potable Water.*

## POTABLE WATER.

Much has been said and written about water analysis, and what constitutes good potable water; and on the other hand, what renders water dangerous as a drink. In 1868, the United Kingdom of Great Britain appointed a commission to inquire into the best means of preventing the pollution of rivers. The commission was styled the "Rivers Pollution Commission." After continuing their labors for six years, in 1874 they made a final report. They examined in all one thousand two hundred and seventy four samples of potable water.

The following tables, shown by Charles Ekin, Chemist, London, in his book, "Potable Water", embodies their idea of typically good and typically bad water, and the nearer each type is reached by inference, the nearer are we to a safe or dangerous potable water. Result of analysis expressed in parts per one hundred thousand. (1)

## A TYPICALLY GOOD SPRING WATER.

Eyford Spring, Bath.

Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrates and Nitrites.	Chlorine.
0.009	0.004	0.0	0.130	1.46

## A TYPICALLY BAD SPRING WATER.

Spring in All-Saint's Laud, Bristol.

0.186	0.030	0.001	4.712	7.10
-------	-------	-------	-------	------

(1) Parts in 100,000 can be converted into grains, per imperial gallon, by multiplying by 7 and then moving the decimal point one place to the left. An imperial gallon contains 70,000 grains. A United States gallon 56,226 grains.



*Potable Water.*

Local boards of health, and those having an analysis of water made for potable purposes, should make a note of these figures, and of what they represent, as they are sufficiently accurate for practical use.

In explanation of the above table, it may be said that good water may contain an excess of organic carbon, but if the proportion of nitrogen as nitrites or nitrates and chlorine are low, the indications are the organic matter is of vegetable origin, and therefore harmless. If the chlorine and nitrogen are high, as in the second table, the organic matter unquestionably comes from animal matter. Nitrogen as nitrites should be absent in good water, from nine tenths to one and one tenth parts per one hundred thousand of nitrogen, as nitrates constitute an excess, and no water containing this amount should be used for potable purposes.

The amount of chlorine in bad water varies from three parts to several per one hundred thousand. Chlorine is evidence of sewage pollution. Water may contain much less than this and yet be polluted from sewage. As a rule, it may be said that a high rate of chlorine is always accompanied with a high rate of nitrogen as nitrates.

The presence of an excess of ammonia, especially albuminoid, is suspicious, and should be governed by the same rule as applies to organic matter, whether it be from animal or vegetable source. Usually it comes from sewage, the organic matter of sewage being of an albuminoid nature, and the quantity present indicates the lack of oxidation of the original matter by percolation through the soil.

While it is true, as a general proposition, that water largely polluted with organic matter may become purified and rendered harmless by percolation through soil, there is constant danger that shallow wells so-called, will be polluted by organic matter which finds access to it, during heavy rain falls, unoxidized. This is especially liable in cities and towns where privy vaults and wells are sunk side by side, and stables and hog-pens contiguously abound. Hence it is, that fevers of malarial type prevail more extensively in wet than in dry seasons.

*Potable Water.*

It should be borne in mind that no amount of percolation, or oxidation will purify water polluted by human excrement, or destroy the specific germ, or poison of Typhoid Fever. It may be carried long distances and at great depth of soil.

For sanitary purposes, the State Board of Health has fixed the following

## STANDARD OF PERMISSIBLE POTABLE WATER.

	Parts per 100,000.	Grains per U. S. gal.
Total solids (maximum).....	28.2	16.4456
Organic matter { organic carbon, 0.056 } { organic nitrogen, 0.013 }	0.009	0.402
Ammonia.....	0.001	.0005
Chlorine (maximum).....	2.3	1.4579
Nitrogen as nitrates (maximum).....	0.4	.2332
Nitrogen as nitrites (maximum).....	Trace	Trace
Oxygen required to oxidize organic matter per three hours at 30 deg. Fah.....	0.3	.0070

Microscopic examination of floating matter to be made.

The topography of entire area of surface to be considered.

The United States gallon to be deemed fifty-three thousand three hundred and eighteen grains.

The limited means at the disposal of the State Board prevents, entirely, any general work, in ascertaining the character of the public and private water supply of the State. Than this, is scarcely another subject more important to the public health, or more clearly within the purview of the legitimate work of the board. Something more than a simple chemical analysis is necessary to a correct and satisfactory conclusion as to the condition of water, and no competent and intelligent chemist will render judgment upon a sample of water for potable use, from his analysis alone. For example, chlorine is an important factor in estimating the character of water for sanitary purposes. It is present in all natural water. It may be derived from the geological formation through which it passes. That it is present in large quantity has really no significance whatever. The important point is from whence the chlorine comes—whether vegetable or animal.

*Potable Water.*

A history of all the sources and surroundings of water is therefore of the utmost importance, in establishing the character of any water, and frequently is of more value than a chemical analysis. A well in a sandy, porous soil, or even stratified rock, in near proximity to privies and cess-pools, may contain water chemically not bad, yet be dangerously infectious, from microbes or disease germs so minute as to escape arrest by soil filtration, and to be detected only by the microscope.

In explanation of the figures expressing the constituent parts of water, as given by chemical analysis, the following will be of aid to the public:

*Total Solids.*—The total solids is the residue left after throwing off by evaporation a measured quantity of water, and consists of the inorganic and organic matter in the water. Though desirable to have it low—the quantity—it has no positive significance as to the quality of the water, unless it be excessively high. A high proportion of solids in river water would be suspicious, yet have no significance in that from an artesian well.

*Loss on Ignition.*—This is the residue left of the solids, after a red heat to burn the organic matter, and dispel the volatile parts of the inorganic matter. Its value consists chiefly in the odor given in the process of heating, whether it be from animal products, or from vegetable material.

*Hardness.*—The hardness of water has very little hygienic significance. The popular notion that hard water conduces to the formation of urinary calculi, is disproved by surgical experience. In Philadelphia, Dr. D. Hayes Agnew, the eminent surgeon, reports the majority of cases of this disorder, in a district in Philadelphia supplied with soft water.

*Chlorine.*—This is a large constituent of common salt. Its presence in water is not conclusive of contamination. Water from deep wells and springs may contain a high proportion of chlorine, and yet be healthful. It is to be considered in connection with the ammonia, nitrates and nitrites. Its presence is suspicious, but a water is not to be condemned thereby, unless confirmed by the history of the source and the surroundings.

*School-house Water Supply.*

*Ammonia.*—This is derived from organic matter in the process of decomposition. An excess of two thousandths parts in one hundred thousand should cause an investigation of the surroundings of the water supply. Albuminoid ammonia suggests pollution with animal organic matter, or the direct mixing of sewage with the water, either directly at or near the source of water supply, or by soil percolation.

*Nitrogen as Nitrates.*—This is one of the stages in the reversion of organic into inorganic matter, ammonia being the first.

*Nitrogen as Nitrites.*—This is the third stage in the reversion above mentioned, and its presence suggests that the soil has failed to oxidize or filter out the infective or polluting parts. It should not be present in potable water.

In all cases, judgment for or against a water can only be given after a careful consideration of the history thereof, together with the aid of the microscope.

## SCHOOL-HOUSE WATER SUPPLY.

One of the most potent causes of Diphtheria and Scarlet Fever in this State during the past two years was unquestionably the low water in wells and streams, thereby rendering them more liable to contamination.

This contamination of the water supply leads to a condition of general ill-health, and thus renders those using it more susceptible to the influence of those factors producing specific diseases. The superadded presence of an infectious disease is all that is needed to inaugurate an epidemic.

In dense communities this is a matter for serious consideration, and especially with reference to public schools. There is probably not a well upon a school-house lot within the State that is not suspicious, if not actually contaminated, surrounded as they usually are, by privies, stables and filthy back alleys of adjoining lots.



*Milk.*

A portion of the wells are driven wells, which afford no security whatever from pollution—in fact are worse than dug wells properly constructed. In view of the importance of this matter, as a sanitary measure, it is suggested that the State Board take some action thereon, and that recommendations, if not positive regulations, be made for school-houses to be supplied with water from water-works in all cities and towns where water-works are in operation, especially when analysis shows the water to be of good quality, and safely potable.

Village and country schools should have the well at least one hundred feet from any privy or stable, and the topography of the contiguous surface should be such as to secure rapid and free drainage in every direction from the well for the farthest possible distance. It should be free from the shade of trees and accessible to uninterrupted air currents.

**MILK.**

It is an inherent, a sovereign—it may be said a natural right of individuals and communities to know the exact character of what they eat and drink, and to require that they shall be healthful. This right is founded in the law of self-preservation. In proportion therefore, as an individual or a community guard themselves by rigorous surveillance over the producers or dealers in these, so will they be improved, and so will be the measure of their health.

Cows' milk is one of the most important elements of the daily food of the people, and far more important, it is the very life of the large majority of children, and with whom the quality is a question of life and death.

Pure and wholesome milk cannot be obtained except from a perfectly healthy animal. To preserve and maintain the health of a cow she must have good food, pure water, fresh air, light, daily

*Milk.*

outdoor exercise, and be kept clean. A failure in any one of these particulars will result in impairment of her milk.

Neither can pure and wholesome milk be obtained from a dairy, unless it be kept in accordance with sanitary regulations. The rule for the cow must be supplemented in the dairy.

Given this as the standard by which to determine the character of the milk supply, it remains with every individual and community to ascertain what are the facts.

When it is known that there is developed in milk frequently a poisonous substance known as Tyrotoxinon, and that bad milk is the medium of communicating many diseases, especially among children, and that these diseases are most frequent among the poorer, or laboring classes, where fresh milk is rarely had, the frequency of these diseases, and the importance of pure milk can be readily understood. The opinion is becoming quite general that the prevalence of Cholera Infantum is caused largely by milk. The milk is drawn from unclean udders, into unclean vessels, jolted over miles of road, and then set away in an impure cellar or pantry, or ice-box with vegetables or meat, and then fed to the "little one" through that abomination of all abominations, the nursing bottle and rubber tube, for it is well-nigh impossible to keep them clean; crusts of decomposing milk form at the neck of the bottle, in the nipple and tube, tending to the decomposition of the entire contents of the bottle. A safer method is a nipple spread over the neck of a bottle, if artificial means are necessary, as both can be easily kept clean.

Milk is also a rapid absorber of foul odors and disease germs, and formidable epidemics of Diphtheria, Scarlet Fever and Typhoid Fever have been traced directly to contaminated milk. An epidemic of Scarlet Fever in London covering a large area was traced directly to a single dairy. An epidemic of Typhoid Fever in Cambridge, Massachusetts, was traced to a dairy in New Hampshire, where the privy vaults drained into the well from which water was taken to wash the milk cans, the vault having been infected previously by a Typhoid Fever case.

*Milk.*

Dr. Vaughan, the discoverer of Tyrotoxicon, has given the following rules for the prevention of the development of Tyrotoxicon in milk:

1. The cows should be healthy and the milk of any animal which seems indisposed should not be mixed with that from the perfectly healthy animals.
2. Cows must not be fed upon swill, or the refuse of breweries, or glucose factories, or any other fermented food.
3. Cows must not be allowed to drink stagnant water; but must have free access to pure, fresh water.
4. Cows must not be heated or worried before being milked.
5. The pasture must be free from noxious weeds, and the barn and yard must be kept clean.
6. The udder should be washed, if at all dirty, before the milking.
7. The milk must be at once thoroughly cooled. This is best done by placing the milk can in a tank of cold spring water or ice-water, the water being of the same depth as the milk in the can. It would be well if the water in the tank could be kept flowing; indeed, this will be necessary unless ice water is used. The tank should be thoroughly cleansed every day to prevent bad odors. The can should remain uncovered during the cooling, and the milk should be gently stirred. The temperature should be reduced sixty degrees Fahrenheit within an hour. The can should remain in the cold water until ready for delivery.
8. In Summer, when ready for delivery, the top should be placed on the can and a cloth wet in cold water should be spread over the can, or refrigerator cans may be used. At no season should the milk be frozen; but no buyer should receive milk which has a temperature higher than sixty-five degrees Fahrenheit.
9. After the milk has been received by the consumer, it should be kept in a perfectly clean place, free from dust, at a temperature not exceeding sixty degrees Fahrenheit. Milk should not be allowed to stand uncovered, even for a short time, in sleeping or living rooms. In many of the better houses in the country and villages, and occasionally in the cities, the drain from the refrigerator leads into a cess-pool or kitchen drain. This is highly dangerous; there should be no connection between the refrigerator and any receptacle of filth.
10. The only vessels in which milk should be kept are tin, glass or porcelain. After using the vessel, it should be scalded and then, if possible, exposed to the air.

The State Board of Health has for sanitary purposes, fixed the following as the standard of pure and healthful milk in the State:

*Tyrotoxicon.*

Water (Maximum).....	86.87
Butter Fat (Minimum).....	3.50
Milk Sugar (Maximum).....	4.35
Salts (Maximum).....	0.60
Ash (Maximum).....	0.70
Casein (Maximum).....	3.98
Solids ..	13.13

Specific Gravity, 1029-1034.

100.00

While the statutes provide a penalty for the adulteration of food, there is no standard of purity of milk fixed by law, and by which an adulteration or value of milk as food could be lawfully determined. It is confidently expected the next legislature will supply this need.

## TYROTOXICON.

Several cases of poisoning from eating ice-cream occurred during the biennial period, the most serious at Adair, on July 4th, 1889, wherein over one hundred and twenty persons were affected. The symptoms were choleric and quite alarming. The suspicion was that the poisoning was caused by tin, or the vanilla extract with which the ice-cream was flavored. Under proper treatment the trouble subsided in a few hours, with no fatal results. A quantity of the milk, cream and vanilla used was sent to the State Board and was submitted to a chemist for analysis. The following is the report of the chemist.

DR. J. F. KENNEDY, *Secretary Iowa State Board of Health:*

DEAR SIR—I have the honor to forward to you my report of the finding, by chemical analysis of the samples of milk and cream, and also the vanilla used in making the ice-cream that poisoned over one hundred persons at Adair, Iowa, on July 4, 1889.

The bottles were labeled as follows:

1. Clear milk.
2. Frozen cream.
3. Frozen cream.
4. Vanilla extract.
5. Frozen cream.
6. Frozen cream.



*Tyrototoxicon.*

I received the box July 6th, and put the bottles at once in ice-box. I tested the vanilla for mineral poisons, also for vegetable alkaloids, with negative results. I took fifteen drops, and that having no appreciable effect, I took thirty drops, and was convinced that the toxic principle was not in the vanilla.

On inspecting the bottles after taking them from the ice, and raising the temperature seventy-five or eighty degrees Fahrenheit, there was an active state of fermentation developed, and on examination with the microscope, there was observable a great abundance of bacteria actively at work. In a few hours the carbonic acid liberated, was sufficient to force the stoppers from the bottles.

On examining the samples of frozen cream and milk for salts of tin and zinc the results were negative. I then proceeded by the methods of Vaughan and Novy, to obtain a ptomaine, if any, and the result was a nice crop of fine crystals of that form of ptomaine called by Vaughan, Tyrototoxicon. On mixing a dose of these crystals in some fresh milk, and feeding to a half grown cat, the physical effects were very marked—vomiting, purging and great prostration.

I am well satisfied that the poison was no other than Tyrototoxicon developed by the action, or through the agency of a certain species of bacteria.

The views entertained at the present time by scientific observers are that each specific pathogenetic micro-organism produces its own characteristic poison. A ptomaine is formed during the putrefaction of organic matter. On account of their resemblance to the vegetable alkaloids, ptomaines may be called putrefactive alkaloids. While some of the ptomaines are exceedingly poisonous, others are not. All the poisonous substances formed during putrefaction are not ptomaines. Ptomaines are temporary forms, through which water passes while being transformed by the activity of bacterial life from the organic to the inorganic state. (PASTEUR.)

The kind of ptomaine formed, depends upon the species of the individual bacterium engaged in its production, the nature of the material acted upon, and the conditions under which putrefaction goes on. The bacteria are the agents that work out the changes in complex organic substances in breaking them up into their original inorganic elements.

Inasmuch as milk is such a valuable and universal article of food, too great care cannot be exercised in its management. It is a notorious fact that milk readily takes up disagreeable odors when standing a short time in a foul atmosphere.

Cows are sometimes allowed to stand, and are milked in filthy barns; the udders are not washed before milking; the vessels for the milk are not as clean as they should be. There can be no doubt that greater attention to the milk used by infants would result in saving many thousands of lives annually.

I beg leave to suggest the following points to be observed by dairy-men:

1. No chemical to preserve the sweetness of the milk or adulterant of any kind should be used at any time.
2. No milk should be saved from diseased or unhealthy cattle.

*Tyrototoxicon.*

3. The cattle should be well and properly fed.
4. The water that the cattle drink should not be from old, stagnant, and filthy ponds.
5. The milk should be chilled before transporting any great distance, and should not be put into a pantry, or an old well, to keep it cool, where there is blue mould, decaying timber, or foul air.
6. Cows should not be milked at unusual hours.
7. The vessels used should be scrupulously clean, and preferably of glass or earthenware, or good tin.

ROBERT McNUTT, M. D.

DES MOINES, IOWA, July 15, 1889.

In 1883 and 1884 there were reported to the Michigan State Board of Health about three hundred cases of cheese poisoning. Generally, the first symptoms appeared within from two to four hours after eating the cheese. When the symptoms appeared later the cases were milder. The severity of the symptoms varied with the amount of cheese eaten. Every one, in the practice of one physician, who ate of the cheese was taken with vomiting. At first the tongue was white, but later it became red and dry, the pulse was feeble and irregular, the countenance was pale. None of these were fatal, but several deaths from cheese poisoning in other cases have occurred. Professor Vaughan, of Michigan State University, made the chemical analysis of the cheese that caused the three hundred cases of sickness. The cheese appeared to be good, and there was nothing in the taste or odor to excite suspicion, but from a freshly cut surface there exuded an acid fluid. When a piece of good cheese with a piece of bad cheese was placed before a dog or a cat, the animal always selected the good cheese. The acid fluid contained microbes, and by chemical analysis a poison was found, which Professor Vaughan named Tyrototoxicon (cheese poison). Since that time this poison has been found in many samples of cheese that caused sickness.

About two years after he discovered Tyrototoxicon, Dr. Vaughan found the poison in milk that had stood in a well-stoppered bottle for about six months, and experimented until he found the conditions under which milk becomes poisonous. The subject was more elaborately worked out by Drs. Newton and Wallace, in 1886, when a large number of people at two of the hotels at Long Branch

*The Murderous Nursing Bottle.*

were taken sick soon after supper. Forty-three people were made sick by drinking milk. The milk used at supper came from a dealer who milked his cows at noon, and then without cooling the milk carried it eight miles during the hottest part of the day to the hotel. All the conditions were favorable for spoiling the milk, which was shown by chemical analysis to contain the poison Tyrotoxicon.

In 1888, Drs. Vaughan and Novy obtained Tyrotoxicon from some ice-cream that had poisoned a number of people at Lawton, Michigan. It was thought at first the illness was caused by the vanilla that was used for flavoring, for the persons who ate lemon ice-cream at the same time were not made sick. But the doctors took two teaspoonfuls each of the flavor and were not made sick. Then it was found that the custard from which the lemon cream was made was frozen immediately, while the custard for the vanilla cream had been allowed to stand for some hours in an old wooden building, unoccupied, which had been used as a meat market.

Since that date the mystery of ice-cream poisoning has been invariably solved in the discovery of Tyrotoxicon as the cause.

It is pertinent here to state that the presence of Tyrotoxicon in cheese can be easily and very simply detected, and every grocer or dealer in cheese should provide the means whereby it can be known. Ordinary blue litmus paper, which can be procured at any first-class drug store, if applied to the fresh cut edge of cheese, will turn red, and the more virulent the Tyrotoxicon, the deeper and more rapid will be the change in the color of the paper. Every citizen can thus easily protect themselves against poisoning from this ptomaine.

## THE MURDEROUS NURSING BOTTLE.

Cholera Infantum and other gastro-intestinal diseases are the cause of many deaths during the hot months, that with proper care could be avoided. The milk given to the little babe should be

*The Murderous Nursing Bottle.*

fresh and absolutely pure. One fruitful source of impurity is the nursing bottle with the rubber tube. It is an abomination that ought not to be tolerated, for the "slaughter of the innocents" produced by this combination is fearful.

It may be more convenient than other forms, but it is absolutely impossible to keep them so clean as not to endanger life. Hundreds of children whose early death is attributed to a mysterious Poison, or to the unavoidable dangers of hot weather, are slain annually by this infamous rubber tube. They are not necessary. If a *bottle* must be used, it is infinitely better to use the common rubber nipple. This can be removed—turned inside out and kept comparatively clean and sweet. The old fashioned way of feeding with a spoon is better than any rubber arrangement. The Committee on Hygiene of the Medical Society of the State of New York, in a report in respect to the extent of the use of these rubber tubes, says: "In spite of the fact that their use has always been discouraged by the profession, and that they are condemned in all text-books, as being dangerous, they are widely sold in all the shops, and continue to be widely used among the poorer classes." In summing up their report upon this point, the committee note:

1. The enormous mortality among bottle-fed children in tenement-house districts.
2. One of the most important, if not the most important factor in this mortality is the use of food improper, uncleanly, and, most of all, *milk* in which the changes of decomposition have begun.
3. One of the chief obstacles to pure food is dirty bottles and vessels, especially those containing particles of sour milk.
4. The tube bottles are so constructed that cleanliness is a matter of impossibility by any means ordinarily employed, even by the use of brushes.
5. The shop-keepers assert that many of the very poor do not buy the brushes at all, to save additional expense.

To what extent are these used? Inquiries have been made at nineteen drug stores to inquire of their sales. Four stores in *tenement* districts sell on an average eight times as many with as without



*The Murderous Nursing Bottle.*

any tubes. Five stores in good localities sell, on the average, six times as many of the other variety.

These figures develop a wonderful fact—an anomaly. Here are the poorer classes, who can ill afford the loss of time required for nursing and medical attendance upon their children, through ignorance it must be, of the dangers, paying more for a complicated rubber tube arrangement than the rich do for a cheaper and more healthful instrument.

Dr. Seibert, demonstrated before the New York Academy of Medicine, by charts and tables covering ten years' observation, that Cholera Infantum became epidemic whenever the daily minimum temperature was sixty degrees Fahrenheit, or upward, and subsides as soon as it falls below that number. He attributes it to the fact that with such a daily minimum temperature, the milk fed readily turns sour, and as almost all these cases occur in hand-fed children, the disease becomes more prevalent because of improper feeding, and the thermal condition combined.

Dr. H. F. Hendrix says of Cholera Infantum:

During the progress of the disease, and for some time before active symptoms manifest themselves, we have noticed the insatiable thirst of these little patients, and always noticed marked relief from giving them plenty of cold water. To prevent disease, I claim, is as much the duty of the physician as to cure, and anything to that end suggested by the medical profession will, I feel sure, find a ready response in the hearts of the people; and in this connection I feel it my duty to say (taking my own observation as a guide) that Cholera Infantum will not occur in any case where a plentiful supply of cold water is given at all times and on all occasions, night or day, whenever the little one desires it. And further, I would like to impress upon the minds of those who have the care of children, to lay aside any scruple of reserve they have in regard to giving cold water and to give it freely. Those not able to let their wants be known should have it placed to their lips and let drink to their satisfaction.

Food given to all children, should be, if possible, perfectly fresh, and if liquid without the intervention of rubber tube, or any other such death-dealing device. Milk tasting sweet is far from being suitable at all times. Often before it has time to be digested or assimilated, by the superadded heat of the stomach, decomposition takes place, important chemical changes occur, and what was

*Meat Poisoning.*

intended to nourish becomes an irritant, if not a cause of death. It were better if the milk intended for children could be taken from the cow at least four or five times daily to insure freshness. A little lime water added to the milk affords an additional means of safety.

## MEAT POISONING.

November 30, 1888, a sample of head-cheese was received from Brush Creek, taken from a butcher shop, and which was supposed to contain poison, as a large number of persons who had eaten the meat had been taken violently and suddenly ill, with symptoms of poisoning. Dr. A. L. Martin furnishes a history of the case to wit:

There were about thirty cases under my treatment, and in all the symptoms were similar. The disease manifested itself in three to ten hours after eating the meat. There was sudden nausea, followed by violent emeses (vomiting), and almost involuntary evacuation of the bowels. Great desire for cold drinks, which were promptly rejected by the stomach. Pulse usually slow, and temperature abnormal, succeeded in a few hours by chilliness and profuse perspiration, and the patients improved by sleep. Some of the patients had severe cramps in the stomach, and others intense distress in the intestines. The trouble slowly yielded to treatment without fatal result.

The meat was given to Professor Davis, Chemist of the Board, who, after careful analysis, pronounced the meat poisoned with Tyrotoxin.

In February, 1889, notice was given to the State Board of sickness in the family of Michael Buechner, at Dunkerton, in Black Hawk county. Eight persons were affected. From the symptoms it was diagnosed by the attending physician, that the trouble was due to some poison taken into the stomach. Two other physicians confirmed this diagnosis. Investigation showed that the family had been eating meat from a steer that had been affected with Actinomyces, or so-called, "lump-jaw." A few weeks before the steer was slaughtered, the lump or tumor on the jaw was incised, and from it

*Meat Poisoning.*

exuded about two quarts of pus. Sickness in the family began about ten days after they commenced to eat the meat of this steer. After the recovery of the family Mr. Buechner began feeding the meat to his dog. In five days the animal became sick, ate nothing for ten days, and died. The logical deduction is, that the sickness in this family was caused by eating this meat.

Actinomycosis is the name for certain contagious tumors affecting the jaws of cattle. The pathological character of the disease was discovered by Bollinger, in 1873. He found the disease not rare in old cattle, developing itself in a few weeks, and lasting a month or two, or even a year, until, through a difficulty of eating, by reason of the diseased jaw, or enlarged tongue, emaciation and death follows, if the animal has not been previously slaughtered for its meat. It affects hogs as well as cattle, and a large number of cases are recorded where it has been transmitted to human beings, two, at least, being in Chicago.

That unscrupulous farmers and butchers sell and buy animals affected with this disease, is evidenced by the fact that in May, 1889, a butcher in Le Mars, this State, learned that at a stock-farm near, was a steer affected with "lump-jaw." The stockman had previously, in March last, called on a veterinary surgeon, who removed the tumor, which contained a teacupful of pus. The local health officer notified the stockman not to sell it for meat, which notice was disregarded. When the health officer heard that a butcher had bought it for sale to his customers, and had actually sold some of it, he had him arrested. It transpired during the trial that the steer weighed one thousand four hundred pounds, and was sold to the butcher for twenty-five dollars. The mayor, before whom the case was tried, fined him twenty-five dollars and costs. The butcher appeals. There is no question as to the result. The only cause for regret is that the fine was not made five hundred dollars. A fine of twenty-five dollars for thus imperiling human life, is simply a travesty. The legislature, should, by positive enactment, fix an adequate minimum penalty for such gross offenses against the public health, and thus prevent the repetition of so farcial a proceeding.

*Rabies.*

## RABIES.

A strange, yellow bird-dog, having a brass collar with the name "D. M. Beard, Cleveland," was found by Mr. Macy, a farmer of Lucas county, lying in his wagon-box, near the barn, January 3, 1888. Mr. Macy went up to the dog, when he attempted to bite him, whereupon the dog was driven off. He found shortly after that one of his horses had been bitten on the nose.

The same evening this dog was seen by Mr. Enslow, when he had a fight with his (Enslow's) dog. The next morning, January 4, this "yellow" dog was found dead a short distance from Mr. Enslow's house.

This dog is supposed to have been rabid, and the original source of communicating the disease to the other animals.

As stated, Mr. Macy's horse was bitten on the nose January 3d. It was seized with Rabies January 15th, and died on the 18th. Enslow killed his dog that was bitten in the fight alluded to, because he said he thought he was "going mad."

January 22d, a dog belonging to Mr. Tharpe, living in the neighborhood, bit a dog of Mr. Taylor—one of his neighbors. Taylor's dog, so bitten, was seized with Rabies February 6th, and died February 9th. January 23d, this same dog of Mr. Tharpe's bit Albert James, a grandson of Mr. Tharpe's, lacerating his hand, which bled freely. The wound was healed—no signs of Rabies. The same morning (January 23d) Tharpe's dog followed the team to the town of Lucas, a thing he was never known to do before. On the way they passed through Mr. Robinson's pasture, in which was one of his horses. On the way to Lucas the dog had several "fights" with other dogs.

The horse of Mr. Robinson's that was in the pasture when Tharpe's dog and the team drove through, January 23d, was seized with



*Rabies.*

Rabies February 12th, and died February 16th; and two of the dogs referred to, as having been fighting with Tharpe's dog, died with marked symptoms of Rabies. Tharpe's dog did not return home, and as a dog supposed to be "mad" was killed by the marshal of Lucas that day, it is believed to have been Tharpe's. Mr. Tharpe's dog went freely among his stock, and hence the date of their being inoculated is not definitely known. Though, as above stated, the dog was first known to be diseased on January 22d or 23d—the day the boy was bitten, and the dog went to town.

The next case occurring on Mr. Tharpe's farm was among the hogs. The first one was sick February 8th, and within a week four more were taken. All died in from one to three days.

Tharpe's cattle sickened as follows: One on the 10th of February, and one on the 11th, both dying on the 12th. The third one sickened February 15th, becoming paralyzed on the 16th, was killed. The fourth on the 17th, and was killed on the 20th, and the fifth and sixth on the 21st of February, and were killed the 22d.

One of Mr. Tharpe's horses became sick with Rabies, February 10th, and died on the 13th.

*To Recapitulate:* The casualties, so far as reported, were as follows:

*Died.* Three horses, belonging respectively to Macy, Robinson and Tharpe; five hogs, belonging to Tharpe; six cattle belonging to Tharpe; six dogs, the strange one, and one each belonging to Enslow, Tharpe, Beal, Taylor and Williams; the boy bitten as above stated, but showing no signs of the disease.

The following symptoms were present, as gleaned from Dr. Johnson's report:

*Horses.* Loss of appetite, disposition to hold the nose in the water, but hesitancy about swallowing; very nervous and excitable; later on a disposition to be vicious—would try to bite; twitching of the muscles of the neck; frothing at the mouth and inability to swallow; a great tendency to rub the head. The respiration was labored, salivation, emaciation, convulsions, paralysis, death.

No post-mortem examination was made in any case so far as known.

*Rabies.*

The following were the symptoms observed in Mr. Tharpe's hogs: Loss of appetite; would stand with nose in water but could not swallow; great restlessness; salivation; trembling; tendency to throw up the nose and to climb up the sides of the pen, and at times would jump up off all four feet at one time; shaking the head; fighting; yawning; would squeal as though being choked; emaciation; great excitability; paralysis; death.

*Cattle.* Loss of appetite; could not drink, though apparently thirsty; restless; spasmodic contraction of the muscles, especially of the posterior extremities—would lick the snow; were furious and disposed to attack any one or anything; did not chew the cud; lost flesh rapidly; milk supply diminished; salivation; disposed to bellow at almost everything; would become furious even upon the approach of a chicken; a hoarseness to their bellowing unnatural in health; would hold the head up high; eyes staring; would lie down a few minutes and then get up; pawing; paralysis; coma; death.

The *dogs* show the following symptoms: Loss of appetite; nervous; restless; excitable; disposed to attack everything in their way; salivation, quite profuse; head down; lower jaw dependent; stupor and death.

It is to be regretted that no post-mortem examinations were made, and that the dogs were not under observation long enough to have noted more particularly their symptoms. The above symptoms were not present in kind, and in the order given in all the cases cited.

In the Spring of 1889 several cases of Rabies were reported at Collins, Story county, but they were not well authenticated.

It may be safely stated that not one suspected dog in ten is really infected with Rabies. There are many disorders of dogs, having symptoms closely resembling rabies, hence it is important, that the fact, whether or not a suspected animal is infected with Rabies be definitely known. The premonitory symptoms of Rabies are sufficiently marked to enable the owner of a dog to protect himself against all danger by confinement and isolation of the animal, or killing it.

There are three stages of the disease. The time required for their

*Rabies.*

development is different in different animals, being more rapid in some than others, the transition from one stage to the other being almost imperceptible. These stages may be distinguished:

1. The prodromic, or melancholy.
2. The irritative, maniacal, or furious.
3. The paralytic.

The first symptoms are a change in the behavior of the animal. It is uneasy, sullen, restless. It becomes dull, seeks to hide around in corners, under the house or stable, under furniture, but no sooner has it lain down and fixed itself for rest than it suddenly starts up, goes to another place, and lies down, only to move again. Its movements are rapid. There is no disposition to bite, indeed it is frequently unusually affectionate manifesting a desire to be fondled, and especially to lick the face and hands of those fondling it. Frequently there will be noticed a change in the tone of voice, when attempting to bark. It is between a bark and a howl, the muzzle being raised. The voice is peculiar and once heard cannot be mistaken. There is a tendency to lick cold objects, as iron or stone, and to gather up bits of straw, wood and carry away. If met by another dog, to lick its cold nose. As the disease progresses it scatters and tumbles about its bed and is in incessant motion, going from place to place, digging the earth, snuffing in corners. There is no propensity to bite, is docile, obeys the command of its master, for a moment, quite rationally, but quickly relapses into its gloomy restlessness.

It has a morbid appetite, rejecting its ordinary food, touching only a few favorite bits, but will swallow all sorts of indigestible stuff, like hair, straw, dung, rope, earth, leather, etc. There is difficulty in swallowing and disposition to vomit. Its movements begin to show signs of uncertainty. The duration of this stage is from half a day to two or three days.

The symptoms of the second stage appear only spasmodically. There is entire refusal of all food, a propensity to bite; a marked change in the voice, and propensity to stray off. If confined, they will struggle to get loose, bite their chain, tear their kennel. There

*Rabies.*

is marked aberration of mind. It will gaze into space and at persons with a vacant stare, and if alone, will sit as if listening for some object, its eyes following it in space, when suddenly it will spring forward to bite. The voice of its master will rouse it from its delusion, and it will answer with signs of attachment and pleasure. This peculiarity of unusual affection of the animal, is one of the most dangerous symptoms, because the animal may thus be permitted its freedom. It is not the animal's teeth that are to be avoided, but the perviduous tongue moist with virulent saliva, which if brought in contact with an abraded skin on the hands, is as fatal as a wound from a tooth.

It sometimes will make furious attempts to wipe off imaginary substances from its jaws with its paws, and if in doing so, it should tumble over, there can be no mistake in the disease. There is a peculiar change in the voice, which is rough, hoarse, short, sharp, and such as is heard in no other disease of this animal.

There is no dread of water at any stage of the disease; in fact the animal will drink water so long as able to swallow, and frequently, unable to swallow, will thrust the entire head in water. The mouth is dry and parched. The flow of saliva comes at the closing stage.

An invariable symptom of true Rabies is the impression made at the sight of another dog, which is so powerful as to excite instant fury. If at large, the animal will go as far as it can see another dog, passing persons and other animals to bite another dog, and it will make no noise, but give a snap and pass on. This stage lasts not longer than three or four days, and is the period of actual Rabies.

Not all the symptoms given are present in any case, but enough will be discovered to enable any person to protect himself. It is during these two stages that the animal has lucid periods, which mislead the owner into insecurity, yet there is great danger at this time, and the animal should be securely chained or confined with no doors nor windows, for in paroxysms of fury it exerts wonderful powers, frequently breaking very stout chains or strong inclosures.

The third, or final stage, develops the most ferocious instincts. There is an unmistakable change in the face and eye, to that of fierceness and terror. If confined, the animal at the sight



*Rabies.*

of a person will spring at them with a peculiar bark. If at large, it will bite whatever comes within reach. If a stick or even red-hot iron be thrust at it, it will seize it and gnaw it furiously, being insensible to pain.

Sharp sounds and pouring water will throw it into paroxysms, which are followed by lassitude and exhaustion, until paralysis ensues, first in the hind limbs, causing it to stagger about. The whole appearance of the animal changes rapidly. The eyes become dull and squint, the voice is husky. The paralysis increases until it cannot rise, which is the prelude of the stupor which follows, broken only by tetanic muscular action, until comes the certain death.

If the dog is not restrained, it begins to run rapidly, as if by some irresistible force, attacking every living being it meets, darting hither and thither to bite a dog, making not a sound—merely a snap and onward, the degree of ferocity being somewhat influenced by the natural disposition of the animal, whether mild or fierce. The race is not long, exhaustion soon comes, it slackens its pace, becomes unsteady, its tail droops; its head is dropped, its tongue, a lead blue color, protruding; it turns not out of its course to attack anything. Paroxysms follow; it finally stops, crawls into some secluded spot, where if not disturbed it lies until death. This stage runs rapidly to the end. The maximum course of this disease is ten days; it may run in as many hours.

In all cases of suspected Rabies, the animal should be confined until its death, or at least ten days, so that it may be positively known whether or not it be a case of Rabies.

This paper would be incomplete, if no means of prevention and protection were offered against this horrible malady. Medical science has not yet provided a prophylaxis for it. It may be safely said that no human being or animal that once has passed its portals, has ever stopped short of that bourne whence there is no returning.

To say, "kill the dogs" would be too extreme. There are many dogs, more fit to live than many men. Yet it will not be denied there are too many dogs, thousands of them, like thousands of men, born only to curse their species. Thousands of dogs are without

*Salicylic Acid for Preserving Fruit.*

responsible masters. They cannot be restrained and imprisoned, as can be dissolute human beings.

The most reasonable thing to do, is to lessen the number of dogs, especially the females. Regulate them by law. Require a high license for the keeping of a bitch,—say twenty-five or thirty dollars, and for dogs one fourth less. For fancy breeds provide a special license of not less than one hundred dollars. Require every licensed animal to be recorded and to wear a collar on which is inscribed the name of the owner and number of the license; grant authority to shoot on sight every dog not wearing the licensed badge, and make it the duty of all police officers to enforce the law. This will decrease the possibility of Rabies to the minimum, and prevent in a large measure the loss of human life, and of property of the farmer in live stock.

## SALICYLIC ACID FOR PRESERVING FRUIT.

*The State Board of Health:*

..... July 12, 1889.

Agents are selling in this county a recipe for preserving fruit with a preparation, the constituent of which is salicylic acid. It seems to be a nice thing. One of our physicians says it is not poisonous, and is healthy. I wish to know if it is unhealthful when used for preserving fruit?

A..... B.....

The foregoing letter is a sample of many received by the State Board regarding the use of salicylic acid for preserving fruit. Without entering into the properties of this drug, it is due to the people to give them the opinion of those who have investigated it.

This acid is obtained from the phenates of barium and calcium. Its use for preserving food and drink became so general in France that the French Academy of Medicine, at the request of the government, took up the matter, and appointed a committee consisting of such eminent physicians and chemists as Bertholet, Bergeron,

*Salicylic Acid for Preserving Fruit.*

Roussel, Proust, Brouardel, Vallin, and others, to investigate it. The committee reported to the government that the daily and long continued use of even small doses of salicylic acid had been demonstrated by medical observation to produce evil effects in feeble and sick persons, and that the use of it as a preservative of food or drink should therefore be forbidden.

Upon the report of this committee the use of this acid as a preservative of food or drink was prohibited by the government of France.

In a case brought before the Paris Court of Appeals for a violation of this law, M. Muller, the presiding judge, in giving his opinion, said:

"Salicylic acid is really a medicine, sometimes useful, often dangerous, the administration of which should be made under the direction of an experienced person, and which the government cannot relegate to merchants, acting only for the interest of their business, as the purchaser may thus receive injury to his health by the employment of this pretended preservative agent, which, when in doses more or less frequently repeated, may act greatly to his prejudice."

M. Vallin, the eminent chemist and physician, in his report to the French government, says:

"The continuous taking of small quantities of salicylic acid, or its derivations, is injurious to health, especially in the case of aged persons, and those whose renal and digestive organs are not perfectly sound."

Professor E. Englehardt says:

"I am against the use of this acid for the preservation of food or drink."

Professor Hilgard says:

"This acid is not a proper substance for daily use. It has a tendency to produce kidney troubles, or to aggravate them. Its continued use tends to injure the bones and teeth. It hinders digestion, and the proper chemical action of the various digestive fluids."

Prof. F. de Chaumont, the eminent French chemist, sanitarian and physician, in an address before the International Health Exposition, at London, in 1884, said of the use of this acid for preserving food: "It has been found that this is not a very desirable thing to take into the system."

*Transportation of Corpses.*

The opinion of those who have given the subject the most critical investigation is adverse to the use of this acid for preserving food, and especially when prepared by irresponsible persons for purely speculative purposes.

## TRANSPORTATION OF CORPSES.

During the past two years continuous effort has been made to establish regulations for the transportation of corpses, that would be operative in every State alike. To this end State Boards, railroad managers and undertakers have been diligently striving.

At a meeting of the National Association of General Baggage Agents of the various railroads, in the United States, held at San Francisco, January 16, 1889, a series of rules that had been previously referred to the various State Boards of Health, and Undertakers Associations, and nearly unanimously approved, were presented to the Baggage Association, and by that body unanimously approved and adopted, and they were again submitted to State Boards of Health for approval.

A resolution was also adopted, declaring "they be put in force by the several lines, on and after December 1, 1889, or so soon thereafter by each line as may be, and not cause any unnecessary friction or annoyance to the general public. It is understood that lines running through certain States or Territories will make such necessary changes or modifications in the rules as will put them in harmony with any State or Territorial law governing the transportation of dead bodies, but so far as they do not conflict with any State or provincial law, they will be enforced, and in the absence of any State law, or State or local boards of health with authority to enforce them, in such States or Territories, the railway companies will enforce the rules in all their essential features, thus



*Transportation of Corpses.*

insuring protection to connecting lines. In such States or Territories they may arrange to accept certificates of physicians or undertakers on transit permits, there being no health officer to issue them.

The rules, as adopted, are as follows:

*Rule 1.* The transportation of bodies of persons dead of Small-pox, Asiatic Cholera, Leprosy, Typhus Fever, or Yellow Fever, is absolutely forbidden.

*Rule 2.* The bodies of those who have died of Diphtheria, Anthrax, Scarlet Fever, Puerperal Fever, Typhoid Fever, Erysipelas, Measles, and other contagious, infectious, or communicable diseases must be wrapped in a sheet thoroughly saturated with a strong solution of bi-chloride of mercury, in the proportion of one ounce of bi-chloride of mercury to a gallon of water; and encased in air-tight zinc, tin, copper or lead-lined coffin, or in an air-tight iron casket, hermetically sealed, and all inclosed in a strong tight wooden box; or the body must be prepared for shipment by being wrapped in a sheet and disinfected by solution of bi-chloride of mercury as above, and placed in a strong coffin or casket, and said coffin or casket encased in a hermetically sealed (soldered) zinc, copper, or tin case, and all inclosed in a strong outside wooden box of material not less than one inch and a-half thick.

*Rule 3.* In cases of contagious, infectious, or communicable diseases, the body must not be accompanied by articles which have been exposed to the infection of the disease. And in addition to permit from board of health or proper health authority, agents will require an affidavit from the shipping undertaker, stating how body has been prepared and kind of coffin or casket used, which must be in conformity with rule 2.

*Rule 4.* The bodies of persons dead of diseases that are not contagious, infectious, nor communicable, may be received for transportation to local points in same State; when encased in a sound coffin or metallic case, and inclosed in a strong wooden box, securely fastened so it may be safely handled. But when it is proposed to transport them out of the State to an inter-state point (unless the time required for transportation from the initial point to destination does not exceed eighteen hours) they must be encased in an air-tight, zinc, tin, copper, or lead-lined coffin, or an air-tight iron casket, or a strong coffin or casket incased in a hermetically sealed (soldered) zinc, copper, or tin case, and all inclosed in a strong outside wooden box of material not less than one inch thick. In all cases the outside box must be provided with four iron chest handles.

*Rule 5.* Every dead body must be accompanied by a person in charge who must be provided with a ticket, and also present a full first-class ticket marked "Corpse," and a transit permit from the board of health, or proper health authority, giving permission for the removal, and showing name of deceased, age, place of death, cause of death (and if of a contagious or infectious nature), the point to which it is to be shipped; medical attendant, and name of undertaker.

*Public Summer Resorts.*

*Rule 6.* The transit permits must be made with a stub to be retained by the person issuing it, the original permit must accompany the body to destination, and two coupons; the first coupon to be detached by agent at initial point and sent to the general baggage agent, and the second coupon, by the last train baggageman. The stub, permit and coupons, must be numbered so the one will refer to the other, and on back of permit will be a space for undertaker's affidavit, to be used in cases of contagious or infectious diseases as required by rules 2 and 3.

*Rule 7.* The box containing corpse must be plainly marked with paster, showing name of deceased, place of death, cause of death, the point to which it is to be shipped, number of transit permit issued in connection, and name of person in charge of the remains. There must also be blank spaces at bottom of paster for station agent at initial point, to fill in the form and number of passage ticket, where from, where to, and route to destination of such ticket.

*Rule 8.* It is intended that no dead body shall be moved which may be the means of spreading disease, therefore, all disinterred bodies, dead from any disease or cause, will be treated as infectious and dangerous to the public health, and will not be accepted for transportation unless said removal has been approved by the State Board of Health, and the consent of the health authority of the locality to which the corpse is consigned, has been first obtained, and the disinterred remains inclosed in a hermetically sealed (soldered) zinc, tin, or copper-lined coffin or box, or box encased in hermetically sealed (soldered) zinc, tin, or copper cases.

The Iowa State Board of health has already once approved these rules, and is in full accord with the movement already inaugurated, being satisfied that any system, to be national in operation, must come from the railroad managers of the country, who are directly interested in protecting their train-men and property from infection.

## PUBLIC SUMMER RESORTS.

No custom is growing more upon our people than the one of spending a Summer vacation in travel and rest (1) at some popular Summer resort. It is questionable whether what is undertaken, as a means of rest and recuperation, does not too often become an occasion of unrest and real danger. The great majority go to some

*Public Summer Resorts.*

crowded place, the more popular, and hence more liberally patronized, the better. There is a whirl of excitement, and a round of pleasure from morning until late at night. The "society" man and woman have exacting and exhausting demands made upon them, and the quiet and retiring man and woman meet with unnumbered and innumerable annoyances. Both return home tired, "done out," unrested, unsatisfied, depleted in nervous force and in purse. It is a striking exemplification of the implicit trust of man in his brother man, a prophecy of the time when all will recognize the universal brotherhood of man, to see the way in which such pleasure seekers submit themselves to the accommodations afforded at such places. The food is eaten without any question as to healthfulness, quality, source or manner of cooking; the most outlandish milk, tea and coffee, with meat too often musty and mellow, may be served; the rooms may be never so poorly ventilated and miserably plumbed; the beds may be occupied without proper ventilation or disinfection by different persons with different affections, and yet the visitor meekly endures and has an abiding trust in the care and brotherly regard of his landlord. The most rickety boats are trusted with human freight upon the lakes, and yet the same confiding trust rests as a benediction upon these pleasure (?) seekers. Few of these Summer resorts, especially the later ones, have adequate means for disposing of the sewage and garbage that accumulate. Human excreta pollute the soil, the air is too often redolent with the most unsavory odors, the water is bad from soil pollution, and too often disease germs are developing in the system to prostrate the visitor with some infectious disease soon after his return to his home.

One of the things the last legislature had its attention called to, was the importance of our Summer resorts being placed under some inspection as to their healthfulness, the disposal of garbage, sewage, etc., and also with reference to the safety of the boats used on our inland waters. The legislators, in their great wisdom or otherwise, the Senate excepted, paid no attention to it.

There is probably not a health resort in the State of Iowa where any provision is made for the proper disposal of sewage, garbage,

*Public Summer Resorts.*

etc. The State Board of Health, or some other board of official health authority should have cognizance of all such places, and should be vested with authority to require either the removal of all causes endangering the lives and health of those resorting thither, or else to prevent their being advertised and used as health resorts, or pleasure resorts.

Dr. Cyrus Edson, of the Health Department of the city of New York, graphically describes the dangers arising from neglect of sanitary precautions, so universally practiced at Summer health resorts:

The following is what Dr. Edson says:

The water supply of the Summer resorts in this country is almost invariably as bad as can be. The most attractive watering place is often but a dangerous guest-trap baited with alluring scenery, fresh air, fishing, boating and other things attractive to its game.

During the months of June and July I visited eight popular resorts. All were supplied with water from dug or driven wells, and the drainage was uncared for so far as preventing contamination of the wells was concerned. At one place nearly all the guests were found to be suffering from Diarrhea. The water here was from a driven well under the house, and only twenty-three feet distant from a source of soil contamination.

Another place, a large town, very closely settled, was found to be exclusively supplied by means of wells about eighteen feet deep. Sewerage there was none. One of the oldest inhabitants boasted of the perfect way in which the sand swallowed up cess-pool and vault contents. 'They never have to be emptied,' he said. 'No wonder,' I replied, 'that your water supply never fails.'

An analysis of water from two wells in this town showed the grossest contamination. The unacclimated, or rather the unacquainted, visitor from the city after a few days in such a town wonders 'what ails his bowels.' It is not much of a mystery to experts or diagnosticians.

What would be the consequence, think you, if a few Cholera bacilli should find their way into towns such as this?

Well, if we are expected to answer, we should say the place would be apt to lose some reputation as a Summer "health" resort.

In June, 1880, a case of Small-pox appeared at one of the most attractive Summer resorts in this State. Though there was but a single case, and successful measures were adopted to prevent any spread of the disease, the entire community at once became excited and alarmed, and a rapid exodus followed, and a depopulation of



*Intramural Cemeteries.*

the locality would have resulted, but for extraordinary measures adopted to restore public confidence and assurance, of all absence of danger. Yet in the environments of nearly, if not all these Summer-resorts, lurks the virus of a disease, tenfold more to be dreaded, and more insidious, because unseen, than Small-pox; against which there is no prophylaxis; and from the ravages of which the only safety is in prevention.

## INTRAMURAL CEMETERIES.

"To bury a dead body, whether known before or not, is a debt I owe humanity," said Seneca, an eminent philosopher of the Silver Age, and counselor of Nero. Where the dead shall be buried is a vital question to the living.

In 1552, Bishop Latimer warned the people of London that intramural burials were dangerous to health.

In 1810, Adam Clarke, in his Commentary on the Bible, says: "No burying place should be tolerated within cities or towns, much less in or about churches and chapels."

Lapse of time has not changed the correctness of these opinions. The advancement of sanitary science has confirmed and intensified them.

"Every one knows," says Vicq. Dazyr, "that animal exhalations, particularly from a putrifying carcass, are very noxious and dangerous. Were we to collect together all the observations of those who have gone before us, we should find proofs without number of the deadly effects of interments in towns, and to which may be attributed the epidemics which have from time to time depopulated our cities."

In 1843, in Minchinhampton, England, in rebuilding a church, it was necessary to remove a portion of the surface of the earth of the graveyard that surrounded the building, to within a foot or two

*Intramural Cemeteries.*

of the level of the buried bodies. The removed earth was spread on adjacent fields, on the rector's garden, and a gardener's grounds, for fertilizing purposes. This diffusion of a morbid poison was soon followed by unusual sickness in this previous healthy locality. The rector's wife, daughter and a servant died; the gardener died; the children who passed the upturned graveyard died. Seventeen deaths occurred, and nearly two hundred children had Measles, Scarlet Fever and various diseases, traced to the exhalation from this poisoned graveyard soil.

The effect of the introduction of decomposing and prutescent animal matter into living tissues, and its capacity to produce fatal disease is too well established to be questioned. It is also equally well established that this morbid matter, when diffused in the atmosphere, can be conveyed into the system by respiration. The energy with which poisons act upon the system, when brought in contact with the lungs, is evidenced by the fact that a single inspiration of the concentrated prussic acid is capable of causing death as quickly as a stroke of lightning.

In addition to the danger of poisoning from graveyards, through the atmosphere, there is another and more formidable danger, from the pollution of wells and sources of water supply, because more insidious. Says Dr. Copeland: "It is fully ascertained that soil that receives the exuvie of animal matter, or the bodies of dead animals, will become rich in general, and the water that percolates through the soil thus enriched will become injurious to the health of those who use it."

Dr. Chadwick, in his report to the British Parliament, after a thorough investigation of intramural burial, said: "There is no case in which the liability to danger should be incurred by interment amidst the dwellings of the living."

In France the opening of a well within one hundred metres (three hundred and twenty-seven feet) of any place of burial is prohibited. In Germany the prohibition extends to three hundred feet. By the public health act of England, cemeteries cannot be located within two hundred yards of a dwelling-house. The minimum distance in France is one hundred and nine yards, and no

*Intramural Cemeteries.*

dwelling-house can, without special authority, be erected within a like distance of a cemetery.

The location of a cemetery should receive the most thoughtful consideration. The dead should be so buried that the living may not suffer. The nature of the soil, and the topography of the adjacent country should be thoroughly examined in reference to drainage and water supply. A burial place should never be selected because it is a gift, or cheap. It should be elevated above the surrounding region sufficient to receive free ventilation by the wind, which should have unobstructed access from all points.

Sandy soil, or sandy loam, with a mixture of vegetable mould, is best adapted to rapid decomposition of bodies. It also affords greater rapidity of percolation of fluids. Clay retards putrefaction, and retains in concentrated form the products of decomposition, and the specific germs of Typhoid Fever, Diphtheria, and malignant fevers are liable to find their way into wells. A soil with stony substratum should be avoided. Fissured rock underneath sand or gravel should also be avoided, as it receives surface water rapidly, and conducts it frequently long distances, contributing largely to the pollution of wells. It is also a dangerous condition when graves and wells are sunk in a porous soil overlying impervious clay, a condition to be found widely extended over the State of Iowa.

No drainage from a cemetery should be permitted to enter a stream of water liable to be used for domestic purposes, or drank by domestic animals.

It is a healthful omen that during the biennial period frequent inquiries have been made of the State Board regarding the location of cemeteries.

Every principle of sanitary science suggests the location of cemeteries away from the habitations of the living. There is, also, a moral fitness in thus fixing the "city of the dead." It affords opportunity for reverent, silent devotion at the shrine of the beloved dead. Beautiful, and adorned by taste and refinement, it becomes a lovely, holy, sacred place. It is instinctive in every human heart to mourn in solitude and retirement. Far down in the vista of

*Kerosene Oil.*

time we see Abraham seeking a burial place for his people, and he "paid to Ephron four hundred shekels of silver, and the field of Ephron, which was in Machpelah, and all the trees that were in the field, that were in the borders round about were made sure, and there Abraham was buried, and Sarah, his wife."

## KEROSENE OIL.

The frequency of complaints made to this office, by retail dealers and consumers, of the inferior quality of kerosene being sold and used throughout the State, suggested an investigation as to the probable cause. A large number and variety of burners, lamps and wicks, and oil of the best and poorest kinds and quality, were procured and thoroughly tested. The result indicates that the complaints were founded principally in an improper use of, and not in the quality of the oil.

*What oil to buy.*—Kerosene may be said to be the middle product of petroleum, the upper being several volatile hydro-carbons, known under the general term of naphtha, a highly inflammable substance; and the lower, of paraffine, heavier and less combustible than kerosene. Naphtha is a very dangerous explosive. An excess of naphtha in kerosene renders the kerosene dangerous. An excess of paraffine makes the kerosene heavy and less combustible.

As naphtha and paraffine have less commercial value than kerosene, the inducement of refiners is to retain so much of them in the kerosene as possible.

The statutes of Iowa demand that so much of the naphtha shall be removed that oil when heated to a temperature of one hundred and five degrees Fahrenheit, will not throw off a vapor which will ignite when in contact with a flame or lighted match. That is what is termed the



*Kerosene Oil.*

flashing point. Extensive observation and experiment have demonstrated that this standard will give satisfactory results for illuminating purposes, and be safe for use in ordinary lamps. It would not, however, be safe for kindling fires in the kitchen stove. No oil having a flashing point below one hundred and five degrees can be lawfully sold, nor used for illuminating purposes in this State.

The flashing point should not be confounded with the burning point, or fire-test, which signifies that degree of temperature or heat at which oil placed in an open vessel will ignite and burn without a wick. The fire-test is not recognized by the Iowa statute, and has little or no value as determining the actual quality of the oil. Retail dealers should especially bear this in mind. Refiners and tank line companies frequently brand oil "one hundred and fifty degrees fire-test," "Head Light one hundred and seventy-five degrees," or trade-marks which have no relation whatever, under the law, to the actual quality of the oil. The brand of an Iowa inspector, indicating the flashing point, is to be deemed the actual quality and standard of the oil. The average difference between the flashing and burning point of kerosene is twenty to twenty-seven degrees, so that oil branded one hundred and fifty degrees fire-test should have a flashing point of one hundred and twenty-three degrees. Hence, no person should be misled or deceived by the dealer who says an oil is one hundred and fifty degrees or one hundred and seventy-five fire-test. The law interposes no inhibition against trade-marks. The refiner or dealer may give his oil any name or grade he pleases.

The tendency of retail dealers is to purchase oil having a high flashing point, presumably on the theory that if oil having a flashing point of one hundred and five degrees is safe, that of one hundred and twenty-six degrees is so much safer. Theoretically that is true; but the higher the flashing point, the denser and heavier the oil. Heavy oil congeals more or less in cold weather, will not rise freely, hence there is imperfect combustion. There is a limit to capillary attraction. Heavy oil is also more liable to clog the wick tube. Oil having a flashing point of one hundred and five degrees to one hundred and ten degrees will give better illumination, burn

*Kerosene Oil.*

freer, and with greater satisfaction in ordinary lamps, than an oil with a flashing point of one hundred and twenty degrees or one hundred and twenty-five degrees.

The freedom with which kerosene will burn depends very much upon the amount of paraffine retained therein, and upon the wick. Heavy, or high grade kerosene has more or less paraffine, which tends to harden and clog the wick, and overheat the wick-tube.

*Lamps.*—Lamps are becoming fashionable. They are going into the most aristocratic homes, as wedding or holiday presents, even where gas is used. Thousands of them are purchased more for ornament than use, and with no regard to utility. Many of them are worthless for illuminating purposes.

They should be of metal, and have no feeding place except the opening for the wick-tube. The bowl should be large in diameter and shallow, not exceeding two and one half inches in depth, so as to bring the flames as near the oil as possible, to secure an even combustion of all the contents. With deep lamps the wick will fail to raise the oil when half consumed, and deficient illumination is the result.

The base should be large and heavy, to prevent overturning.

*They should be cleaned and filled every day, and once each week entirely emptied of their contents, to remove the dregs and sediment.*

When oil has been kept forty-eight hours in an half-filled lamp, a dangerous vapor forms, which will be released by the process of filling the lamp.

Never remove the top nor refill a lamp when burning.

Before lighting, turn the wick down even with the tube, and raise it gradually.

Never blow down a chimney to extinguish a lamp. Turn the wick down until the flame flickers, then give a quick puff of breath horizontally across the top of the chimney.

During the day keep the lamp where the oil will not become warm. Never set it on a mantel over a fire-place, grate, or stove where there is a fire.

*Kerosene Oil.*

Never leave a lamp burning with the wick turned down. Air-currents are liable to cause the chimney to break. The wick-tube then will become greatly heated, and the lamp filled with a dangerous vapor. A burning lamp with a broken chimney becomes liable to violent explosion in about fifteen minutes. A lamp should not be left burning at all in a vacant room or house.

*Burners.*—The successful combustion of kerosene depends largely on the burner. Two kinds are made, one for heavy oil, the other for light oil. Of these there are numerous devices and patents. Competition and universal demand for cheapness has filled the markets with worthless burners. The successful and commendable Hinge Sun burner for ordinary house lamps has been largely displaced by cheap imitations, some of which are simply brass-washed tin.

The burner should be adapted to the oil to be used, whether heavy or light. It should be well made, of brass, and as short as possible. It should be properly constructed for draft and ventilation for the escape of vapor from the vapor chamber of the lamp. For light oil, it should burn without heating—the cooler the better. The Hinge Sun, Grand, and Irex gave most satisfactory results with light oil, especially the Irex, which requires a thick, even wick, giving a fine light. For heavy oil, a more liberal wick is required to raise the oil freely enough to supply the flame and give the required heat, hence two or more wicks are provided. The Dual, Duplex, Oxford, and Moehring will burn successfully oil having a flashing point of two hundred and seventy to two hundred and eighty degrees, yet the flame will not be so white as that from one hundred and five or one hundred and ten degrees oil with a good burner, nor give so good satisfaction.

The so-called Hitchcock lamp, designed to burn without a chimney, gives a steady, strong, clear pleasing light of full sixteen-candle power, and being of metal, is commended for safety, economy and illumination.

Burners should be kept perfectly clean, and free from crustation on the wick-tube, and accumulation of charred wick on the perforated disk. The disk is for the purpose of supplying draft and

*Kerosene Oil.*

the necessary amount of oxygen of the atmosphere to consume the carbon of the oil. When the disk is clogged, imperfect combustion and smoke is the result.

Keep the vent-tube along the wick-tube open and clean, as it is the safety-valve of the lamp.

Gummed and clogged burners can be easily cleaned by boiling a few moments in sal-soda or concentrated lye and water.

Use chimneys properly adapted to the burner. The size and form has much to do with the success of the burner. Get the best annealed glass. There is no economy in purchasing cheap, common glass chimneys. Most flat-wick burners require what are known as sun-burner bulb chimneys. Burners with more than one wick require flat-bulb chimneys.

*Wicks.*—Probably not one person in one hundred gives a lamp wick thought or attention. Yet it is one of the most important factors in the burning of kerosene, as it is also one of the most probable causes of complaint of the unsatisfactory burning of oil. The markets are filled with cheap wicks, worthless and valueless at any price. They are hard, soft, rough, smooth, thick, thin, wide, narrow, regular and irregular, all in the same wick. Select a wick of soft, even texture, thick enough to carry oil sufficient to supply the flame. As wick tubes are presumed to be of proper size, the wick should snugly fit the tube, yet move freely. It should only reach the bottom of the lamp. The so-called Fletcher wick appears to be made with much care, and was the best of the samples tested. Wicks should be changed once each month.

At the annual meeting of the Board in May, Rule 9, of the Rules and Regulations for the Inspection of Illuminating Oil, was amended to read as follows, to-wit:

*Rule 9.* The brand must be placed on the barrels, or packages, with bright colors, and must be affixed by the inspector in person, or by some person under his direction, who is not directly nor indirectly interested in the manufacture and sale of illuminating oil. The brand is an official signature, and must not be permitted to pass out of the custody of the inspector. *But no barrel shall be branded previous to being filled with oil.*



*Safety Burning Fluids.*

Considerable complaint has been made during the past year by oil refiners against the rigidity of the inspection in this State, and several attempts were made to force illegal oil into the State, but the payment of transportation out of the State of the rejected stuff uniformly provided a remedy.

## SAFETY BURNING FLUIDS.

A large number of complaints were made during the past year of persons going about the State selling a so-called French Electric Fluid, and the "Excelsior" Safety Burner. This is an old fraud under a new name, and which has been exposed many times during the past twenty years.

A large number of so-called safety lamps and processes for making safety burning fluids have been patented, to make it possible to burn the explosive naphthas without danger. A keg of gunpowder is safer in a house than either. Agents go about selling recipes for making the so-called safety fluid, and claim that it is perfectly safe. It should be known that nothing can be added to naphtha that will change its explosive character. If so, refiners would long since have discovered it.

No lamp is safe with dangerous oil, and all lamps are safe with safe oil.

The chief substance of this so-called safety fluid is gasoline, benzine, rhigolene, or other volatile constituent of naphtha—it is only naphtha under a false name, into which roots, gums, barks and salts have been introduced, only to leave it as explosive as before. The formula for making this "Electric Fluid," reads: "Gasoline one gallon, gum camphor one ounce, salaratus one ounce, common salt four ounces."

The experiments given by the vender of these fluids to deceive the people are very convincing. To show his mixture is not

*Railroad Accidents.*

explosive, he will unscrew the wick tube, apply a match where the vapor, if any, quietly takes fire and burns without explosion; or he pours a quantity in a saucer and applies a match. There is no explosion, the customer is satisfied, and to save a few cents purchases the patent. Now, it should be borne in mind that a certain portion of air is necessary to cause an explosion of naphtha vapor, and it requires some skill to properly mix these, and the vender is very careful that he does not do it. Equal parts of air and vapor will not explode; three parts air and one part vapor will give a vigorous flash; five parts air and one of vapor will give a loud report; eight or more parts air and one vapor will give a violent explosion.

The sale or use of these so-called safety fluids, or of any oil for illuminating purposes which are the product of petroleum, which has not been inspected and approved, is prohibited in this State, and all persons selling such should be arrested, and fined, or imprisoned, as provided by law.

## RAILROAD ACCIDENTS.

The murderous car-coupler and pin still continues the slaughter of young men, and to mangle and maim bodies and limbs. They will probably continue until prohibited by force of law, notwithstanding inventive genius has devised an adequate preventive against this murderous business.

The Railroad Commissioners, in their report for the year ending June 30, 1888, say:

During the year, one hundred and eighty persons were killed on the railroads in the State. Of these ten were passengers, one hundred and one employes, and sixty nine others not connected with the operation of the road. Eight were killed by derailment, twenty by collision, one caught in frogs, nineteen coupling cars, thirty-two fell from trains, ten getting on and off

*Railroad Accidents.*

trains, two at highway crossings, twenty from miscellaneous causes, three from overhead obstructions, nine while stealing rides, eight while intoxicated, thirty-six while trespassing on track, and one suicide.

There were seven hundred and twenty-three persons injured during the year. Of these seventy-seven were passengers, five hundred and sixty-four employes, and eighty-six others, not connected with the operation of the road nor sustaining the relations of passengers; fifty-nine were injured by derailment, seventy-one by collisions, seven were caught in frogs, two hundred and forty coupling cars, fifty-two fell from trains, sixty getting on and off trains, five at highway crossings, one hundred and eighty-two from miscellaneous causes, thirteen from overhead obstructions, eleven while stealing rides, twenty-five trespassing on track, and one while intoxicated.

The number killed is forty-eight more than the previous year, the number injured is two hundred and eighty-three more.

There were in the State during the year three of four accidents attended with loss of life and personal injury from causes that may reasonably be expected not to occur again. This will not, however, we think, satisfactorily account for the greatly increased number of killed and injured over the report of the former year. With the increased appliances for safety, we had hoped this year to record a decrease.

There were eight killed and fifty-nine injured by derailments, there were twenty killed and seventy-one injured by collisions, there were one killed and seven injured by being caught in frogs. The one killed was on the Chicago, Milwaukee & St. Paul Railway, and five of the injured on the Illinois Central, one on the Chicago & Northwestern, and one on the Sioux City & Pacific. The Commissioners understand that the Chicago & Northwestern is using the Edwards' foot guard, but are not aware what safety appliances are used by the other lines reporting accidents from this cause.

Nineteen persons were killed and two hundred and forty injured coupling cars. The Western Car Builder's Association, more than a year ago, agreed upon couplers of the Janney type, as in most respects more fully than any other, meeting the conditions required for safety. It is evident that the automatic coupler has not been very generally adopted, as nineteen persons were killed in 1888, and nine in 1887, and two hundred and forty injured, while in the previous year one hundred and thirty-four were injured. But one year since the organization of this Board, has there been as many killed, and the injured exceed any previous number by fifty-eight.

In 1878, there were killed, coupling cars.....	17
In 1878, there were injured, coupling cars.....	70
In 1879, there were killed, coupling cars.....	14
In 1879, there were injured, coupling cars.....	55
In 1880, there were killed, coupling cars.....	17
In 1880, there were injured, coupling cars.....	87
In 1881, there were killed, coupling cars.....	20
In 1881, there were injured, coupling cars.....	64
In 1882, there were killed, coupling cars.....	16
In 1882, there were injured, coupling cars.....	182
In 1883, there were killed, coupling cars.....	16

*Railroad Accidents.*

In 1883, there were injured, coupling cars.....	98
In 1884, there were killed, coupling cars.....	8
In 1884, there were injured, coupling cars.....	109
In 1885, there were killed, coupling cars.....	15
In 1885, there were injured, coupling cars.....	174
In 1886, there were killed, coupling cars.....	10
In 1886, there were injured, coupling cars.....	126
In 1887, there were killed, coupling cars.....	9
In 1887, there were injured, coupling cars.....	194
In 1888, there were killed, coupling cars.....	19
In 1888, there were injured, coupling cars.....	240

Since the creation of this Board in 1878, one hundred and fifty-nine persons have been killed and thirteen hundred and thirty-nine injured, coupling cars. We had hoped better results than seem to have been attained by the limited use of automatic couplers. We have confidence that casualties will be reduced in as great a rate as in the item of caught in frogs, which, in 1884, is reported as killed, eleven, this year but one.

Thirty-two persons were killed and fifty-two injured falling from trains. When the air brake is universally applied to freight trains we think that much of the exposure to loss of life and personal injury will be removed. To one who has watched the movement of freight trains carefully, and the wrenching and breakage that seems to belong to the best management of the past, the conviction is unavoidable that economy requires as soon as practicable the application of brakes operated from the engine to all parts of the train at once. The dictates of humanity, as well as the financial interests of the roads, call for as rapid a change in this respect as practicable.

Ten persons were killed and sixty injured getting on and off trains while in motion. This is made by the Iowa statute a penal offense, and as far as we are able to judge, accidents from this cause are the result of individual recklessness, for which we can suggest no remedy.

Nine persons were killed and eleven injured stealing rides, most of these were on the Chicago & Northwestern, and probably the result of a wreck. It is astonishing the numbers that travel about the country in exposed positions on railway tracks and in freight cars, with apparently no motive but the gratification of a taste for vagrancy.

Thirty-six persons were killed and twenty-five injured while trespassing on track. The reports of this Board, covering a period of eleven years, show that three hundred and thirteen persons have been killed and two hundred and three injured, while walking on the track. Sixty-one per cent of these accidents are fatal. We have reported this condition year after year, and see a gradual yearly increase of death and injury from this unnecessary exposure. We have suggested before that walking on track be made a penal offense, not for the benefit of the railway companies, but for the protection of the public. Something should be done to impress upon the public mind the danger. The convenience and advantage of using the track for a highway can hardly compensate for the death-rate of three hundred people, and the serious injury of two hundred more, an average of sixty a year, that will



*Railroad Accidents.*

continue as long as something is not done to check the practice. Familiarity with trains is no protection. In England walking on track is prohibited, and the prohibition enforced as a public regulation.

There were more than twice the number of persons killed while coupling cars in 1888 than in 1887. Of the total number killed, eighty-four were from preventable causes. This is a serious loss to the State, from a financial and economic standpoint.

Every human being of adult age forms a part of the industrial wealth of the people. They can be estimated at a money value. The courts of this country have fixed an average standard of five thousand dollars as the sum a railroad company must pay for the loss of a human life, caused by its own negligence. Added to this should be the various expenses incident to railroad accidents, as medical attendance, burial expenses, etc. In the death of these eighty-four persons we have a loss, to-wit:

Eighty-four persons at \$5,000 each.....	\$422,000.00
Medical attendance, care, etc., at \$50 .....	4,200.00
Burial expenses, at \$50 .....	4,200.00
Total .....	\$430,400.00

It may safely be estimated that the loss to the industrial wealth of the State, from clearly preventable causes, is more than three quarters of a million dollars per year.

Such a loss of life, and such wholesale maiming of bodies and limbs is nothing less than criminal, and the State Board of Health would be grossly derelict in official duty, if it did not most earnestly protest against it; and it, therefore, indorses the utterances of the Railroad Commissioners in regard thereto; and, would further urge upon the legislature such action as will provide against it.

Self-preservation is the first law. The protection of human life is the supreme law. Railroad companies have now no valid reason for refusing to adopt the necessary appliances to prevent entirely the loss and damage from the link and pin coupler. Adequate and successful automatic substitutes have been perfected. Only mercenary reasons exist against their uniform and universal adoption on

*House Plants and Health.*

every railroad in the United States. It is simply a question of a few dollars' expense—a consideration which has, and should have, no weight whatever in the enactment of compulsory measures necessary to secure protection to human life.

## HOUSE PLANTS AND HEALTH.

There is perhaps nothing that so eloquently appeals to our love of the beautiful as Nature's varied flowers and foliage. In sickness or in health; at home or abroad; in prosperity or in adversity, the humblest flower, and the verdant or variegated leaf, has a mission of good cheer and help to all.

There are but a few of the countless variety of flowers and leaves that exhale a perfume that is injurious, and these are well recognized.

It would be well, if all people could be induced for sanitary reasons, as well as the aesthetic, to cultivate and cherish plants. There is no reason why, in our Northern homes, the blooming flower, with its rich and health-giving fragrance, as well as the non-blooming plants, may not be seen and enjoyed in Winter as well as in the Summer.

Their presence is especially commended in all our State institutions for the insane; the hospital for the treatment of the deaf mutes; the reformatories; the orphan's home, in all our public as well as private schools; as well as our private houses. None are so poor as not to be able to afford a flower or some plant.

It is pleasing to note the growing favor with which house plants and floriculture are coming to be regarded as sanitary agents. It is but a few years since physicians largely, and the laity generally, looked upon house plants, especially flowering plants, in a living

*House Plants and Health.*

or sleeping room, as positively injurious. They were generally looked upon as God's beautiful creatures; but if good creatures, as having their place, and that place out of doors. A happy and sensible change in public and professional sentiment is taking place.

They are not only regarded as harmless, but it has been abundantly demonstrated that they possess and exert therapeutic and healthful influences. They are especially beneficial in rooms deprived of moisture by hot air furnaces, since the transpiration of moisture by their foliage supplies the exhausted and much needed moisture of the air. It has been also demonstrated that the perfume-bearing flowers, and foliage, especially, produce ozone; an essential and vitalizing principle of the atmosphere. Persons living and working in green-houses, and conservatories, are notoriously long-lived and healthy. Persons with an inherited and acquired predisposition to pulmonary disease have enjoyed good health while in the conservatories and green-houses, and on leaving to engage in other pursuits have rapidly developed their tendency. There are many instances of persons with advanced Consumption, who have been greatly benefited by living in an atmosphere fragrant with perfume-bearing flowers. They have a solarium in connection with the New York City Hospital, in which is a great number of foliage and flowering plants, and convalescents find their most rapid and uninterrupted improvement in proportion to the time spent in this department of the hospital. When our homes and hospitals, and our public schools and seminaries of learning, shall contain more of these beautiful, mute evangelists of health, another important step will be taken in not only making these places the pleasant spots of earth, but the most healthful. If possible, every public hall and church, should, during every service held therein, be decked and decorated with these silent and powerful promoters of a healthier life here, and antetypes of a brighter life hereafter.

*Consumption—Its Cause and Prevention.*

## CONSUMPTION.

## ITS CAUSE AND PREVENTION.

There is no single disease that carries off so many of the human family yearly as Consumption,—nor is there any disease in the United States, nor in Iowa, as a part thereof, so fatal as this. Until comparatively recently it has generally been regarded hereditary and climatic in its origin—a result of cold or exposure.

Never, however, has there been such a rapid change in public sentiment in regard to sanitary matters as has taken place since Koch discovered the bacillus of Tubercle, and announced to the world that Consumption was a communicable disease. It is within less than a decade of years, that a book was written entitled, "Is CONSUMPTION CONTAGIOUS?" The author strongly declared that it was, and yet adduced a mass of evidence that it was *not*. Now, there is scarcely one who does not believe it to be a contagious disease and preventable. A few months ago the Health Department of New York City, appointed a commission of eminent physicians to thoroughly investigate the subject and report as to the best means of preventing Tuberculosis. The question is of such vital importance because of the wide-spread desolation produced by this disease, that their report in full, and the rules adopted by the Health Department of New York City, in accordance with the suggestions made by the committee respecting preventive measures are given in full. Unfortunately several of the rules are seemingly impracticable in the present state of society; and yet the observance of any of them will to that extent lessen the danger. The faithful observance of all, would infinitely lessen the number of cases. It is recommended that all carefully read the report and the rules adopted, and faithfully use every endeavor to practice them.



*Consumption—Its Cause and Prevention.*REPORT ON THE PREVENTION OF TUBERCULOSIS TO THE BOARD OF  
HEALTH OF NEW YORK CITY.HEALTH DEPARTMENT, }  
CITY OF NEW YORK, May 28, 1889. }

The disease known as Tuberculosis, and, when affecting the lungs, as Pulmonary Tuberculosis (Consumption), is very common in the human being and in certain of the domestic animals, especially cattle. About one fourth of all the deaths occurring in the human being during adult life is caused by it, and nearly one half of the entire population at some time in life acquires it. The disease is the same in nature in animals and in man, and has the same cause.

It has been proven beyond a doubt that a living germ, called the Tubercle Bacillus, is the cause and the only cause of Tuberculosis. It does not seem necessary to state the facts upon which this assertion is based, for the observation first made by Robert Koch in 1882 has been confirmed so often and so completely that it now constitutes one of the most absolutely demonstrated facts in medicine.

Tuberculosis may effect any organ of the body, but most frequently first involves the lungs. When the living germs find their way into the body they multiply there, if favorable conditions for their growth exists, and produce small new growths or nodules (Tubercles) which tend to soften. The discharges from these softened Tubercles, containing the living germs, are thrown off from the body. In Pulmonary Tuberculosis these discharges constitute, in part, the expectoration. The germs thus thrown off do not grow outside the living human or animal body, except under artificial conditions, although they may retain their vitality and virulence for long periods of time, even when thoroughly dried. As Tuberculosis can only result from the action of these germs, it follows from what has just been said that when the disease is acquired it must result from receiving into the body the living germs that have come from some other human being or animal affected with the disease.

It has been abundantly established that the disease may be transmitted by meat or milk from tubercular animals. The milk glands in milk cows often become affected with the disease when their lungs are involved, and the milk from such animals may contain the living germs and is capable of producing the disease. Among stall-fed dairy cows twenty per cent or thirty per cent are sometimes found to be affected with the disease. Tubercular animals are also frequently killed for food; their flesh sometimes contains the germs, and if not thoroughly cooked is capable of transmitting the disease. Boiling the milk or thoroughly cooking the meat destroys the germs. Although the meat and milk from tubercular animals constitute actual and important sources of danger, the disease is acquired, as a rule, through its communication from man to man.

Tuberculosis is commonly produced in the lungs (which are the organs most frequently affected) by breathing air in which the living germs are suspended as dust. The material which is coughed up, sometimes in large

*Consumption—Its Cause and Prevention.*

quantities, by persons suffering from Consumption, contains these germs, often in enormous numbers. This material, when expectorated frequently, lodges in places where it afterward dries, as on the streets, floors, carpets, clothing, handkerchiefs, etc. After drying, in one way or another, it is very apt to become pulverized and float in the air as dust.

It has been shown experimentally that dust collected from the most varied points, in hospital wards, asylums, prisons, private houses, etc., where consumptive patients are present or have been present, is capable of producing Tuberculosis in animals when used for their inoculation. Such dust may remain for weeks its power of producing disease. On the other hand, dust collected from rooms in institutions or houses that have not been occupied by tubercular patients does not produce the disease when used for the inoculation of animals.

These observations show that where there are cases of Pulmonary Tuberculosis, under ordinary conditions, the dust surrounding them often contains the Tubercle Bacilli; and persons inhaling the air in which the dust is suspended may be taking in the living germs. It should, however, be distinctly understood that the breath of tubercular patients and the moist sputum, received in proper cups, are not elements of danger, but only the dried and pulverized sputum. The breath and moist sputum are free from danger, because the germs are not dislodged from moist surfaces by currents of air. If all discharges were destroyed at the time of exit from the body, the greatest danger of communication from man to man would be removed.

It then follows, from what has been said, that Tuberculosis is a distinctly preventable disease.

It is a well known fact that some persons, and especially the members of certain families, are particularly liable to Tuberculosis, and this liability can be transmitted from parents to children. So marked and so frequent is this liability, and so frequent is the development of the disease in particular families, that the affection has long been considered hereditary. We now know that Tuberculosis can only be caused by the entrance of the germ into the body; and that this transmitted liability simply renders the individual a more easy prey to the living germs when once they have gained entrance. The frequent occurrence of several cases of Pulmonary Tuberculosis in a family is then to be explained, not on the supposition that the disease itself has been inherited, but that it has been produced after birth by transmission directly from some affected individual. Where the parents are affected from Tuberculosis the children, from the earliest moments of life, are exposed to the disease under the most favorable condition for its transmission, for not only is the dust of the house likely to contain the bacilli, but the relationship also between parents and children, especially between the mother and the child, are of that close and intimate nature especially favorable for the transmission by direct contact.

If, then, Tuberculosis is not inherited, the question of prevention resolves itself principally into the avoidance of tubercular meat and milk, and the destruction of the discharges, especially the sputum, of tubercular individuals.

*Consumption—Its Cause and Prevention.*

As to the first means of communication, those measures of prevention alone answer the requirements, which embrace the governmental inspection of dairy cows and of animals slaughtered for food, and the rigid exclusion and destruction of all those found to be tubercular.

For the removal of the second means of communication, *i. e.*, the sputum of tubercular individuals, the problem is simple when the patients are confined to their rooms or houses; then wooden or paste-board cups with covers should always be at hand for the reception of the sputum. These cups are supported in simple racks, and at least once daily, or more frequently if necessary, should be removed from the racks and thrown with their contents into the fire.

The disposition of the expectoration of persons who are not confined to their rooms or houses is a far more difficult problem. The expectoration certainly should not be discharged on the street, and the only practicable means for its collection seems to be in handkerchiefs, which, when soiled, should at the earliest moment be soaked in a solution of five per cent of carbolic acid and then boiled and washed. Handkerchiefs thus soiled are exceedingly dangerous factors in distributing Tubercle Bacilli; for when the sputum becomes dry it is easily separated in flakes from the cloth, and then becomes pulverized and suspended as dust.

It becomes evident from what has been said that the means which most certainly prevent the spread of this disease from one individual to another, are those of scrupulous cleanliness regarding the sputum. These means lie largely within the power of the affected individual. It is furthermore to be remembered that Consumption is not always, as was formerly supposed, a fatal disease, but that it is in very many cases a distinctly curable affection. An individual who is well on the road to recovery may, if he does not with the greatest care destroy his sputum, diminish greatly his chances of recovery by self-inoculation.

While the greatest danger of the spread of the disease from the sick to the well is in private houses and in hospitals, yet if this danger is thoroughly appreciated, it is for the most part quite under control, through the immediate destruction of the sputum and the enforcement of habits of cleanliness. But in places of public assembly, such as churches and theatres, particularly the latter, the conditions are different, and the safety would seem to depend largely upon a dilution and partial removal of the floating and possibly dangerous dust by means of adequate ventilation.

Rooms in private houses and hospital wards that are occupied by phthisical patients should from time to time be thoroughly cleaned and disinfected, and this should always be done after they are vacated, before they are again occupied by other individuals.

Steamship companies should be obliged to furnish separate apartments for consumptive persons, so that no person in the exigencies of travel need be forced to share his room with one who might be a source of active danger to him.

*Consumption—Its Cause and Prevention.*

We desire to especially emphasize the following facts:

1. That Tuberculosis is distinctly a preventable disease.
2. That it is not directly inherited.
3. That it is acquired by the direct transmission of the Tubercle Bacillus from the sick to the healthy, usually by means of the dried and pulverized sputum floating as dust in the air.

The measures, then, which are suggested for the prevention of the spread of Tuberculosis are—

1. The security of the public against tubercular meat and milk, attained by a system of rigid official inspection of cattle.
2. The dissemination among the people of the knowledge that every tubercular person may be a source of actual danger to his associates if the discharges from the lungs are not immediately destroyed or rendered harmless; and,
3. The careful disinfection of rooms and hospital wards that are occupied or have been occupied by phthisical patients.

HERMAN M. BIGGS, M. D.,

T. MITCHELL PRUDDEN, M. D.,

HENRY P. LOOMIS, M. D.,

*Pathologists to the Health Department, New York City.*

RULES TO BE OBSERVED FOR THE PREVENTION OF THE SPREAD OF  
CONSUMPTION.

HEALTH DEPARTMENT, CITY OF NEW YORK, {  
301 MOTT STREET, July, 1889. }

Pulmonary Tuberculosis (Consumption) is directly communicated from one person to another. The germ of the disease exists in the expectoration of persons afflicted with it.

The following extract from the Report of the Pathologists of the Health Department explains the means by which the disease may be transmitted:

"Tuberculosis is commonly produced in the lungs (which are the organs most frequently affected) by breathing air in which living germs are suspended as dust. The material which is coughed up, sometimes in large quantities, by persons suffering from Consumption contains these germs often in enormous numbers. \* \* \*

"This material when exported frequently lodges in places where it afterward dries, as on the street, floors, carpets, handkerchiefs, etc. After drying in one way or another it is very apt to become pulverized and float in the air as dust."

By observing the following rules the danger of catching the disease will be reduced to a minimum:



*Consumption—Its Cause and Prevention.*

## I.

Do not permit persons having Consumption to spit on the floor or on cloths, unless the latter be immediately burned. The expectoration of persons suspected to have Consumption should be caught in earthen or glass dishes containing the following solution:

Corrosive Sublimate, 1 grain.  
Water, 1 pint,

and finally thrown into the sewer or burned.

## II.

Do not sleep in a room occupied by a person who has Consumption. The living room of a consumptive patient should have as little furniture as practicable. Hangings should be especially avoided. The use of carpets and rugs ought always to be avoided.

## III.

Do not fail to wash thoroughly the eating utensils of a person who has Consumption as soon after eating as possible, using boiling water for the purpose.

## IV.

Do not mingle the unwashed clothing of a Consumptive person with similar clothing of other persons. The soiled clothing of a consumptive person should be removed at once, put in boiling water for forty-five minutes, or otherwise disinfected.

## V.

Do not fail to catch the bowel discharges of a Consumptive person with diarrhea in a vessel containing corrosive sublimate one grain to water one pint.

## VI.

Do not fail to consult the family physician regarding the social relations of persons suffering from suspected Consumption.

## VII.

Do not permit mothers suspected of having Consumption to nurse their offspring.

*Consumption—Its Cause and Prevention.*

## VIII.

Household pets, animals or birds, are quite susceptible to Tuberculosis, therefore do not expose them to persons afflicted with Consumption; also do not keep, but destroy at once, all household pets suspected of having Consumption, otherwise they may give it to human beings.

## IX.

Do not fail to cleanse thoroughly the floors, walls and ceiling of the living and sleeping rooms of persons suffering from Consumption, at least once in two weeks.

By order of the Board.

EMMONS CLARK, *Secretary.*

CHAS. GEO. WILSON, *President.*

*Consumption through Meat and Milk.*—Not the only danger—nor perhaps the greatest danger—comes from the inhalation of the dried human sputa. It has long been suspected, and has now been satisfactorily demonstrated, that the meat and milk of cattle affected with Tuberculosis produce the disease when eaten—especially the milk, which is seldom boiled before being fed. Few have any idea of the number of cattle that are affected with this terrible disease, and the number is rapidly increasing.

The Massachusetts Society for the Promotion of Agriculture have been making some interesting investigations relative to the infectious properties of the milk of tuberculous cattle. Their report will not be given to the public for some time yet, but they have arrived at the following conclusions:

1. Emphatically, that the milk from cows affected with Tuberculosis in any part of the body, may contain the virus of the disease.
2. That the virus is present whether this is disease of the udder or not.
3. That there is no ground for the assertion that *there must* be a lesion of the udder before the milk can contain the infection of Tuberculosis.
4. That, on the contrary, the bacilli of Tuberculosis are present and active in a very large proportion of cases in the milk of cows affected with Tuberculosis, but with no discoverable lesion of the udder.<sup>(1)</sup>

<sup>(1)</sup> H. C. Ernst, A. M., M. D., in November number, 1889, of American Journal of Medical Science.

*Consumption—Its Cause and Prevention.*

An "International Consumption Congress" was recently held in Paris. It was composed of leading medical men and sanitarians from all parts of the world. After mature deliberation upon the causes of Consumption, Dr. Chaveau said, in reference to the conclusions reached:

One of the most remarkable facts to recall is the virtual *unanimity* of the Congress in admitting the *contagious* nature of Tuberculosis (Consumption) and the possibility of its transmission from human beings to animals, or *vice versa*. I believe indeed only one doctor disputed this point. The practical identity of Tuberculosis in the case of men, women, and cattle, is now acknowledged. \* \* \* Men and women are constantly giving Tuberculosis to cattle and getting it back through meat and milk. This is how so many happen to have Consumption who are engaged in dairy work. A dairy-maid with Consumption coughs and spits on a bundle of hay; a cow eats the hay and gets the same disease. The cow is milked and some one drinks the milk, and, if he is apt to take the disease, he gets Consumption. Many strong people, of course, escape, and in a general way the stronger the general health and constitution, the less likely is the person to get the infection, but the proportion liable to get it is very large. Over one fifth of the population of the world dies of Tuberculosis. In France alone one hundred thousand yearly perish.

While speaking rather discouragingly of the results of *treatment* he says: "There is hope in open air health resorts, such as you have in America. Get into perfectly pure air, away from towns or even villages, on some height. Live in air night and day; the revivifying and even curative virtues of this treatment is wonderful. \* \* \* The great things, remember, are to beware of Saliva. Cook your meat right through. Boil your milk thoroughly."

*House-flies and Consumption.*—House-flies are often, and a very common means of propagating Consumption. A number of very interesting experiments were made by Spillman and Haushalter recently, with a view to ascertaining what, if any, probability there was of Consumption being propagated by the common house-fly. In a report just made to the Academy of Sciences, Paris, they embody the results of their experiments. They made repeated examinations of the excrement and of the contents of the intestines of the flies that fed upon the spit-cups containing the sputa of Consumptive patients. They invariably found present in this excrementitious matter the bacillus of Tuberculosis, the demonstrated contagious principle of Consumption. They also found these

*Physiology in Public Schools.*

bacilli present in the dried excrement of the flies as it was scraped from the walls and windows of the rooms occupied by Consumptives. It has been well demonstrated that these germs possess wonderful tenacity of life, and they suggest, in their report, how easily the air or food and drink may become polluted by the dried remains, or dried excrement of flies having access to the sputa of Consumptive patients. They further suggest in their report that a suitable, receptive soil is quite as necessary as a suitable seed for successful implantation and propagation of Tuberculosis. The practical deduction from these reports is the great importance of promptly and effectively disinfecting the sputa and spit-cups of these unfortunate patients—either by the complete destruction of the sputa by fire, or by a strong solution of corrosive sublimate, or of phenic acid. This report, and the practical deductions therefrom, only more strongly confirm the opinion that too great care cannot be observed in the exposure of the well to this disease—that Consumptives ought not to cast their expectorated matter upon the ground and upon the floor of churches and public halls, to be desiccated and set afloat in the air, to be breathed into the lungs, and to contaminate our food and drink. Then, too, greater conveniences should be provided for such cases by the railroads in the passenger coaches. As it is, almost invariably the sputa is thrown upon the floor—more or less becomes dried and adherent, and later set afloat to produce its noxious effects.

## PHYSIOLOGY IN PUBLIC SCHOOLS.

At the May meeting of the State Board the Attorney-general presented a resolution providing for the appointment of a committee of three to examine the various text books on Physiology now in use in the public schools of the State, and to report as to their fitness, and to what extent they comply with the spirit and letter of the late statute requiring Physiology to be taught in the



*Physiology in Public Schools.*

common schools with the especial reference to the effects of alcohol and narcotics upon the human system. A committee was appointed who presented the following report at the November meeting:

MR. PRESIDENT—Your committee, to whom the resolution on text-books on Physiology was referred, beg leave to submit the following report: After giving the matter all possible thought and consideration, we are of the opinion that it is not wise nor prudent for us to recommend any particular set or series of text-books for use in the common schools of the State, for the reason that all such schools are already supplied as contemplated by law, compelling the teaching of the evil effects of alcoholic stimulants, narcotics and tobacco, upon the human system, by several different series of text-books on these subjects. Therefore a sweeping change at this time, substituting a single series for the many, would work a hardship and a loss upon the patrons of our schools.

We, therefore, beg to be relieved of that part of our duty, as imposed upon us by the resolution referred to. We do, however, deem it proper to offer some suggestions as to what we think such text-books should aim at. In our opinion, it was the aim of the Twenty-first General Assembly to promote the cause of temperance, and to protect the young from the pernicious effects of the poisons referred to, by showing and teaching that all beverages containing alcohol are harmful; and their effects should be explained to each grade according to the age and understanding of the pupil. Narcotics, with tobacco, should, as well as alcohol, be treated and described as poisons in all cases, and not at all be treated therapeutically. Their value in that relation should not be treated in our common schools, but be left to those who teach materia medica and chemistry—to those who have attained a higher grade of education than is afforded by our common schools.

We do not deem it expedient, nor even possible, for your committee to set forth in a report of this kind, just what a series of text-books on this subject should, or should not, contain, but deem it advisable and proper to leave such books open to competition by the various authors and publishers who may wish to compete for the patronage and profit accruing to those who supply the best books—books that will best set forth to the youthful mind the direful results following the use of such deadly poisons.

That uniformity may be secured, thereby saving great loss to the patrons of our schools, and that the best may be secured, and unworthy books be excluded, we think it would be wise for the next General Assembly to so amend the law that some proper authority may be designated, whose duty it shall be to adopt, for the use of the schools of the State, a series of text-books that will best promote the cause of temperance and protect the interests of those concerned.

The report was accepted and the committee discharged.

*Powers and Duties of Health Officers.*

## POWERS AND DUTIES OF HEALTH OFFICERS.

*Must be Appointed.*—The statute, chapter 151, laws of 1880, section 14, requires every local board of health to appoint a "competent physician" as health officer. The provision is mandatory, not directory. The presumption of law is that he is to be the sanitary adviser and counsel of the board.

*What he should be.*—To competently fill the office, he should have a practical knowledge of Chemistry, Physiology, Ventilation, Sewerage, Drainage and Water Supply. He should be a student of sanitary science, and be able to distinguish a nuisance when he sees or smells one. He should be competent to diagnose correctly contagious and infectious diseases. He should be a person of practical, professional experience—the more the better. He should be a person of good judgment and discretion. He should be the most "competent physician" obtainable.

*Not a Member of the Board.*—He is not a member of the local board. But a physician who is a member of a local board may be also the health officer of the board.

*Powers and Duties.*—His powers and duties are only such as are conferred by the local board, when in session. They cannot be conferred nor authorized by individual members of the board. Neither can members of a local board by separate acts, or declarations, ratify acts of a health officer. The power of a health officer must be previously given by a local board, and it must be of record. He has power to do whatever is authorized by the local board, not in contravention of the rules and regulations of the State Board, or the lawful powers of the local board.

*Powers and Duties of Health Officers.*

*Is Advisory Counsel.*—He is an advisory counsel of a local board in sanitary matters, and not an executive officer, except when acting under authority, and by order of the local board.

*Not to attend Quarantined Persons.*—It is not his duty to attend persons quarantined for contagious diseases. The sick may employ whom they please to attend them, except in the case of paupers, as provided in chapter 1, title IX of the Code.

*When Diagnosis Doubtful.*—It is not his duty to verify the statement of an attending physician as to suspected cases of contagious disease. Whenever well authenticated symptoms lead to certainty that the attending physician is in error in diagnosis, it is the duty of the board to direct the health officer, or other person, to visit the case, but, such visit should not be made except after notice to the attending physician, and as a courteous recognition of his professional rights.

*Danger Signals.*—It is not his duty to put up danger signals. That should be done by some police officer, constable or specially delegated officer.

*Quarantine.*—He cannot establish, nor release, quarantine. That power is vested in the local board. He must obey the rules of the State Board, regarding quarantine.

*Disinfection.*—It is not his duty to disinfect quarantined premises. That should be done under the supervision of the attending physician, and some member of the local board, acting by advice of the health officer.

*Notice to State Board.*—Upon the occurrence of Small-pox within his jurisdiction he must report the same by telegraph, if there be no telegraph, by mail, to the State Board, and this whether the case be mild or severe, or modified by vaccination.

*Report to State Board.*—It is his duty to study the cause, rise, progress and decline of any epidemic disease in his jurisdiction and report the same to the State Board, on subsidence of the disease.

It is his duty, by statute, to make a report to the State Board, on blank forms furnished by the State Board, of statistics, concerning the local board of which he is the health officer. If he is the health officer for a township and a city or town within a township, or more

*Powers and Duties of Health Officers.*

than one township, he must make a separate report for each board, just as distinct and separate as though made by different persons.

*Lawful Physician.*—He must be a lawful physician—holding a certificate of authority to practice medicine.

*Compensation.*—His fees and compensation are fixed by the local board. If given an annual salary, such salary will be deemed full compensation for all service rendered within his duties as health officer, unless otherwise provided by the board.

*Contagious Disease—Self-protection.*—In visiting premises where Diphtheria and Scarlet Fever prevail, it is not necessary that the clothing should be changed in ordinary cases, but the face, whiskers and hands should be thoroughly cleansed with corrosive sublimate solution or strong carbolic acid. The former is preferred, as it is a germicide; the acid is doubtful.

In Small-pox there should be worn a loose gown of glazed muslin, long enough to cover the feet, buttoning closely at the neck and wrists, and having a waist-band; the head—all the hair, if possible—covered by a cap of like material. This should be put on out of doors and taken off on retiring from the house. After removing the cap and gown, the hands, face and all exposed parts of the body should be washed well in soap and water and then rubbed freely with a weak solution of corrosive sublimate, the best germicide known. Wearing apparel, such as coat, vest and pants, that cannot well be washed or boiled, can be thoroughly disinfected by steam, hot air (two hundred and twelve degrees Fahrenheit) or by sprinkling them and pressing them slowly and thoroughly with a flat-iron as hot as can be used without burning the goods. No reliance can be put in sulphurous fumigation, and it should not be used.



*Decisions of Supreme Court.*

## DECISIONS OF SUPREME COURT.

The Supreme Court has given the following decisions upon cases involving the liability of physicians to make return of births and deaths to the Clerk of the District Court, and upon the expenses and powers of local boards, and upon nuisances:

## PHYSICIAN'S RETURN OF BIRTHS AND DEATHS.

Action in law to recover a statute penalty. A demurrer to the petition was sustained and judgment rendered thereon for defendants. Plaintiff appeals.

BECK, J.—I. The petition is in ten counts and claims to recover ten dollars on each as a penalty for the failure of the defendant, who is a physician, to render a report of a death or birth specified in the count, as requested by the State Board of Health, under provisions of chapter one hundred and fifty-one, Acts of the Eighteenth General Assembly; McClain's Statutes, page four hundred and fifty-one; Miller's Code, page four hundred and twenty-one.

The petition shows that defendant was required by the regulations of the State Board of Health to report in each case of death referred to, the sex, nationality, place of birth, period of residence in this State, and the place and date of burial of the decedent, and the complications connected with the cause of death, and to report in each case of birth, "the number of the child of the mother," the nationality, place of birth, and age of each parent; the maiden name of the mother, and her place of residence. It is also alleged in the petition that defendant was furnished with blanks prescribed by the State Board of Health for his reports, as required by law, and that he "knowingly and willfully failed and neglected and refused to make his report in each case for more than twenty days."

The demurrer of the petition was sustained upon the ground that the statute, so far as it authorizes the Board of Health and the plaintiff to require the defendant to report the information demanded of him, is in conflict with the Constitution of the United States, and of this State, and is unjust and oppressive, and contains requirements which were impossible for the defendant to perform.

We have not been favored with the argument on behalf of the defendant and are, therefore, not informed of the grounds upon which the statute in

*Decisions of Supreme Court.*

question was assailed in the court below, and it is claimed to be unconstitutional. It cannot be expected that we shall consider arguments of which we have not heard, or that we will imagine objections and discuss them. Our consideration of the case will, therefore, be brief.

It is proper to remark that, under the statute brought in question, the defendant may be required to report the information sought in the manner prescribed by the Board of Health.

II. The statute requires the collection of statistics pertaining to the population of the State, and the health of the people, which may impart information useful in the enactment of laws and valuable to science, and the medical profession, to whom the people will look for remedies for disease, and for means tending to preserve health. The objects of the statute are within the authority of the State, and may be attained in the exercise of its police power. Similar objects are contemplated by States requiring a census to be periodically taken, the constitutionality of which we have never heard questioned.

III. We need not inquire whether the provisions of the statute are unjust or oppressive. These are matters for the consideration of the legislative part of our government. We may observe, that it is difficult to discover oppression or injustice in requiring the medical profession to make known to the world statistics which may promote, and are promoting the public health.

IV. One ground of the demurrer is, that defendant, under the statute, is required to do that which it is impossible for him to perform. The law requires of no man impossibilities. If the information sought from defendant could not have been obtained by him in the *bona fide* exercise of reasonable diligence, the law will not punish him for not imparting it. A physician should honestly endeavor to obtain and report all information required by the regulations of the statute and the Board of Health.

This is his duty as a citizen, and is imposed as an obligation by the ethics of the useful and honorable profession of which he is a member.

In our opinion the demurrer to the plaintiff's petition was erroneously sustained.<sup>(1)</sup>

REVERSED.

## EXPENSES IN SMALL-POX CASES.

Action to recover for expenses alleged to have been incurred in providing for certain persons infected with Small-pox, and in providing for the safety of the inhabitants. There was a trial to the court, and judgment was rendered for the plaintiff.

ADAMS, J.—One of the persons provided for was one Christina Shutt, who, at the time she was taken sick with Small-pox, had come to Clinton a few days before with the intention of making that city her home. She was a native of Denmark, and had not gained settlement elsewhere. The statute

(1) *J. E. Robinson, Clerk of the Courts, Appellant, v. D. M. Hamilton, M. D.*, 60 Iowa, 134.

*Decisions of Supreme Court.*

upon which the plaintiff relies, sections twenty-one and twenty-two, chapter one hundred and fifty-one, of the laws of the Eighteenth General Assembly, McClain's Statutes, 455, provides, where relief is furnished as in this case, for charging the county to which the sick or infected person belongs.

The defendant insists that a person belongs only to the county in which he has a settlement, and if the sick or infected person has no settlement in the State, no county can be charged.

The statute, however, above cited, makes it the imperative duty of the local board of health to provide for such person, regardless of his settlement, and if no county can be charged there is no provision in the statute in question for the payment of their expenses. It appears to us that where there is no settlement the sick or infected person must be deemed to belong to the county where the relief becomes necessary.

We proceed next to examine certain items, which the defendant insists ought to have been rejected. One is for food and clothing furnished persons other than the sick. Under the statute above cited it becomes the duty of the local board of health to provide for the removal of the sick person, if he can be removed, and, if not, to provide for him where he may be, and also to provide for the safety of the inhabitants.

In the case at bar the sick persons were not removed, but were provided for in the houses respectively where they happened to be. No question is raised as to the proper exercise of the discretion of the board in this respect.

Only two families were afflicted, and the means adopted for the safety of the inhabitants was the confinement of the members of these two families within their respective houses, with the view of securing as complete isolation as might be practicable. The prompt arrest of the contagion, and extinguishment of the disease, demonstrated the wisdom of the board.

The isolation, however, was necessarily continued, through several weeks, and during at least a part of this time it was found necessary to supply the two families with food. Not all the members were sick, and yet all necessarily shared in the food.

The defendant insists that it cannot be charged, under the statute in question, for food furnished to well persons. It insists that a county can be charged with only those expenses for which the sick person is primarily liable; and it contends that neither of the sick persons in this case could be charged with food furnished to either of the well persons. But in our opinion its position cannot be sustained. The well persons, without doubt, constituted the nurses and attendants of the sick ones. If so, the food furnished constituted a part of the expenses of the sickness. But it constituted a part of the expenses in another and more important sense. It was a part of the expense of isolation; and while that was adopted for the safety of the inhabitants, it was made necessary by the sickness. Section twenty-one of the statute provides expressly for the removal of the sick person for the safety of the inhabitants, and for charging the expenses to the sick person. The expense of isolation is of precisely the same character.

It is true that we find isolation provided for only by the general words:

*Decisions of Supreme Court.*

"Such other measures as may be deemed necessary for the safety of the inhabitants," and we find that provision only in section twenty-two, which contains no provision whatever for expense. The only provision for expenses is to be found in section twenty-one. But sections twenty-one and twenty-two should be taken together. Whatever expenses are incurred under either section are, we think, to be charged alike. In our opinion, they are to be construed as if the provisions of both sections had been embraced in one section, and the provisions as to charging had been placed at the close. If we are correct, then, the sick person is properly chargeable with all the expenses which may properly be incurred under either section, including the expenses of removal, if that is adopted, and the expense of isolation, if that is adopted; and we think that the county is ultimately liable for the same, if the sick person, and those liable for his support, are unable to pay.

The board caused the clothing worn by the members of the families to be burned, and supplied other clothing. The burning of the clothing was necessary for the safety of the inhabitants. The payment therefor, or supply of other clothing, was an expense necessarily incident to the sickness. It was, we think, primarily chargeable to the sick person, and those liable for his support, and secondarily to the county.

The court allowed a recovery of one hundred and eighty-five dollars, as money paid the attending physician, Dr. Smith. The defendant insists that in this the court erred. Its objection is based upon the ground that Dr. Smith had been employed and paid by the year, by the county, to attend to all such poor persons as he should be required to attend, under the direction of the overseer of the poor. Its objection is based upon the further ground that Dr. Smith was employed by the year by the board of health. As to the first ground, it is to be said that the services in question were not rendered under the direction of the overseer of the poor, and perhaps could not have been properly, so long as the board assumed exclusive control. As to the second, it is to be said that while Dr. Smith was employed by the board of health, at three hundred dollars per year, the court found that one hundred and eighty-five dollars was such proportion of three hundred dollars as the services in question bore to the year's services. Possibly it should have appeared in evidence, if it did not, that the aggregate charges, amounting to one hundred and eighty-five dollars, were all reasonable. But the evidence is not set out, and no question is raised by the appellant upon this point.

We see no error, and the judgment is (<sup>1</sup>)

AFFIRMED.

Action to recover the value of certain lumber furnished by plaintiff upon the request of the board of health of the city of Le Mars and the overseer of the poor, which was used in building a pest-house necessary for the proper care of persons found in the city afflicted with Small-pox. A demurrer to the petition was sustained, and the plaintiff standing upon the petition, judgment was rendered against him. He now appeals.

<sup>(1)</sup> City of Clinton vs. County of Clinton, 61 Iowa, 266.



*Decisions of Supreme Court.*

BECK, J.—I. The petition alleges that a large number of persons residing in Le Mars being sick of Small-pox, and others being exposed to the contagion, and the welfare and safety of the people demanding that they should be removed to a building apart from the other inhabitants, to prevent the spread of the contagion, the board of health of the city, being unable to procure such a building, proceeded to erect a suitable hospital, wherein the Small-pox patients should be kept and treated. The lumber in question was furnished by plaintiffs upon the request of the board of health and the overseer of the poor, and used in erecting the hospital. It is shown that the account for the lumber was approved by the board of health and presented to the supervisors of the county and rejected by them.

The demurrer is upon the grounds: 1. That the defendant is not authorized by law to erect hospitals, and cannot be made responsible therefor. 2. That the board of health of the city, and the overseer of the poor are not authorized by law to bind defendant by a contract for the lumber. 3. That defendant is not authorized by law to own or become indebted for hospitals or pest-houses. 4. That the city, being alone authorized to erect such buildings, is liable for the cost thereof. No other grounds of error are stated.

II. Under chapter one hundred and fifty-one, laws of the Eighteenth General Assembly, section thirteen, the mayor and council of each incorporated town constitute a board of health, and are clothed with authority prescribed by the act. This provision supersedes and repeals Code section five hundred and twenty-five, which authorized the city councils to establish boards of health. The authority of the board of health is prescribed by the act, which as to these matters, repeals Code sections four hundred and fifteen and four hundred and eighteen, specifying the powers of boards of health under the Code. We must, therefore, determine the authority of boards of health by consulting the act above cited. Section twenty-one provides that, "When any person coming from abroad, or residing within any city, town or township within this State, shall be infected, or shall lately have been infected with Small-pox, or other sickness dangerous to the public health, the board of health of the city, town or township where said person may be, shall make effectual provisions, in the manner which in they shall judge best, for the safety of the inhabitants by removing such sick or infected persons to a separate house, if it can be done without damage to his health, and by providing nurses and other assistance and supplies, which shall be charged to the person himself, his parents or other person who may be liable for his support, if able, otherwise at the expense of the county to which he belongs."

This statute authorizes and requires the board of health to "make effectual provision, in the manner in which they shall judge best, for the safety of the inhabitants, by removing such infected persons to a separate house." The law contemplates the isolation of infected persons, and directs that "effectual provisions" therefor shall be made by the board of health. This is demanded by humanity, and has long been known to be the effectual method of arresting the spread of contagion. Public policy demands that the spirit of the

*Decisions of Supreme Court.*

statute shall be regarded and enforced. The board of health is authorized to do whatever is necessary in order to make "effectual provisions" for the isolation of infected persons.<sup>(1)</sup> In order to isolate the patient he may be removed to a separate house. If no suitable house may be had, or if a temporary pest-house or hospital may be erected at a less cost than the rent of such a house, the board of health, in the exercise of wise discretion, may provide such temporary buildings. This they would be authorized to do in the exercise of these general powers under this section, for it is incidental thereto. They could not otherwise make "effectual provision for the safety of the inhabitants."

The expense of providing a place for isolating the infected person is a part of the expense incurred in rendering "effectual provision for the safety of the inhabitants," which the statute directs and requires, and under the express language of the section quoted, such expenses are chargeable to the county.

III. It will be observed that such expenses are primarily chargeable to the infected person, and the county is only liable in case of his inability to pay them. The petition does not allege the inability of the person sent to the hospital to answer for the expenses incurred. Counsel for defendant now insist that the petition is void on account of the absence of such allegation. But no such objection was raised by the demurrer, or in any other manner made, in the district court. It cannot be first presented here.

IV. A question may arise under the statute, as to the liability of a solvent infected person to pay the expenses of erecting a hospital, or pest-house. As it is not presented in this case, we do not consider it. We may, however, suggest that such expense, which is incurred for the benefit of the inhabitants of the city by providing for the isolation of an uncertain number of infected persons, would with difficulty be apportioned to such as would be liable therefor, if, indeed, it could be done at all. Beside, it would be a great hardship upon the unfortunate subjects of infection to impose upon them the expense incurred, not for their own benefit, but for the benefit of the people. It would be quite as just to include in the estimates of the cost of keeping paupers or the insane, the expense of erecting poor-houses or hospitals.

V. Counsel for defendant insists that chapter one hundred and seven, acts of the Eleventh General Assembly, section eight, which authorizes boards of health to establish pest-houses and hospitals, is not repealed by chapter one hundred and fifty-one of the acts of the Eighteenth General Assembly, above referred to, and is, therefore, still in force. We think differently. The last named act in express language (section twenty-five) repeals all prior acts in conflict with its provisions. The first charges the cities with the expense of providing pest-houses; the last, as we have seen, holds the counties liable therefor. Here is a direct conflict. The last act prevails, and the first is repealed. But, further than this, the subject of the act of the Eleventh General Assembly, which pertains to the establishment of boards of health, and their duties and powers, was revised by the Code of

(1) *The City of Clinton v. The County of Clinton*, 61 Iowa, 253.

*Decisions of Supreme Court.*

1873, and the provisions of the eighth section are not re-enacted. It is, therefore, repealed. Code, section forty-seven. See, also, sections four hundred and fifteen, four hundred and twenty, five hundred and twenty-five.

It is our conclusion that the district court erred in sustaining the demurrer. Its judgment is therefore reversed, and the cause is remanded for further proceedings in harmony with this opinion.<sup>(1)</sup>

## REVERSED.

Action to recover for care, nursing and service rendered by plaintiff to certain persons sick of Small-pox. There was a judgment for plaintiff upon a verdict, for a sum less than her claim. She now appeals to this court.

BECK, C. J.—I. The plaintiff brings this action to recover for services rendered to these persons sick of the Small-pox, one of them, a woman, being sent to the pest-house by the board of health, and the others permitted to remain in their own house. The services to all these persons were rendered at the instance, and upon the request of the board of health. The plaintiff recovered for the service rendered to the woman sent to the pest-house, the petition alleging that she was a pauper, and there was evidence introduced tending to show the fact. But there was no such allegation or proof as to the other persons, and for that reason the court directed the jury to find for the defendant, upon the claims for services rendered to them. Questions involving the correctness of this ruling are the only ones presented in this case.

II. If the defendant is chargeable at all in this action, its liability arises under chapter one hundred and fifty-one, section twenty-one, acts of Eighteenth General Assembly, which is as follows:

SEC. 21. When any person coming from abroad, or residing within any city, town or township within this State, shall be infected, or shall lately have been infected with Small-pox, or other sickness dangerous to the public health, the board of health of the city, town or township where said person may be, shall make effectual provision, in the manner in which they shall judge best, for the safety of the inhabitants, by removing such sick or infected person to a separate house, if it can be done without damage to his health, and by providing nurses and other assistance and supplies, which shall be charged to the person himself, his parents or other persons who may be liable for his support, if able, otherwise at the expense of the county to which he belongs.

This provision will bear no other interpretation than that the county is liable for the care of the sick persons contemplated in the statute only in case they, or the persons liable for their support, are not able to make compensation therefor. It is not necessary to inquire as to the operation of the statute. It plainly provides that the county shall be liable only upon the conditions specified. Upon these conditions the county's liability depends, and it cannot be established until it is shown that the facts exist which are contemplated by the statute. It is, therefore, very plain that the burden of

*Decisions of Supreme Court.*

proving these facts rests upon the plaintiff. If they are not shown, plaintiff fails to establish a cause of action.

III. But counsel for plaintiff insists, that as it was shown that the county allowed plaintiff a part of her claim it cannot now deny indebtedness for the balance, being estopped by such partial payment. This position is not sound. As it was not shown that the county is liable under the conditions of the statute, the payment made was simply a gratuity, or was rather made in violation of law. The county cannot be bound by such unlawful act of its officers. There is no estoppel in the case, because plaintiff did not change her condition, assume any obligation, or do or suffer anything which ought to preclude the defendant from denying its liability. Surely the county cannot be estopped by the unlawful act of its supervisors.

The foregoing considerations dispose of all questions in the case.<sup>(2)</sup>

## AFFIRMED.

## EXPENSES OF PHYSICIANS IN SMALL-POX CASES.

The plaintiff, who is a physician, seeks to recover of the defendant upon an account for medical services rendered to certain persons who were afflicted with Small-pox in the township of Union, in Black Hawk county. There was a trial by jury, when the plaintiff had introduced his evidence, the defendant moved the court to instruct the jury that there was no evidence upon which to found a verdict for the plaintiff. The motion was sustained, and the jury were instructed to return a verdict for the defendant, which was done. Plaintiff appeals.

ROTHROCK, J.—It appears from the evidence that the village of Finchford is in Union township, Black Hawk county. It is a small place of some fifteen or twenty houses. A woman named Newell went there and was taken sick. She was treated by Dr. Lowell, the village physician, and, after some four or five days, it was discovered that her ailment was Small-pox. It was not discovered, however, until several other persons had contracted the disease, and people became alarmed, and sent for the township trustees. Two of the trustees, and the township clerk, responded to the call, and a meeting of the citizens was held with the trustees at the school-house. The township clerk was appointed secretary of the meeting, and kept minutes of the proceedings. After a statement of the object of the meeting, and an interchange of views, the two trustees held a consultation, and appointed Dr. Lowell, and two other persons, a committee to take such measures as they thought necessary to arrest the spread of the disease, and to attend to the wants of those who were sick. The township trustee did not live in the village. The village was at once quarantined by the committee appointed by the trustees, and the necessary precautions were taken. In a few days Dr. Lowell was attacked with the disease and was unable to give medical attention to those who were sick.

<sup>(1)</sup> *Staples v. Plymouth County*, 62 Iowa, 365.

<sup>(2)</sup> *Gill v. Appanoose County*, 68 Iowa, 20.



*Decisions of Supreme Court.*

As we understand the evidence, the plaintiff resides at Cedar Falls, and was sent to Finchford, by the chairman of the Cedar Falls board of health to investigate the matter. He found four sick, and no physician to attend them, no wood, and nothing to eat. One of the committee appointed by the trustees requested plaintiff to treat the sick, and, after being assured that the committee were authorized by the township trustees to employ a physician, he consented to give the necessary medical attention to the sick. The plaintiff testified as a witness, as follows:

"I asked them (the committee), where they got the power. They said they got it from the township trustees. And, after I visited the patients, I went to the trustee to know if he had given this committee that power. He told me they had. Told me to go on and do the best I could for these people, and under these statements, I did so. The trustee I saw, was Mr. Pashby, the chairman of the board. Saw him next day after that. Afterward I saw him again, and at different times reported, upon his asking how the cases were getting along. Also saw Mr. James (a trustee), frequently, who inquired about it. They directed me to do my duty the best I could for them; to try and stop the disease. I told Mr. Pashby one day that the expenses were getting heavy on the county, and he went among the neighbors and met me with supplies, which I carried in. No other persons went out and in the lines from February 5th until quarantine was lifted March 23d. I think the last visit. I carried the supplies from Cedar Falls."

On the 31st day of March, 1883, the three township trustees met at Cedar Falls, which is outside of Union township, at the request of those who had bills to present, for allowance and approval for expenses attending the Small-pox sickness and quarantine. The plaintiff then and there presented his account for his services, and the same was approved by all of the trustees.

On this state of facts it is claimed by the defendant that the county is not liable for medical attendance and services rendered to such of the Small-pox patients as were unable to pay the plaintiff. Chapter one hundred and fifty-one, of the Eighteenth General Assembly provides as follows:

SEC. 13. The mayor and aldermen of each incorporated city, the mayor and council of any incorporated town or village in the State, or the trustees of any township, shall have and exercise all the powers and perform all the duties of a board of health within the limits of the \* \* \* townships of which they are officers.

SEC. 14. Every local board of health shall appoint a competent physician to the board, who shall be health officer within the jurisdiction. \* \* \* \* \* The clerks of the townships \* \* \* shall be clerks of the local boards. The local boards shall also regulate all fees and charges of persons employed by them in the execution of the health laws and their own regulations.

SEC. 21. When any person coming from abroad, or residing within any city, town or township within this State, shall be infected, or shall lately have been infected with Small-pox, or other sickness dangerous to public health, the board of health of the city, town or township where said person

*Decisions of Supreme Court.*

may be, shall make effectual provision, in the manner in which they shall judge best, for the safety of the inhabitants, by removing such sick or infected person to a separate house, if it can be done without damage to his health, and by providing nurses and other assistance and supplies, which shall be charged to the person himself, his parents or other person who may be liable for his support, if able, otherwise at the expense of the county to which he belongs.

SEC. 23. If any infected person cannot be removed without damage to his health, the board of health shall make provision for him, as directed by the preceding section, in the house in which he may be, and in such case they may cause the persons in the neighborhood to be removed, and may take such other measures as may be deemed necessary for the safety of the inhabitants.

SEC. 24. Local boards of health shall meet for the transaction of business on the first Monday of May and the first Monday in November of each year, and at any other time that the necessities of the health of their respective jurisdictions may demand. \* \* \* \* \*

It will be observed that this statute provides that local boards of health shall appoint a competent physician to the board, who shall be the health officer within its jurisdiction. And the board is authorized to regulate all fees and charges of persons employed by them in the execution of the health laws and of their own regulations. The evidence shows that the plaintiff was not employed by the board of health; he was employed by a committee appointed by a majority of the board. We are therefore required to determine the question whether the board of health could delegate the power to employ a physician to a committee, none of whom were members of the board. We think it is very clear that the discretion as to what physician shall be employed must be exercised by the board, and that it cannot be delegated to a committee. And, although the plaintiff, after he entered upon the employment, saw two of the trustees, who as individuals directed him to attend the Small-pox patients, and do what appeared to be necessary in the premises, we do not think this can be regarded as an employment by the board.

In *Herrington v. District Township of Liston*, 47 Iowa, 11, it is said: "The question is here presented whether a corporation, whose business is transacted by a board of directors, can be bound by the assent of a majority of the directors to a contract expressed otherwise than at a duly convened meeting. We are of the opinion that it cannot. While it is true that a majority of a board will govern in the absence of a provision by statute, or in the articles of incorporation requiring the concurrence of a greater number, yet their determination is valid only after the minority have had an opportunity to be heard. A board must act as a unit, and in the manner prescribed. The determination of the members individually is not the determination of the board; citing *McCollough v. Moss*, 3 Denio, 557; *Liebigstone v. Lynch*, 4 Johns., chapter 595; *Rice v. Plymouth County*, 43 Iowa, 196. And see *Taylor v. District Township of Wayne*, 25 Iowa, 447.

Our conclusion is that the plaintiff, not having shown an appointment by

*Decisions of Supreme Court.*

the board of health, cannot recover in this action. The facts show that this determination works an apparent hardship in this case. But we cannot allow hardships in individual cases to lead to the establishment of a rule which would work a great mischief to the public at large. If we were to overturn what we regard as a well established rule, to prevent hardship in this case, we would turn loose upon the local school boards and other local bodies in this State, all sorts of solicitors, who could obtain the individual assent of members of the boards to all manner of contracts and expenditures, which could not be obtained from the board, acting as a unit. The statute providing for a board of health, provides for meetings of the board at any time that the necessities of the health of their respective jurisdictions may demand, and the board in this case, should have met as a board, when it was known that the plaintiff's services were required, and made the proper appointment as a board. They could not, by their separate acts and declarations, ratify the act of the committee appointed by them. They should have ratified it as a board of health before the service was performed.

We think the judgment of the district court must be <sup>(1)</sup>

**AFFIRMED.**

**ABATEMENT OF NUISANCES.**

SEEVERS, J.—The agreed facts are, that the city of Cedar Rapids is a corporation organized under a special charter, and has a population of about fifteen thousand, and the mayor and aldermen appointed a board of health, as provided in chapter one hundred and sixty-eight of the acts of the Nineteenth General Assembly, and said board of health adopted and published, according to law, the following rule or regulation: "There shall not be kept or maintained, within the corporate limits of the city of Cedar Rapids, any hog-pen or inclosure wherein swine are kept and fed by the owner, lessee or occupant of any property therein, save and except such pens as may be used for the purposes of commerce only; and all such pens used for the purposes of commerce shall be kept clean, and the owner, lessee, or manager thereof shall see that the same do not become nuisances in any respect." The city duly enacted an ordinance providing that any person who shall knowingly violate or fail to comply with any rule or regulation of the board of health should be deemed guilty of a misdemeanor and punished as provided in the ordinance. The defendant maintained in the corporate limits a pen in which was kept one hog, and for the purpose of commerce. Such pen was kept clean, and was not a nuisance by reason of filth therein, but was a nuisance, if at all, because of the rule or regulation of the board of health. These facts were agreed upon for the purpose of enabling the district court to determine whether the regulation of the board of health is valid, and the question to be determined is, whether such board has the power and authority to adopt such order or regulation, and whether the same can be enforced by ordinance.

<sup>(1)</sup> *Young v. County of Black Hawk, 66 Iowa, 460.*

*Decisions of Supreme Court.*

It is not insisted that the statute authorizing the city to create the board of health is unconstitutional, and as the parties have agreed that the only point to be determined is whether the board of health had the power and the authority to establish the rule and regulation that it did, it is immaterial whether the pen as kept was in fact a nuisance. The board had the authority to establish such reasonable rules and regulations as in its opinion would preserve the health of the inhabitants of the city. The only question, therefore, is whether the regulation is reasonable. It is said that while "ordinances which unnecessarily restrain trade or operate oppressively upon individuals will not be sustained, yet such as are reasonably calculated to preserve the public health are valid, although they may abridge individual liberty and individual rights in respect to property." 1 Dillon Municipal Corporations, section 320.

In *Commonwealth v. Patch*, 97 Mass., 221, it was held that a similar regulation was reasonable and valid. The facts in that case were precisely like the facts in this case, except that the number of inhabitants in the town of Springfield does not appear. It was presumed, because the evidence was not before the court, that the regulations and ordinance operated upon the most thickly settled part of the city. We must assume that the pen in question was situated in a populous part of the city of Cedar Rapids; for the question to be determined is one of power and authority. The question, therefore, is whether the regulation is valid when applied to cities containing fifteen thousand inhabitants. In our opinion the ordinance is reasonable and cannot be said to be invalid when applied to such cities. Before an ordinance or regulation of a board of health can be said to be unreasonable, it should clearly so appear. The question should not remain doubtful, and the discretion necessarily reposed in the officers and boards of cities making regulations for the preservation of the health of the inhabitants cannot be declared invalid unless it clearly so appear. A legal restraint may be imposed on the few for the benefit of the many. We conclude that the regulation and ordinance cannot, as a matter of law, be said to be unreasonable. <sup>(1)</sup>

**AFFIRMED.**

Action for damages alleged to have been sustained by reason of a nuisance caused by defendant. The plaintiff also prayed for an injunction to abate the nuisance. There was a trial to a jury, which found the existence of the nuisance, and rendered a verdict for twenty dollars damages. The defendant appeals.

ADAMS, C. J.—I. The defendant moved for an order requiring the plaintiff to state her cause of action more specifically, by stating whether the board of health had determined the question as to the existence of the nuisance. The court overruled the motion, and the defendant assigns the action of the court as error. It is provided in section sixteen, chapter one hundred and fifty-one, laws of 1880, that local boards of health may make such regulations concerning nuisances as they shall judge necessary for the

<sup>(1)</sup> *State v. Holcomb, 66 Iowa, 167.*



*Decisions of Supreme Court.*

public health and safety; and if any person shall violate any such regulation he shall forfeit a sum of not less than twenty-five dollars, for every day he shall knowingly violate the regulations, to be recovered before a justice of the peace. It is contended by the defendant, that the intention was to confer upon the local boards of health the exclusive jurisdiction to determine what constitutes a nuisance and to abate nuisances. But we think otherwise. The alleged nuisance in the case at bar consisted in maintaining a yard for feeding cattle and hogs near the plaintiff's residence. Her action was brought to recover for damages sustained in the discomfort suffered. We cannot think that the statute in question was designed to exclude all remedy for such damages, nor to make a finding of a local board of health of the existence of the nuisance a condition precedent to the maintenance of an action for damages.

II. It is contended that instructions three, four, six and seven, state too broadly the law in regard to nuisance. Wherein the law is stated too broadly appellant's counsel does not specifically point out. Such a general assertion, made in respect to four instructions together, does not, we think, render it proper for us to say more than that we have read the instructions complained of, and see no error.

III. The defendant asked certain instructions regarding the measure of damages, which the court refused. The rule as to the measure of damages, given by the court appears to be correct, and we think fully covers the ground.

IV. One James Bohannon, a son of the defendant, was called as a witness in his father's behalf, and testified in regard to the good condition in which he and his father kept the lots in question. He was then asked a question, in these words: "About how are they in comparison to where he, Baker, plaintiff's husband, keeps his own hogs and cattle, in his own lot?" The court excluded the question, and the ruling is assigned as error. It is contended that the witness' answer would have shown that the plaintiff's husband kept his lot in a worse condition than the defendant did the lots in question, and so plaintiff could not properly complain, under the rule in *Cassady v. Cavenor*, 37 Iowa, 300. But, suppose the fact had been shown as defendant claimed the fact to be, that certainly, without more, would not have aided the defendant, and there was no offer to prove more on that point. The mere fact that the plaintiff's husband's lot was in a worse condition would not have tended to show that his lot was a nuisance, or a source of any discomfort to the plaintiff. A hog-lot does not become a nuisance by reason of its condition alone, but its *condition and location*. We think that the court did not err.

V. It is contended that the evidence does not sustain the verdict. There was, as is usual in such cases, a great conflict in the evidence. Possibly, according to the preponderance of the evidence, the lots were not a nuisance; but we cannot say that the evidence is such that we would be justified in disturbing the verdict.

VI. A decree was rendered enjoining the defendant from using the lots in question as feed-lots. It is insisted that the injunction should not have

*Decisions of the Attorney-general.*

gone further than to enjoin such use of the lots as constitutes a nuisance, allowing the defendant to use the lots as feed-lots, if he can so change the mode of use, or condition of the lots as to obviate the trouble complained of.

In *Shiras v. Olinger*, 30 Iowa, 371, this court refused to enjoin absolutely the use of a livery stable found to be a nuisance, and enjoined only the particular mode of use thereof employed, which mode of use seemed to constitute substantially all the solid ground of complaint. But the case before us we regard as different. The trouble arose largely from the wet and miry condition of the soil of the lots. We see no reason to suppose that any mode of use could be adopted which would obviate the trouble.

We think that the decree below should be (5)

AFFIRMED.

## DECISIONS OF THE ATTORNEY-GENERAL.

### COMPULSORY VACCINATION.

A communication from Carroll county was addressed to Hon. Henry Sabin, State Superintendent of Public Instruction, in which it was stated that the local board of health had ordered the vaccination of all pupils attending the public school. This action was in accordance with rules and regulations adopted by this Board for the prevention of contagious diseases in the State. It was stated that the school board ignored the rules of the local board and of the State Board, and advised the teacher to pay no attention to the order, especially as the school would close in three weeks, and from the further fact that no cases of Small-pox existed within the State so far as known. The communication was respectfully referred to the State Board of Health for reply. The following answer was given:

(5) *Baker v. Bohannon*, 60 Iowa, 60.\*

\* NOTE.—While a livery stable is not necessarily a nuisance, yet it may be so declared, if it is built in close proximity to existing residences, and becomes seriously detrimental to the health and comfort of the occupant.—*Shiras v. Olinger*, 30 Iowa, 371.

*Decisions of the Attorney-general.*

STATE BOARD OF HEALTH, SECRETARY'S OFFICE, }  
DES MOINES, May 28, 1888. }

DEAR SIR—Your letter, dated May 23d, and seeking information relative to the authority and propriety of local boards of health requiring the vaccination of children attending the public schools, is at hand.

1. Section two, chapter one hundred and fifty-one (Laws 1880), makes the State Board of Health the guardians "of the health and life of the citizens of the State," and empowers them to make from time to time such rules and regulations as they may deem necessary for the preservation of the public health, and makes it the duty of certain officers to enforce such rules and regulations. Unfortunately, no penalty is prescribed for non-compliance with these rules and regulations of the State Board *per se*. The Attorney-general, however, has decided that the rules and regulations of the State Board *when adopted by local boards* are not only doubly binding, but by section sixteen, a penalty of twenty-five dollars for every day is assessable against any one violating such or any rule or regulation of a local board.

So the case is just this: November 6, 1885, this Board, among others, adopted the following rules:

"Rule 1. Every pupil entering any public school of Iowa, must give satisfactory evidence of protection by vaccination.

"Rule 2. The fact of such vaccination and protection must be entered with each name on the school record and transfer promotion lists."

Now if your local health board has formally adopted these rules, and has made them a matter of record, they are just as binding as though in an actual outbreak of Small-pox or any other contagious disease you should make a rule requiring quarantine, etc. These rules, a copy of which I send you, were not only adopted by this Board, but are officially approved by the State Superintendent of Public Instruction, Hon. J. W. Akers.

I doubt whether you have the authority under the law to *compel vaccination*, but I have no doubt *whatever* that you have the right, and it is your duty to forbid attendance upon the public schools, should you believe such prohibition to be in the interests of the public health, in case of refusal to be vaccinated, or in case of any violation of quarantine against any infectious disease, whereby through such exposure the health or lives of others might become endangered. As there is no case of small-pox in your city, nor a case in the State so far as is known at this office, I would suggest that no litigation be had at present, but that you confer with your directors and secure, through your county superintendent, an opinion from the Hon. Henry Sabin, State Superintendent of Public Instruction, in regard to the matter. This is a case where the duties of the State Board of Health and Department of Education are co-ordinate, and as it is the first instance of the kind, and so near the close of the school year, and fortunately no great danger imminent, harmony will be subserved and the public safety not greatly jeopardized by having an opinion from the State Superintendent on the subject.

I am respectfully,

J. F. KENNEDY, M. D., Secretary.

*Decisions of the Attorney-general.*

The letter was laid directly before Hon. Mr. Sabin, and he in an official letter fully acceded with the views therein expressed, and said further: "The directors are expected to be *even more zealous than the health officers* in protecting and caring for the health of the school."

This correspondence was laid before the State Board at its meeting, and they passed a resolution asking the Attorney-general for an official opinion upon the following interrogatories:

1. Has a local board of health power to require the vaccination of children before entering the public schools as a means of protection against the spread of Small-pox?
2. Has a local board of health power to exclude from the public schools, as a means of preventing the spread of Small-pox?
3. Has a local board of health power to require vaccination of all persons within their jurisdiction, as a means of preventing the spread of Small-pox?

The Attorney-general gave the following as his decision thereon:

OFFICE OF ATTORNEY-GENERAL, }  
DES MOINES, IOWA, June 1, 1888. }

J. F. KENNEDY, M. D., Secretary of the State Board of Health, Des Moines, Iowa:

DEAR SIR—At the last regular meeting of the State Board of Health, held on the 29th ult., there was submitted to me by the said board a communication from Robert E. Crylie, of Glidden, Iowa, respecting the subject of vaccination. It seems that the health officer of the town of Glidden had ordered the teachers of the public schools to require that the pupils attending school should be vaccinated. There was opposition made to this by the directors of the school, and the teachers were by them directed not to obey the orders of the health officer until further directions from the board of school directors. The question raised is one of authority on part of local boards of health to require pupils attending the public schools to be vaccinated.

The health laws of the State of Iowa, in so far as they provide for boards of health to regulate their powers and duties, are contained in chapter one hundred and fifty-one of the Laws of 1880. Section two of that act provides that:

"The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of the State. They shall have charge of all matters pertaining to quarantine; \* \* \* they 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



*Decisions of the Attorney-general.*

improvement of the public health; and it shall be the duty of all police officers, sheriffs, constables, and all other officers of the State, to enforce such rules and regulations, so far as the efficiency and success of the board may depend upon their official co-operation."

This confers upon the State Board of Health the power to determine when it becomes necessary to resort to quarantine, or to require vaccination, or to take other precautionary measures for the prevention of the spread of contagious or infectious diseases; and it would be the duty of local boards of health to co-operate within their several jurisdictions with the State board in carrying out the regulations which may be prescribed by the said State board.

Section thirteen of the same act provides that the mayor and aldermen of each incorporated city, and the mayor and councilmen of any incorporated town, or the trustees of a township, shall exercise the powers, and perform the duties of a board of health within their respective jurisdictions.

Section sixteen of the same act empowers these boards of health to make rules and regulations respecting nuisances, sources of filth and causes of sickness within their jurisdiction, such as they may judge necessary for the public health and safety.

And sections twenty-one and twenty-two give further and more specific directions in respect to the action of these local boards, in cases of Small-pox or other sickness dangerous to the public health, when within their jurisdictions. And the closing part of section twenty-two provides, after having enumerated a number of duties to be performed by these local boards, that they take such other measures as may be deemed necessary for the safety of the inhabitants.

These are all of the provisions of the statutes that I have been able to find bearing upon the subject. From these provisions, it is clear to my mind that, when, in the opinion of the State Board of Health, it becomes necessary for the State, or any particular locality within the State, to adopt precautionary measures to prevent the spread or introduction of Small-pox, the State Board of Health may make rules requiring persons attending the schools of the State to be vaccinated. I take it that it has become a settled fact that proper vaccination is, if not the only, certainly the surest remedy of preventing the spread of Small-pox. When the State Board has made such rules or regulations, it then becomes the duty of the local boards within their respective jurisdictions to adopt measures for enforcing therein these provisions of the State Board, and in that case there should be no question as to the authority of the local boards to require pupils attending the public schools to be vaccinated, or, in default thereof, to prevent their attendance. Or the local board may, if the necessity of the case in their opinion requires it, cause the schools to be closed. And it is the duty of the board of school directors, and the teachers within the schools, to obey the orders of the local board of health when thus made, and a refusal to do so would subject them to the penalties provided in said chapter one hundred and fifty-one.

Another question involved in the inquiry is whether these local boards may require all persons to be vaccinated without reference to their attending

*Decisions of the Attorney-general.*

school or not; or, in other words, whether the local boards have the power and the authority to compel all persons within their jurisdictions to submit to vaccination. In my opinion they have not such authority, but they may, under the direction of the State Board of Health, when the necessity of the case requires it, quarantine all persons who refuse to be vaccinated. I do not think, however, that either the State Board of Health or the local boards acting under the direction of the State Board of Health, would have the power, arbitrarily, to require such vaccination, or in default thereof to declare such quarantine. This could only be done when there was such a prevalence of diseases as to render it imperatively necessary, and the question of this imperative necessity might become a judicial question.

A. J. BAKER,  
*Attorney-general.*

## ABATEMENT OF NUISANCES.

August 6th the local boards of health of Grand View, Port Louisa, Bloomington and Seventy-Six townships sent a petition asking the State Board to investigate a nuisance existing at the head of Muscatine slough, in the Mississippi river. The petition also set forth that the local board of health of Muscatine, within whose jurisdiction the nuisance existed, had been repeatedly petitioned to abate the same, as a cause of much sickness; but had refused and neglected to take any action in the matter. The nuisance was created by a lumber company in filling one channel of the river with refuse from a lumber mill. The question as to the power of the State Board of Health, also of the four local boards, in the premises, and as to the proper measure to secure an abatement of the nuisance, was referred to the Attorney-general, who answered as follows:

OFFICE OF THE ATTORNEY GENERAL,  
DES MOINES, August 11, 1888. }

J. F. KENNEDY, M. D., *Secretary State Board of Health:*

DEAR SIR—The parties who created the nuisance described in the inclosed petition are subject to indictment. They may be proceeded against civilly by those who are affected by the nuisance for damages, and by way of injunction to restrain the further continuance of the same. The citizens of Louisa county, however, cannot compel the local board of health of Muscatine to declare the obstruction a nuisance; the local board are to judge of this for

*Decisions of the Attorney-general.*

themselves, and no other tribunal can substitute its judgment for the judgment of the local board. The refusal to act, however, is no bar to the court, in proper proceeding, and upon sufficient evidence, declaring the obstruction a nuisance, and ordering it abated, and rendering judgment for damages.

Yours truly,

[Signed]

A. J. BAKER.

At Mechanicsville an infectious disease appeared. The local board of health with its health officer, in accordance with the rules and regulations of the State Board, ordered a quarantine. At the end of nine days, contrary to the rule of the State Board requiring forty days' quarantine, and against the advice and direction of the local health officer, the local board of health raised the quarantine. The question then arose as to the powers of the State Board in the premises. There were a number of local boards of health, who, while they had proper respect for the State Board, felt that rules and regulations adopted and promulgated by it were binding only when adopted by them, and that they might adopt or reject the rules and regulations of the State Board at pleasure. The matter was referred to the Attorney-general.

OFFICE OF THE IOWA STATE BOARD OF HEALTH, }  
DES MOINES, February 4, 1889. }

JOHN Y. STONE, *Attorney-general*:

Where the State Board of Health, by virtue of the power and authority vested therein, has made and published rules and regulations for the restriction and prevention of contagious disease within this State, among which is the quarantine of the premises whereon such disease may exist, and the isolation of the sick for a period of forty days; and further, where in a given case quarantine has been established for a period of nine days, has a local board of health power or authority to set aside and annul such rules and regulations of said State Board by raising the quarantine and releasing the persons and premises from such restrictions before the expiration of the quarantine term of forty days?

J. F. KENNEDY, *Secretary of the Board*.

THE STATE OF IOWA, OFFICE OF ATTORNEY-GENERAL, }  
DES MOINES, February 8, 1889. }

To the State Board of Health:

SIR—I am in receipt of your communication stating in effect that in one of the towns in this State three clearly defined cases of Diphtheria developed some time ago, and that in accordance with regulations adopted by your

*Decisions of the Attorney-general.*

honorable Board, and perhaps by the local board of health in the locality, the patients had been isolated and were under treatment. It is further stated that after the continuance of this isolation and treatment for nine days, the restrictions were raised and communication permitted between the patients and other persons who might come in contact with them.

As I understand the matter, the restrictions were raised by the local board of health of the town. You now ask whether this local board of health had authority to change the status that had been established under the regulations above mentioned. Section two, chapter one hundred and fifty-one, of the acts of Eighteenth General Assembly, provides as follows:

"The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of the State. They shall have charge of all matters pertaining to quarantine. \* \* \* They shall have authority to make such rules and regulations \* \* \* as they may from time to time deem necessary for the preservation or improvement of public health; and that it shall be the duty of public officers, sheriff, constables and other public officers of the State to enforce such rules and regulations, so far as the efficiency and success of the Board may depend upon their official co-operation."

My attention is called to the regulation adopted in relation to cases of Scarlet Fever and Diphtheria by your Board, and which is as follows:

"Isolation—separation of the sick from the well. Whenever a child has sore throat and fever, and especially when this is accompanied by a rash on the body, the child must be immediately isolated as completely as possible from other of the household and from other persons until a physician has determined whether it has Scarlet Fever or Diphtheria. All persons known to be sick with either disease must be promptly and thoroughly isolated from the public for not less than forty days."

The adoption of the foregoing regulation is undoubtedly within the power of the State Board. I think it is the purpose of the law to give the State Board superior control over all matters relating to public health. Local boards have the power and are required within their respective jurisdictions in case epidemic disease is developed to take such measures as may be deemed necessary for the safety of the inhabitants. See section twenty-two, chapter one hundred and fifty-one of the acts of the Eighteenth General Assembly. But even the local board has no authority to do away with the restrictions that have been previously established by the State Board, nor any right or authority to change a condition with respect to a patient that had been established under the regulations of the State Board. The object of this law is to furnish methods, means or agencies for preserving and protecting life and health. The State Board is invested with power in this matter extending over the whole State. It is the duty of all persons to observe the regulations it has established, because in legal contemplation, as well as in fact, they have been established for the public good. Local boards act within their respective localities, but they have no power to take action in conflict with the action or regulations of the State Board.

I am, therefore, of the opinion that the act complained of as stated in the



*Decisions of the State Board.*

first part of this communication was without authority, and that it is the duty of the public officers, sheriffs and constables in the locality where this infraction has occurred, to enforce the order of the State Board of Health, and to see to it that the regulations of said Board are carried out.

Respectfully yours,

JOHN Y. STONE, *Attorney-general.*

## DECISIONS OF THE STATE BOARD.

### LOCAL BOARDS.

Whose duty is it to put up placards in cases of contagious diseases?

*Answer.*—In cities and towns the council usually designates the marshal or police. In townships, the board may designate some person, or it may be done by some member of the board. It should not be done by the health physician, as it would be manifestly unjust for the health physician to go to a house where a rival physician was in attendance, to put up a placard.

Where a quantity of illuminating oil is of superior quality, purchased in Chicago, and bearing the brand of an Illinois inspector, as being "Test of one hundred and fifty degrees," must such oil be inspected again before use in this State?

*Ans.*—The statute says, all oil for illuminating purposes, before sale or use in this State, must be inspected within this State. An inspection made in Illinois is of no value in this State. All oil sold or used within this State must previously be inspected by an Iowa inspector, and bear his brand of inspection. It is proper to state here, that the refiner's brand of "one hundred and fifty deg. Fire Test," or "one hundred and seventy-five deg.", is little or no indication of the quality or standard of the oil under Iowa inspection law. The flashing point, and not the burning point of oil is the standard in this State.

*Decisions of the State Board.*

Has a local board power in case of doubt regarding a case of suspected contagious disease, contrary to the wishes of the family in which the disease exists, to call competent physicians, when the diagnosis of the attending physician is questioned?

*Ans.*—A local board has unlimited power to adopt such measures as they deem best to protect the people from contagious diseases. In the case cited, professional courtesy would dictate that the attending physician should be notified and invited to be present.

Where there is probable danger from an outbreak of Small-pox, should the local board require all children to be vaccinated, or only issue a general recommendation?

*Ans.*—General vaccination should be required. The board should do all in its power to protect the people from, and prevent the spread of the disease.

Is vaccination obligatory upon pupils in the public schools?

*Ans.*—By virtue of power therein vested, the State Board has made the following rules:

RULE 1. Every person entering any public school of Iowa must give satisfactory evidence of protection by vaccination.

RULE 2. The fact of vaccination and protection must be entered with each name on the school record, and on transfer and promotion lists.

The Attorney-general says in an official opinion, that rules and regulations made by the State Board of Health are binding upon the people.

If a person has Scarlet Fever the second time, and the eruption is well developed, would you expect infection by exposure to it?

*Ans.*—Yes.

If, during an epidemic of Scarlet Fever, an adult die of a disease difficult of diagnosis, but developing symptoms of malignant Scarlet Fever, and a child, constantly with such adult person, is taken sick on the eighth day (the adult dying on the sixth), is it safe to treat the case of the child as a contagious disease?

*Ans.*—The local board must decide in all cases whether or not a disease is contagious, where there is a doubt. The board should always take the safe side, and suspicious cases should be treated as

*Decisions of the State Board.*

contagious until proven otherwise. In the case cited, the presumption is in favor of contagion, but that would depend wholly on the possibility of exposure, a fact to be determined by circumstances.

Where there is a conflict among physicians in the diagnosis of suspected contagious disease, who is to decide?

*Ans.* The local board. The statute vests them with unlimited power to make such regulations and investigation as they deem best, and their decision is final until set aside by the courts.

Is ice suitable for potable use when taken from a pond into which the sewage of a city is discharged?

*Ans.*—If the pond is still, without a rapid outlet, the ice would undoubtedly be polluted. As a precautionary measure, such ice should be prohibited by local boards for potable use within their jurisdiction, until the fact of its purity can be determined by analysis. Freezing does not remove the impurity, and water polluted with sewage is one of the most prolific sources of Typhoid Fever known.

Where a physician refuses to report contagious diseases to the local board, obstructs the enforcement of regulations of the local board, and advises his patients, sick with contagious disease, or their friends, to totally disregard quarantine regulations, who is to enforce the penalty provided for violations of regulations of a local board?

*Ans.*—If in a city, prosecution should be made by the city attorney, on complaint of the local board. If in a township, complaint should be made before a justice of the peace, and the county attorney notified, whose duty it is to prosecute the case. In either event it is the duty of the local board to enforce the law. The State Board has no authority to do so. A physician, who, for any reason, will encourage his patients sick with, or convalescing from a contagious disease, to mingle with the well, and those susceptible to the disease, or who will not promptly and cheerfully aid, in all possible ways, the restriction and prevention of such diseases, is unworthy of his profession, should have his certificate revoked, and be remanded to some less responsible and honorable business.

1. Has a local board of health power to require the vaccination of children before entering the public schools as a means of protection against the spread of Small-pox?

*Decisions of the State Board.*

2. Has a local board of health power to exclude from the public schools, as a means of preventing the spread of Small-pox?

3. Has a local board of health power to require vaccination of all persons within their jurisdiction, as a means of preventing the spread of Small-pox?

As these questions involved a construction of law, and were deemed of considerable importance, they were referred to the Attorney-general, who gives the following as his decision thereon:

OFFICE OF ATTORNEY-GENERAL,  
DES MOINES, IOWA, June 1, 1888. }

J. F. KENNEDY, M. D., *Secretary of the State Board of Health, Des Moines, Iowa:*

DEAR SIR—At the last regular meeting of the State Board of Health, held on the 29th ult., there was submitted to me by the said board a communication from Robert E. Crylie, of Glidden, Iowa, respecting the subject of vaccination. It seems that the health officer of the town of Glidden had ordered the teachers of the public schools to require that the pupils attending school should be vaccinated. There was opposition made to this by the directors of the school, and the teachers were by them directed not to obey the orders of the health officer until further directions from the board of school directors. The question raised is one of authority on part of local boards of health to require pupils attending the public schools to be vaccinated.

The health laws of the State of Iowa, in so far as they provide for boards of health to regulate their powers and duties, are contained in chapter one hundred and fifty-one of the Laws of 1880. Section two of that act provides that:

"The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of the State. They shall have charge of all matters pertaining to quarantine; \* \* \* they 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 the public health; and it shall be the duty of all police officers, sheriffs, constables, and all other officers of the State, to enforce such rules and regulations, so far as the efficiency and success of the board may depend upon their official co-operation."

This confers upon the State Board of Health the power to determine when it becomes necessary to resort to quarantine, or to require vaccination, or to take other precautionary measures for the prevention of the spread of contagious or infectious diseases; and it would be the duty of local boards of health to co-operate within their several jurisdictions with the State board in carrying out the regulations which may be prescribed by the said State board.

Section thirteen of the same act provides that the mayor and aldermen of each incorporated city, and the mayor and councilmen of any incorporated



*Decisions of the State Board.*

town, or the trustees of a township, shall exercise the powers, and perform the duties of a board of health within their respective jurisdictions.

Section sixteen of the same act empowers these boards of health to make rules and regulations respecting nuisances, sources of filth and causes of sickness within their jurisdiction, such as they may judge necessary for the public health and safety.

And sections twenty-one and twenty-two give further and more specific directions in respect to the action of these local boards, in cases of Small-pox or other sickness dangerous to the public health, when within their jurisdictions. And the closing part of section twenty-two provides, after having enumerated a number of duties to be performed by these local boards, that they take such other measures as may be deemed necessary for the safety of the inhabitants.

These are all of the provisions of the statutes that I have been able to find bearing upon the subject. From these provisions, it is clear to my mind that, when, in the opinion of the State Board of Health, it becomes necessary for the State, or any particular locality within the State, to adopt precautionary measures to prevent the spread or introduction of Small-pox, the State Board of Health may make rules requiring persons attending the schools of the State to be vaccinated. I take it that it has become a settled fact that proper vaccination is, if not the only, certainly the surest remedy of preventing the spread of Small-pox. When the State Board has made such rules or regulations, it then becomes the duty of the local boards within their respective jurisdictions to adopt measures for enforcing therein these provisions of the State Board, and in that case there should be no question as to the authority of the local boards to require pupils attending the public schools to be vaccinated, or, in default thereof, to prevent their attendance. Or the local board may, if the necessity of the case in their opinion requires it, cause the schools to be closed. And it is the duty of the board of school directors, and the teachers within the schools, to obey the orders of the local board of health when thus made, and a refusal to do so would subject them to the penalties provided in said chapter one hundred and fifty-one.

Another question involved in the inquiry is whether these local boards may require all persons to be vaccinated without reference to their attending school or not; or, in other words, whether the local boards have the power and the authority to compel all persons within their jurisdictions to submit to vaccination. In my opinion they have not such authority, but they may, under the direction of the State Board of Health, when the necessity of the case requires it, quarantine all persons who refuse to be vaccinated. I do not think, however, that either the State Board of Health or the local boards acting under the direction of the State Board of Health, would have the power, arbitrarily, to require such vaccination, or in default thereof to declare such quarantine. This could only be done when there was such a prevalence of diseases as to render it imperatively necessary, and the question of this imperative necessity might become a judicial question.

A. J. BAKER,  
*Attorney-general.*

*Decisions of the State Board.*

Can a local board appoint an inspector of meat, slaughter-houses, etc., or would they be authorized to enact an ordinance providing for such an appointment? If so, would butchers be compelled to submit all meat offered for sale to inspection, and who would pay the inspection fees?

*Ans.*—Under the provisions of chapter one hundred and fifty-one, laws of 1880, local boards of health have power to make such rules and regulations for the protection of the public health within their jurisdiction, as they may deem necessary. This power is unlimited, the presumption of law being only, that such power shall be exercised reasonably. The condition of the food supply, slaughter-houses, privies, hog-pens and stables, is an important factor in the health of a community. It is clearly the duty of a local board to secure to the people, within their jurisdiction, complete immunity from danger, by reason of the unhealthful condition of either. That a local board has the power to prohibit the sale of unwholesome meat, vegetables, or food of any kind, is beyond question. The power to do an act carries the means to execute. Under chapter one hundred and fifty-one, laws of 1880, a local board cannot enact ordinances. The power to do that is derived under the law of municipal corporations, and can only be exercised in incorporated cities and towns; and in such all health regulations should be put into ordinances, as, by so doing, they can be much better enforced, as they then come within the purview of municipal law. A city or town may, by ordinance, provide a penalty for violation of health regulations made by the local board of health.

Fees for the inspection of food would have to be paid by whomsoever, and in such manner as the local board may determine, as provided in section fourteen, chapter one hundred and fifty-one, laws of 1880, which says local boards "shall regulate all fees and charges of persons employed by them in the execution of the health laws, and of their own regulations."

Is it the duty of a local board to establish quarantine in case of contagious disease, when no reports of such disease has been made to them by the attending physician?

*Ans.*—Yes. It is their duty to protect their community against the spread of contagious diseases, at all times, and under all circumstances. To require notice from the attending physician would

*Decisions of the State Board.*

often defeat the purpose of the law. Physicians frequently attempt to secrete a contagious disease for fear of injury to their practice.

Where a township board of health meets on the same day and at the same time as township trustees, how are the board of health to fix their pay?

*Ans.*—A township board of health, and a township board of trustees, though composed of the same persons, are created under different statutes, and have separate and distinct duties to perform. A board of trustees cannot act as a board of health while sitting as trustees. They must adjourn, or take a recess, and organize as a board of health. The proceedings of each board should be kept in separate records. They are separate and distinct bodies as though composed of entirely different persons. Section fourteen, chapter one hundred and fifty-one, laws of 1880, says local boards shall fix all fees for the execution of health laws. The compensation of township trustees has nothing to do with it, hence the question of compensation of members of a local board for services, comes within their own discretion. See *Staples v. Plymouth County*, 62 Iowa, 369.

Do the regulations of the State Board, requiring vaccination of children in the public schools, apply to schools in the country as well as in cities and towns?

*Ans.*—They apply to all public schools in this State, whether in country, city or town.

What are the rules of the State Board regarding analysis of water?

*Ans.*—When a city, town, school board or community desire to have tested a water supply for public use, taken from water-works, wells, lakes or streams, the State Board of Health will procure an analysis of the same at reduced price and pay one half the expense. This does not apply to water supply for private use. In cases where a water supply, private or public, is suspected of being a cause of sickness, or where the same has been condemned for use by a local board, the State Board will at its own expense procure an analysis of the same, but the request to do so must be made by the local board of health, or in case of school supply, by the school

*Decisions of the State Board.*

board. The water must be procured according to the following instructions:

1. Glass-stoppered bottles, of the kind technically known as "acid bottles," and procurable from any druggist, should be used for this purpose. These bottles hold one gallon, and must be perfectly clean; it is desirable that they should not have been previously used for any other purpose.

Waters for analysis must not be put into stone-ware vessels. Corks should also be avoided if possible, but if used, they must be quite new and well washed with the water before insertion into the bottle.

2. Before collecting the sample, rinse and *cleanse the bottle thoroughly*; then rinse the bottle well three times, with the sample water, filling it each time about one third full. Then fill it within half an inch of the stopper, tie the stopper down, with a piece of calico over it, and seal the string. The quantity must be *not less than one gallon*.

If the sample be taken from a well with a pump fixed in it, pump about four gallons of water before filling the bottle; then pump the water directly from the spout of the pump into the bottle.

If the sample be taken from a tap or hydrant, let a couple of gallons flow before filling the bottle, then allow the water to flow directly into the bottle.

If the sample be intended to represent the water supply of a town, it ought to be taken from a pipe in direct communication with the street main, and not from a cistern, nor from any pipe supplied from a cistern, tank or reservoir.

In taking a sample of water from a tank, well (in which a pump is not fixed), or stream, plunge the neck of the bottle completely below the surface, when practicable, and if a can or dipper be used, let it and the string used in dipping it up be scrupulously clean, and avoid, as much as possible, collecting the water from the surface. On the other hand, be careful not to disturb any mud or sediment at the bottom of the water.

If the sample be ice, melt the ice naturally—not by artificial heat—in a porcelain-lined or vitrified vessel, and pour into the bottle.

3. At the time the samples are forwarded for analysis, send to the Secretary of the State Board the following particulars:

(a.) From what source the samples are collected—wells, rivers or streams.

If from wells—

(b.) Describe the soil and subsoil, also the water-bearing stratum into which the well is sunk.

(c.) The diameter and depth of well, and if walled or curbed, how, and how far above and below the earth surface.

(d.) The distance of the well from either privies, stables, hog-pens, cess-pools or house-drains.

If from rivers or streams—

(e.) State the distance from the source to the point at which the sample was collected.

(f.) State whether sewage or other animal polluting matter is known to gain access to the river or stream above the point at which the sample is collected.

If from springs—

(g.) Describe the stratum from which the spring issues.

(h.) State whether the sample is taken direct from the spring, or otherwise.

The analysis of every sample of water involves considerable time and labor; it is therefore important that the above instructions be strictly attended to, in order that the result may not be rendered worthless. For the same reason, it is desirable that the samples should not be unnecessarily multiplied.

4. All bottles should be distinctly labeled and numbered, stating where from. The description of source should be numbered to correspond with the bottle, that no mistake may occur.

Water in stone or earthen jugs will not be received.

Pack carefully, and prepay express charges.



*Decisions of the State Board.*

Where an incorporated city covers an entire township, does the city board of health or the township board have jurisdiction?

*Ans.*—The city board.

Where there are a few cases of Measles in a school district is it not the duty of the local board to close the public schools?

*Ans.*—No. In case of an outbreak of any contagious disease, the public schools should not be closed, unless the number of sick outnumbers the well, and the school thereby becomes decimated. By closing the schools the children are thrown together, and inter-visit and play, and the risk of exposure is greatly increased. By continuing the school, isolating the sick, and prohibiting teachers visiting the sick, the danger of exposure is greatly lessened.

If a pupil or teacher is affected they must be removed from the school at once, and, unless the other children in the family go from home to live, they must also be excluded. Report the name of the pupil or teacher, together with the supposed character of the disease, to the principal or superintendent of the school; or if in a country district, to the school board, *at once*, as well as to the parents of the child. Such a child, or teacher, must not be, under any circumstances, readmitted to the school, except upon a certificate from the attending physician, and a permit from the local board, or a health officer, showing complete recovery, thorough disinfection of his or her person and clothing, and the disinfection of the home.

In case of an outbreak of Small-pox in any community, or a threatened outbreak, every child attending the school and every teacher must be examined relative to having been successfully vaccinated, and if not so vaccinated, must be excluded from the school until so protected.

If a person is ascertained to have attended school when affected with either Diphtheria, Measles, Scarlet Fever, Membranous Croup, Whooping Cough, or Small-pox, the local board of health must immediately close the room wherein such person attended, and direct its proper disinfection.

In all cases of doubt the public must have the benefit of the doubt. It is infinitely better to isolate and quarantine a suspicious

*Decisions of the State Board.*

case for a few days and find a harmless error had occurred, than to allow such an one to attend the school, and, after many had been wantonly exposed, find that a fearful and fatal mistake had been made. Prevention is inexpensive and sensible—exposure is always dangerous, and hence senseless.

Where a pupil affected with an infectious disease has been expelled from the public school, and the parents persist in returning such pupil to the school, has a local board power to enforce the expulsion of such pupil?

*Ans.*—Yes, and it is their duty to do so.

Is quarantine obligatory in a case of Diphtheria when the local board has no rule specifically naming Diphtheria?

*Ans.*—Yes. Section fourteen, chapter one hundred and fifty-one, laws of 1880, says local boards of health shall make such regulations as may be deemed necessary to protect the public health. Section twenty-one, says, in case of contagious disease, local board *shall* make *effectual* provision for the safety of the inhabitants, either by the removal of the sick to a separate house, or the removal of the well persons from the house and leaving the sick; or take such other measures as are necessary for safety. Diphtheria is a contagious disease, hence, comes within the rule.

Does the State Board of Health simply recommend quarantine in case of contagious disease, or do they command it, *i. e.*, are their regulations mandatory?

*Ans.*—Section two, chapter one hundred and fifty-one, laws of 1880, says the State Board of Health shall have charge of all matters of quarantine. To have charge of, means to direct, to control, to have command of. The Attorney-general says regulations of the State Board of Health are binding upon the people and local boards without subsequent action by local boards. Its regulations are mandatory. It has declared that Diphtheria is a contagious disease, and "that all persons sick therewith must be thoroughly isolated from the public not less than forty days." Also, that no such person must be permitted to associate with others, nor attend school, church, nor any public assembly, until in the judgment of a careful physician they can do

*Decisions of the State Board.*

so without endangering others. It is also provided that where a contagious disease has subsided, there are no more cases; where proper disinfection has been had; where the sick have recovered, and there is no more danger from infection or contagion, the quarantine may be removed, though the forty days from appearance of the last case on the premises quarantined have not elapsed."

Is it the duty of an attending physician, when he reports a case of contagious disease to the local board to put up a danger signal?

*Ans.*—No. It is the duty of the local board. The attending physician has done his duty when he reports the disease.

Where a physician does not report contagious diseases to a local board, is the presumption to be taken that he is not attending such cases?

*Ans.*—No. It makes no difference whether or not a physician reports a case of contagious disease to a local board; the board may, and has the right to decide for itself whether or not a suspected case is or is not contagious or infectious. It is not to be presumed that because an attending physician has not reported a case as contagious, therefore it is not so. It is the duty of the local board to determine that, and govern themselves accordingly.

Is a local board required to appoint a health officer, and to have such officer constantly in office?

*Ans.*—Section fourteen, chapter one hundred and fifty-one, laws of 1880, says local boards of health *shall* appoint a competent physician who shall be the health officer of such board. There is no discretion about it, and local boards can no more neglect or refuse to appoint such officers than they can any other duty which, as public officers, they are sworn to perform.

Is it the duty of the attending physician, in case of contagious disease, to quarantine, to put up danger signals, and disinfect the premises?

*Ans.*—All sanitary regulations are under control of the local board, and the attending physician cannot interfere therewith. It is for the local board to establish and remove quarantine, to put up and remove danger signals, and to enforce quarantine regulations. It is professional courtesy due to the attending physician that he be

*Decisions of the State Board.*

consulted in all matters, and the local board may authorize disinfection to be done under his supervision, but the local board only, has power to decide as to the efficiency of the disinfection and the removal of quarantine. The attending physician has no right nor power to do either. The health officer has no power to do any act except as defined by the local board, when in session. Individual members of the board cannot act for the board.

In an incorporated town, is it necessary for the council (which is the local board of health) to adopt rules and regulations, or ordinances, for the enforcement of the regulations of the State Board of Health; or can said council enforce the rules of the State Board without adopting the same?

*Ans.*—The statute says local boards shall make such regulations regarding causes of sickness within their jurisdiction, as they may deem necessary for public health and safety. This statute is mandatory, not directory. Regulations made by the State Board are binding upon all people, without indorsement or adoption by local boards.

In the circular to clerks and health officers of local boards it is said: "It is preferable to prosecute violations under ordinances as criminal offenses." What authority under the statutes have local boards to adopt ordinances?

*Ans.*—Under the law of municipal corporations, only incorporated cities and towns are empowered to enact ordinances. Under that law, a city or town may adopt the regulations of the State Board as ordinances, and provide penalties for violation thereof. This would bring them within the purview of the criminal law, whereas a prosecution for a violation of such regulations, made under chapter one hundred and fifty-one, laws of 1880, would be only a civil action, the penalty being a forfeiture and not a fine. Where a city council adopts these regulations as an ordinance, a violation thereof would be two offenses in one act, one against the ordinances and the other against the statute. But a local board can act as a board of health, only under the statute. If in a city or town, it can secure the same result to a degree more effectually, through ordinances under municipal law. The Supreme Court has decided that a city or town may by ordinance provide penalties for violations



*Decisions of the State Board.*

of health regulations made under the provisions of chapter one hundred and fifty-one, laws of 1880. *State v. Holcomb*, 68 Iowa, 107.

Where an attending physician reports to the local board a case of Diphtheria, what is the duty of the local board?

*Ans.*—It is the duty of the local board at once to take cognizance of the notice and adopt measures to protect the community. Every day and hour of delay is dangerous, and it is gross neglect of official duty. It may also be the fact that the attending physician has made a mistake in diagnosis, and prompt action to determine the fact will also relieve public suspense and alarm.

Will pine lumber, used for curbing a well, render the water unfit for drinking purposes, there being no other source of pollution?

*Ans.*—In the use of wood for curbing wells, there is a strong possibility and extreme probability of pollution of the water. Above the water line there is constant decay, and decaying vegetable matter is a source of pollution. Beside, wood is subject to the action of insects, providing a lodgment for them. They die, and fall into the water. The decay of once living organisms, animal or vegetable, gives more or less taint of a putrefactive nature to water, and this taint, when of sufficient strength, is known to induce diarrheal tendencies in the human system. Strictly speaking, wood curbing would not render water unfit for potable use, but it cannot be used except with such unfavorable and objectionable conditions as to condemn it upon hygienic principles.

Has a local board the right to enforce quarantine regulations regarding Diphtheria?

*Ans.*—Yes. And it is furthermore a duty of the board to do so.

Where, in an unmistakable case of spontaneous explosion of a lamp, resulting in damage only to property; and in another suspicious case, resulting in death, either from explosion or accidental dropping the lamp, what steps are necessary to secure an inspection of the kerosene causing the explosion, and does this duty devolve upon the health officer, or the local board?

*Ans.*—Where there has been a lamp explosion, from suspected illegal oil, notice should be sent by the local board, or its health officer, at once to Dr. Beardsley, State Oil Inspector, at Burlington.

*Decisions of the State Board.*

A sample of the oil identical with that which was in the exploded lamp, should be procured, not less than one quart, and sent to the office of the State Board of Health, together with all the facts to be obtained regarding the explosion. The sample of the oil should be verified so as to be known and identified as being a part of that in the lamp. A copy, also, of the brand of the inspector on the barrel, should be sent.

Have local boards power to protect their community against the ravages of rabid dogs?

*Ans.*—Yes. The best protection against nine tenths of the dogs is to cut their tails off close to their ears.

Where a family living in the country has Diphtheria in their family, has a local board of a town authority to quarantine against said family, and prevent them from coming into the town?

*Ans.*—Yes.

Is it necessary that regulations for quarantine be adopted at a regular session of the board?

*Ans.*—They may be adopted at any meeting of the board, but it must be done by the board; it cannot be delegated to other persons. The Supreme Court says local boards should meet whenever it is necessary to suppress an outbreak of contagious disease, and make the necessary regulations therefor.

Is the burning of hydro-naphthal sufficient for disinfection, after Scarlet Fever; or must sulphur be used?

*Ans.*—Hydro-naphthal is not recommended by the State Board. Sulphur has been discredited and abolished, as unreliable and inefficient, as commonly used.

## CLERKS OF LOCAL BOARDS.

By order of the township board of health, I, as clerk, was requested to travel several miles to give official notice to persons to bury dead animals lying on their premises. Who pays for this service; the county or the township?

*Ans.*—Section fourteen, chapter one hundred and fifty-one (1880), says local boards shall regulate all fees and charges of persons

*Decisions of the State Board.*

employed by them in the execution of the health laws, and of their own regulations. The presumption of the law is that such expenses are to be paid by the township, the same as other general expenses, and section four hundred and twenty, of the Code, especially provides how expenses of local boards of health are to be paid. As there is nothing in chapter one hundred and fifty-one in conflict with that section, the presumption is that section four hundred and twenty was not repealed by chapter one hundred and fifty-one, and such is the opinion of the Attorney-general. This being so, it would take the question of the compensation of the clerk for services performed under chapter one hundred and fifty-one, out of the provisions of section three thousand eight hundred and nine, of the Code, which provides that for official services rendered, where no other compensation or method of payment is provided, he shall be paid by the county.

## HEALTH OFFICERS.

Where a physician was appointed by the county supervisors as township physician for one or more townships, does such appointment constitute the appointee the health officer for such township?

*Ans.*—No. The statute says the local board of each township shall appoint a health officer for such township. The Supreme Court says, where the statute provides certain duties shall be performed by public officers, they can be done in no other manner than as prescribed by statute.

1. Can a local board of health delegate their power to a health officer?
2. If they can, are his orders of legal force?
3. Is the health officer of a township liable to penalty for failure to enforce the rules and regulations of the State Board?

*Ans.*—1. The health officer of a local board has power to do whatever the local board has the lawful authority to direct him to do.

2. Orders and directions made by a health officer acting by authority of a local board have the same force, as though made by the board.

*Decisions of the State Board.*

3. The Attorney-general says rules and regulations made by the State Board of Health, are of full force and effect upon the people without indorsement by local boards. It is the purpose of the legislature to give the State Board Supervisor control over matters relating to public health. The State Board is invested with power in this matter extending over the whole State. It is the duty of all persons to observe the regulations it has established. Local boards have the power, and are required within their respective jurisdictions in case epidemic disease is developed, to take such measures as may be deemed necessary for the safety of the inhabitants.

What are the duties of a health officer?

*Ans.*—The term "health officer" implies more than the fighting of contagious diseases. The legislature acted advisedly when it required that a health officer must be a "competent physician." The purpose of the law is that he shall be the sanitary advisor of the local board. To competently fill this office, he should have a practical knowledge of Chemistry, Physiology, Ventilation, Sewerage, Drainage and Water Supply. He should be a student of current sanitary literature and sanitary laws, and he should be able to distinguish a nuisance when he sees or smells one. He should be able to trace the causation of disease, and apply the means for removal. The field of a health officer is a very broad and important one. If the work is well and faithfully done, it will save thousands of lives every year in this State from preventable diseases alone. Hence, local boards should strive to do more than merely comply with the law, in appointing a health officer, by selecting the best person for the place that can be had, and then pay them for their services.

Can a local board appoint as its health officer a physician who is not a regular practitioner, yet who is deemed to be a competent physician?

*Ans.*—Chapter one hundred and four, Laws of 1886, requires all physicians in this State to have a certificate from the State Board of Medical Examiners, giving them authority to practice medicine. Without such certificate, a person has no right to practice medicine in this State, and he is not a lawful physician. The State Board of



*Decisions of the State Board.*

Health will not recognize any but lawful physicians as health officers of local boards. It is doubtful if a local board can appropriate public money to pay for the services of a person not lawfully qualified to perform the service.

Is the law requiring a local board to appoint a health physician mandatory or optional?

*Ans.*—It is mandatory. The law says, they *shall* appoint, etc. There is no discretion regarding it. It can no more be neglected or evaded than any other duty devolved upon the board, and there is no doubt a local board could be indicted for neglect of duty as public officers, for failure to obey the statute.

Has a health officer of a local board the right to ignore rules and regulations of the State Board, regarding quarantine in cases of contagious or infectious diseases?

*Ans.*—No. Rules and regulations made by the State Board regarding quarantine are binding upon all persons.

Would it be proper to call a meeting of health physicians of a county; or would it conflict with medical ethics?

*Ans.*—It would be eminently wise and proper. Medical ethics and theory and practice of medicine, have no place in Sanitary Science and Hygiene. Whatever will promote the public health in a community should receive the united and earnest efforts of every health officer, as well as every citizen.

For services rendered to a local board by a health officer, is he to be paid by the township or by the county, on certification of the township trustees?

*Ans.*—Section fourteen, chapter one hundred and fifty-one, Laws of the Eighteenth General Assembly, says, local boards shall regulate all fees and charges of persons employed by them in the execution of the health laws, and their own regulations. The presumption of law is that the services of a health officer are to be paid by the township precisely as other public expenses. See decisions of the Supreme Court, *ante*.

Is it necessary for the health officer to examine all cases of contagious diseases when the attending physician pronounces them as such?

*Decisions of the State Board.*

*Ans.*—It is not; but where a difference of opinion exists as to the diagnosis of a suspected disease, the local board may take such measures as they deem necessary to determine the questions.

Is it the duty of the health officer of a local board to attend and treat quarantined cases of contagious disease?

*Ans.*—No. All persons sick with contagious disease, whether quarantined or not, may employ whom they please to attend them, during sickness, and neither the health officer nor local board can interfere. This does not apply to paupers.

Is puerperal fever infectious?

*Ans.*—Yes. Not only is it infectious, but it is fearfully fatal. One of the greatest misfortunes of a physician or midwife is the occurrence of a case of puerperal fever in their practice, because of the danger of carrying the infection to others in the puerperal state. Hence, every attendant upon cases of labor should, by the use of antiseptic measures, sedulously guard against the occurrence of the disease. The hands and all instruments and appliances should be washed in a solution of corrosive sublimate (one to one thousand parts), and all discharges subject to decomposition, and capable of producing septicæmia, should be promptly removed and destroyed. The only way to avoid this terrible disease, is for every practitioner to recognize his personal responsibility in the matter, and he who does not is guilty of criminal negligence.

Is a physician who holds a certificate from the State Board of Medical Examiners, allowed under the prohibitory law, to prescribe liquors from his own office supply of medicines, to his own patients who really must have stimulants?

*Ans.* This is not a question within the province or jurisdiction of the State Board, but for the information of the public and physicians we give the law as it is:

"No person shall manufacture for sale, sell, keep for sale, give away, exchange, barter or dispense any intoxicating liquor, for any purpose whatever, otherwise than as provided in this act. Persons holding permits, shall be authorized to sell and dispense intoxicating liquors for pharmaceutical and medicinal purposes, and alcohol for specified chemical purposes, and wine for sacramental purposes, but for no other purposes whatever; and all

*Decisions of the State Board.*

permits must be procured from the district court of the proper county at any term thereof after this act takes effect."

It is evident from the statute that no person, not holding a permit, can dispense alcoholic liquor for any purpose whatever, and this applies also to registered pharmacists.

Where a physician appointed a health officer by a local board, declines to serve, does the health officer previously appointed, hold over, or is there a vacancy; and if a vacancy, must it be filled?

*Ans.*—It depends upon the terms of the appointment. If the appointment was made for a specified period, as one year, and the year has expired, there is a vacancy, and it must be filled. If the year or specified period has not expired, the former appointee holds over, unless he declines to serve, in which event there is a vacancy.

Where, in an epidemic of contagious disease, a health officer of a local board gives directions for disinfection of infected premises, differing entirely from those of the State Board of Health, and there is a question as to their efficiency, which are to be considered paramount?

*Ans.*—The rules of the State Board in such cases are binding upon all local boards, and upon the people, and health officers of local boards should enforce them.

Does Membranous Croup come within the list of diseases classed as dangerous, and to be quarantined?

*Ans.*—Yes. Membranous Croup, for sanitary purposes is to be declared and considered dangerous to public health, and is included in the rules and regulations of the State Board for the restriction and prevention of Diphtheria.

Has a health officer power to give a family in which is Diphtheria, freedom from quarantine?

*Ans.*—Neither a health officer nor a local board has power to annul regulations made by the State Board. A health officer has no power to establish nor remove quarantine. He may enforce quarantine, or do any act, within the statutes, and rules and regulations of the State Board, which may be authorized and directed by the local board.

*Decisions of the State Board.*

1. What are the duties of a health officer of a local board?
2. Is it a part of his duties to disinfect school-buildings, where there is an epidemic of contagious disease, or to vaccinate children of the public schools?
3. Where such service is performed by order of a city mayor as chairman of a local board of health, is the health officer entitled to extra compensation, he being employed as health officer at a certain sum per annum?

*Ans.*—The duties of a health officer, are not defined by statute, hence they are such as are defined by the local board. He has no power nor authority except such as is specially delegated to him.

2. In the absence of any specific orders or directions of the local board it would be the duty of the health officer to perform whatever was ordered by the board, to protect the people of their jurisdiction against contagious disease.

3. Section fourteen, chapter one hundred and fifty-one, laws of 1880, says: "local boards shall regulate all fees and charges of persons employed by them in the execution of the health laws and their own regulations." Where a health officer was appointed and his compensation fixed by the board, a direction by the mayor, to the health officer to "go ahead and do the best he could, to suppress an epidemic of disease," would under ruling of the Supreme Court in *Young v. County of Black Hawk*, 66 Iowa Reports, 460, not be deemed an employment of the health officer by the board, such as to warrant extra compensation. The Supreme Court decides that power to employ a physician cannot be delegated to a committee of a local board, nor can it be exercised by individual members of a board, and no recovery can be had for services rendered, when so ordered. When it is necessary to do so, the board must convene, and in session make the proper orders. Where the compensation of a health officer is a fixed and certain sum, in the absence of any express provision, the sum fixed would include all services rendered in the performance of duty as health officer.

## QUARANTINE.

Where the father of children who have Diphtheria (he being employed away from home), comes home, and wishes to return to his work, must he be retained in quarantine with the remainder of his family?



*Decisions of the State Board.*

*Ans.*—A person who has been absent from home during sickness in his family, and death from Diphtheria, should not be detained by quarantine; but before leaving his home should be thoroughly disinfected in his person and clothing, and he should not go into public assemblies nor school-rooms.

Is there any penalty for violating quarantine regulations of a local board?

*Ans.*—Chapter one hundred and fifty-one, sections thirteen, fourteen, fifteen and sixteen, Laws of 1880, define the powers and duties of local boards of health. Section sixteen gives them authority to make such rules and regulations as they may deem necessary for the public health and safety. Such rules and regulations, when made by a local board, are binding upon all parties within the jurisdiction of such board, and a violation of them renders the offender liable to a penalty of twenty-five dollars for each day such rules and regulations are violated.

Where one in a family of five children died from Scarlet Fever, burial was immediately had, the premises thoroughly disinfected with corrosive sublimate solution and brimstone, after removing all paper from the walls, and there are no further symptoms of the disease in the remaining children, should the quarantine be maintained for the full thirty-five days?

*Ans.*—In the case cited, where a death has occurred from Scarlet Fever, the funeral held and the premises thoroughly disinfected, even though there are other children in the family who were exposed, yet not attacked, it is not necessary to continue the quarantine, but the children should be kept from all public assemblies, and the public schools, for at least fifteen days—a reasonable time for the incubation of the disease. The parents and other adult persons of the family should not take any unnecessary risks.

Can a person exposed to a contagious disease be restrained from attending the public schools, provided the disease is not, nor has not been in the scholar's house?

*Ans.*—There is no necessity for quarantining a person exposed to a contagious disease. Exposure is no evidence that the exposed person will have the disease, provided the exposure is not repeated, so as to cause danger from infection by the clothing. This rule

*Decisions of the State Board.*

does not apply, however, to an unvaccinated person who has been exposed to Small-pox. There should, in all cases, be such isolation of those sick from contagious disease as to preclude the possibility of exposure.

Does Whooping Cough come within the rules of the State Board requiring children affected thereby to be excluded from the public schools?

*Ans.*—Rules three, four and five of the State Board, are as follows:

**RULE 3.** Persons affected with Diphtheria, Measles, Scarlet Fever, Whooping Cough, or Small-pox, must be excluded from schools until the school officers, by authority of the attending physician, or health officer, grants permission for their admission; and all persons from families where such diseases exist shall also be excluded.

**RULE 4.** It is the duty of every school teacher and school officer who discovers, or who has knowledge of a case of these contagious diseases, to cause the fact to be immediately reported to the local board of health.

**RULE 5.** If a person is ascertained to have attended school when affected with either of these contagious diseases, the local board of health shall immediately close the room wherein such person attended, and direct its proper disinfection.

Should "Scarlatina" in very mild form be quarantined?

*Ans.*—Yes. It is a misnomer to designate a disease as "Scarlatina" for the purpose of indicating to the public that it is a mild form of Scarlet Fever, and therefore not dangerous. An exposure to the disease in its mildest form may, and often does, result in cases the most malignant and fatal. It is dangerous and contagious in any form, and every case should be isolated until all danger is passed. It should be called Scarlet Fever at all times, and nothing else. Physicians who use the term "Scarlatina" would benefit the public by abandoning it.

What should be done with a person who endeavors to induce persons on quarantined premises to violate the rules of quarantine?

*Decisions of the State Board.*

*Ans.*—He should be arrested and fined promptly.

Can a local board of health shut up a family, and be compelled to furnish subsistence during the time of quarantine?

*Ans.*—Yes. The law gives local boards unlimited power to make such regulations as they deem necessary to protect the public health. The presumption would be, that if the board deemed the quarantine of a family necessary, it would be equally necessary to furnish the family with subsistence. The State Supreme Court in *City of Clinton v. The County of Clinton*, has so decided.

Southeast of this place they have Diphtheria in its most virulent form. Already fifteen have died. The quarantine rules are not enforced. School children have been allowed to visit a house wherein its inmates were sick and died of Diphtheria. A young man came to my house from a house where his brother was sick. He is now sick and will probably die. Is there no way to compel people to enforce the quarantine?

*Ans.*—If our correspondent means by the word "enforce," to observe and obey the quarantine rules, there is a way to enforce the quarantine, by arresting and fining promptly every person who violates it. Quarantine means complete isolation of those sick with a contagious disease from all other persons, except those necessary to their care. Children should be specially excluded from premises whereon is Diphtheria or Scarlet Fever. If a local board neglect or refuse to provide proper measures to prevent the spread of contagious disease, they can be indicted for malfeasance as public officers, or they can be compelled by *mandamus* to do their duty.

Where a teacher in the public schools went to a house in which the same day a child died from Diphtheria, and has since there remained, should she, the teacher, sixteen days after, be permitted to resume her duties in school, the premises wherein she lived having been in the meantime thoroughly disinfected, together with every article therein? or should the full quarantine period be required?

*Ans.*—In the case cited, there is no objection to the teacher resuming the duties of the school-room, provided there is a proper change of clothing. The quarantine of premises in cases of Diphtheria and Scarlet Fever is not so much to keep adults from going in and out, as in keeping the sick completely isolated from the well, especially from children.

*Decisions of the State Board.*

Should houses be quarantined in which are cases diagnosed by the attending physician as Diphtheritic Croup?

*Ans.*—In all cases, Diphtheritic Croup, or as it is generally called, Membranous Croup, must be treated as an infectious disease. It is etiologically and pathologically like laryngeal Diphtheria. A strict quarantine must be maintained in both cases.

What shall be done with a female school teacher, who is living in the same house where there is Scarlet Fever?

*Ans.*—She should not be permitted to go into the school-room, unless she has been thoroughly disinfected. She should bathe thoroughly, disinfect her hair, put on an entire change of clothing that has not been exposed; have all infected clothing boiled or pressed with hot irons, and change her boarding place. To allow her otherwise to go into a school-room where she would be brought in contact with children who are so susceptible to the disease, would be criminal indeed.

Does the issuing of a quarantine consist simply in giving the notice?

*Ans.*—Quarantine consists in the notice and rigid enforcement of quarantine regulations. Laws do not enforce themselves. The quarantine must be maintained for the prescribed time succeeding the appearance of the last case of the disease.

How long should public school pupils who have had the Measles be quarantined?

*Ans.*—The incubation period of measles is about seventeen days. Quarantine should be maintained thirty days, or until all desquamation and cough have ceased.

For the benefit of local boards the following is given as the average incubation period of the diseases named:

Scarlet Fever.....	11 days.	Small-pox.....	16 days.
Measles.....	16 days.	Mumps.....	21 days.
Epidemic Roseola.....	16 days.	Whooping Cough.....	21 days.
Chicken-pox.....	18 days.	Diphtheria.....	10 days.



*Decisions of the State Board.*

Persons known to have been exposed should be quarantined for the period given above. In cases where the disease has appeared, quarantine must be maintained, to-wit:

*Scarlet Fever.*—Six to eight weeks from date of the rash, desquamation having completely ceased, and there being no appearance of sore throat.

*Measles.*—Three to four weeks, all cough and desquamation having ceased.

*Epidemic Roseola.*—Two or three weeks, according to nature of the attack.

*Chicken-pox.*—Until every scab has fallen off.

*Small-pox, Diphtheria and Scarlet Fever.*—Forty days.

*Mumps.*—Two or three weeks from commencement, all swelling having subsided.

*Whooping Cough.*—Six weeks from the commencement of whooping, provided the characteristic spasmodic cough and whooping have ceased.

Quarantine means the complete isolation of the sick from the well, except the physician and necessary nurses.

Where a disease has run its course, the patient fully recovered, the proper disinfection had, and there is no further danger from infection, the quarantine may be raised, though the full period has not elapsed; but this must not be done unless with the advice of the health officer, or a competent physician, and must be done by order of the local board.

Has a local board of health in a case of Diphtheria, in a mild form, power to confine and require the attendants and well members of the family to remain strictly within their homes, or on their own premises? Shall a mechanic or business man, who takes every precaution by change of clothing, be compelled to relinquish his work or business, and remain in quarantine during the sickness in his family, it being understood that the sick are isolated and all directions of the State Board observed?

*Ans.*—The powers of a local board are unlimited and discretionary. They may make such rules and regulations regarding quarantine as they deem necessary to protect the community within their jurisdiction from the spread of infectious or contagious diseases. The kind or form of disease—whether mild or malignant

*Decisions of the State Board.*

—makes no difference. The presumption is, this authority will be exercised with reasonableness and good judgment. Where the rules of the State Board are observed, and the sick are completely isolated from the family (Small-pox excepted), it is not necessary to confine all the members of the family, especially those who are seldom in contact with the disease. It is not necessary to prevent those who provide for the family, from going to and from their vocation—unless their vocation puts them among children who are housed up. School teachers should at once change their place of boarding and lodging—and before doing so bathe thoroughly, change all clothing, and disinfect all removed clothing by thorough boiling, or pressing with a hot iron. Paramount to all else, the house should be rigidly quarantined and placarded, so as to prevent others, especially children, going there. Especially, also, should dogs and cats be rigidly prohibited from entering the sick room, as they are particularly liable to carry infection in their hair or fur. Another important fact that should be indelibly impressed upon the minds of health officers, local boards and the people, is that Diphtheria and Scarlet Fever are just as contagious in the mild form as in the most malignant form. Hence, in the mild form spreads more rapidly, because there are more exposures and less restrictions. Every case, however mild, should be treated as a possible source of infection, and menace to the public. If there be error of judgment let it always be on the safe side.

What is the incubation period of Scarlet Fever? When should quarantine begin, and how long continued?

*Ans.*—The incubation period of Scarlet Fever averages eleven days. Quarantine should begin on the appearance of the rash, and continue six to eight weeks, or until desquamation, or peeling of the skin has ceased, and there is no appearance of sore throat.

Is it proper to give more freedom to patients recovering from Scarlatina than from Scarlet Fever? Is one harmless, and the other dangerous?

*Ans.*—No. Both are equally contagious. They are one and the same disease. It is a most reprehensible distinction made by some physicians that Scarlatina and Scarlet Rash are not contagious.

*Decisions of the State Board.*

They are all Scarlet Fever, though differing in malignancy, and the use of the terms "Scarlatina" and "Scarlet Rash" should be abandoned, as they are misleading, and often a source of great trouble. By this error the disease often becomes epidemic in a community, assuming a malignant and fatal form, whereas, if the people were made to understand that every case, however mild, was equally dangerous with the most malignant, they would more readily and promptly seek protection.

Should quarantine be established in cases of Chicken-pox?

*Ans.*—The State Board has not included Chicken-pox in the list of communicable diseases dangerous to the public health, and therefore has not deemed quarantine necessary in such cases.

We are having quite a number of cases of Scarlet Fever in our town and surrounding country. The disease thus far has been mild—so mild in fact that the most of the people seem to have little or no fear of it, and even go so far as to say it is not Scarlet Fever, or some of them would have died out of as many cases as we have had. I think some of the cases are not reported, and others overlooked, especially cases of sore throat—thus furnishing us continually with unlooked for, and oftentimes unknown sources of contagion. These cases of sore throat are what annoy me most, and how to manage them with equal justice to all concerned. The diagnosis, in many cases, is very doubtful. I do not want to treat a case of Tonsillitis for Scarlet Fever, and in the course of a few weeks, or months, be called to treat the same person with a well marked type of Scarlet Fever. How can these cases of sore throat be most satisfactorily managed?

*Ans.*—The best possible, because the only *safe* way, is to isolate and quarantine, at least for a few days, all suspicious cases. There are often cases of simple Tonsillitis that for a day or two resemble Scarlet Fever. Desquamation is the special diagnostic sign of Scarlet Fever. As that does not begin for several days, and as in the meantime many exposures might take place, the Board orders, that all such suspicious cases be treated as dangerous—that the community, rather than the affected, be given the benefit of the doubt. In no other way can efficient preventive measures be carried out.

After two or three days' quarantine and careful observation, if it be found that the disease is *not* an infectious one, then the quarantine can be raised by the action of the local board, not upon the

*Decisions of the State Board.*

motion of the attending physician. It is the duty of the attending physician to report the facts to the local board, whose duty alone it is to raise a quarantine once established.

In Scarlet Fever, can we have or are we likely to have desquamation without an eruption of the skin? I have seen cases of sore throat, without eruption, followed in the same family by well marked cases of Scarlet Fever, with no other known source of contagion. Again, I have noticed in many families, the smaller children, say from two to ten years of age, would have the fever with eruption, followed by desquamation, whilst the older children and adults would be, some of them at least, sick with fever and sore throat, without eruption or desquamation. Now, it has appeared to me that many of these cases of sore throat in larger children and adults, without eruption or desquamation, are capable of furnishing the contagion of Scarlet Fever, and smaller children become infected from them, and have a well marked type of the disease, eruption, and all the attending sequelæ. Should all cases of Scarlet Fever be isolated for thirty-five days, or in a mild case may the time be cut down to twenty-one or thirty days? Our local boards seem to think that in mild cases it is unnecessary to quarantine for thirty-five days, and consequently in their rules and regulations they say, "they shall be isolated until they are well," and the result is many of the families who are sick think in ten days or two weeks they are well, and want the doctor sent around to let them disinfect and get out. In mild cases of Scarlet Fever it does seem that many of them would be perfectly safe to turn loose on the public in thirty days; but it seems, also, that the local board should have a minimum time stated for isolation, and not have a doctor called short of that time to examine them with a view to raising the quarantine.

*Ans.* It is possible that there have been many cases of Scarlet Fever where there has been no eruption, and no discoverable desquamation, and yet that desquamation may occur without eruption has been attested by very good authority. Perhaps, the best authority we have upon Scarlet Fever, Prof. Thomas, of Leipzig, Germany, in his very exhaustive treatise upon Scarlet Fever, as found in Ziemssen's Cyclopædia, Vol. II. After speaking of desquamation as always present in the usual form of Scarlet Fever, says on page two hundred and thirty-seven:

"The cases of Scarlatina without eruption. These attacks, it should be noted, are sometimes followed by more or less well marked and extensive desquamation,"—showing that at times, even without the eruption, desquamation may occur.

On page two hundred and fifty-two, after speaking of the very



*Decisions of the State Board.*

slight cases where there is little constitutional disturbance, but slight, if any, throat symptoms, and no eruption; and of the difficulty of diagnosis in such cases, he says: "In the absence of satisfactory ætiological evidence, the scarlatinal nature of the attack is proved by the subsequent occurrence of the *characteristic desquamation, even when there has been no previous trace of an eruption*, and by the appearance of a moderate amount of dropsy and albumenuria."

Again, under the sub-head, "Diagnosis," on page two hundred and eighty-five, he says: "In cases where an early diagnosis is impossible, the doubt will be cleared up at a later period, by the occurrence of desquamation, particularly the occurrence of desquamation in the palmar and the plantar regions, or, perhaps, by the appearance of albumenuria, with or without dropsy, or other symptoms of Nephritis." Such attacks generally disappear in a few days, but they should receive the same attention which is paid to the unmistakable disease; every throat affection during a Scarlet Fever epidemic is suspicious!

The rules of the State Board of Health, requiring quarantine for forty days, in *all* cases of Scarlet Fever and Diphtheria, is binding upon all the State, whether adopted by local boards or not. No period short of this is safe. There must, of necessity, be many cases where even the period of forty days is not safe. It is important, however, to adopt some period, and the Board, after much deliberation, and in accordance with the results of the most careful and extensive observations by those who have had ample opportunities, and who have made preventive medicine a special study, have accordingly made the period forty days. To have named twenty or thirty days would have been just as arbitrary, and not as safe. In all suspicious cases, isolate and quarantine until no doubt exists as to the true character of the disease. This may require ten days or two weeks.\* If the disease be found not an infectious one, release at once. If, in the meantime, it has proved to be Scarlet Fever, or any infectious disease, *however mild*, quarantine for the specified time. No other course promises so nearly absolute safety, unless it be a more extended period. Such

*Decisions of the State Board.*

a quarantine is very inconvenient, and seems arbitrary, yet this fact is to be borne in mind, if such a quarantine were rigidly enforced in all contagious and infectious diseases, its necessity would seldom occur. To have an attack of any contagious disease is a great misfortune, and generally is the result of somebody's carelessness; to have such disease in a mild form so as to recover fully, and in a short time, is certainly a source of congratulation, and should inspire its subject with a gratitude so profound as to lead to a cheerful compliance with those rules that experience has proved are best calculated to protect others from an attack that may be malignant in form; or though similarly simple in form, may prove fatal from complications that are too often liable to supervene.

When an undoubted case of Scarlet Fever is quarantined, is it obligatory on the board to keep up the quarantine for forty days, or may they let the patient out when the physicians say there is no danger? The case in question is a teacher, and when released will go into the school-room.

*Ans.*—No person having Scarlet Fever must be released from quarantine, until the expiration of the forty days fixed by the State Board. In Scarlet Fever there is always a desquamation, that is, a scaling off of the scarf skin. These scales are regarded as most infectious agents, the most common and effective means by which the disease is propagated. Often this scaling-off process is delayed—seldom fully completed before the seventeenth day. It would be criminally wrong to release a school-teacher, and allow him or her to go into the school-room, and thereby endanger the health and lives of children who are specially susceptible to the disease.

*First:* In houses where all the inmates under fifty years of age have already had the disease (Diphtheria), and are fully recovered from it, and the house and clothing have been thoroughly disinfected, what is the object of the forty-day quarantine?

*Second:* Will Diphtheria disease-germs be destroyed by a quarantine of forty days?

*Third:* Can Diphtheria disease-germs be destroyed effectually and entirely by burning large quantities of sulphur, so that the fumes will come in contact with infected clothing, for several hours, and washing wood-work, ceiling, etc., in a solution of corrosive sublimate, one drachm to a gallon of water?

*Decisions of the State Board.*

*Fourth:* Suppose A to be a man of forty years of age, with a family of small children, all of whom have had the Diphtheria and are fairly convalescent, will he be permitted after thorough disinfection of his person, say by washing his body, hair and whiskers in a strong solution of carbolic acid, changing his clothing for clothes never near the infection, to leave the quarantined premises for the purpose of continuing his avocation, providing he does not again return to the quarantined premises, but eats and sleeps elsewhere?

*Fifth:* In a family where the members come down one after another, when does the forty days begin to run, at the time of the coming down of the last patient, or at the time when the last patient is fully recovered?

I ask you these questions in order that I may do my whole duty in this matter of quarantine, and that I may have a better idea of your desires and opinions of the matter.

*Ans.*—1. The object of forty days' quarantine is to insure a greater amount of safety than can be done by a shorter period. Free ventilation and time alone, have a great deal to do in destroying the activity of any disease germs, notably those of Diphtheria. Even for some time after all the inmates of a house have recovered, there are excretions from the lungs, skin, bladder and bowels, that possess more or less of the infectious principle. Disinfection alone, however thorough, will not always destroy these disease germs, but disinfection, time and the beneficent influences of plenty of fresh air combined, will secure the greatest safety practicable. Experience has demonstrated, time and again, that a period less than thirty-five or forty days is too great a source of danger to be permitted. The quarantine for such an extended period is not alone, nor principally, against the parties affected, so much as against the premises. To throw open premises where infectious diseases have existed, immediately after recovery, even after proper disinfection and ventilation, would be a great and unnecessary exposure to any susceptible persons who might enter. In England, the provinces of Canada, and in nearly all the States of the Union, the period is either thirty-five or forty days.

2. No. That is not in every case, perhaps, in a few, by quarantine alone; but proper disinfection, ventilation, and forty days, combined, would insure comparative safety; perhaps, in most cases, perfect immunity. The germs producing Diphtheria are generally regarded as short-lived—compared with those of Scarlet Fever.

*Decisions of the State Board.*

There are many cases on record where Scarlet Fever has been produced, after two or three years, by wearing clothing previously worn by persons who had been affected by the disease, and where disinfection had been neglected.

3. Sanitarians differ somewhat in regard to the efficiency of sulphur fumes as a disinfectant in Diphtheria. It is difficult to have the fumes in a sufficiently concentrated form, remain long enough in contact with clothing and articles of furniture to destroy the disease germs. Hence, it has been entirely abandoned, and is not recommended by the State Board. Better and only satisfactory results are obtained from washing the walls, ceiling and wood-work, after sulphur fumigation, if used, with a solution containing at least two drachms of corrosive sublimate to the gallon of water.

Clothing or bedding that cannot be washed or boiled, should be either burned, or subjected to a dry heat of not less than two hundred and thirty degrees Fah.; or, what is better, to steam at a temperature of two hundred and thirty degrees Fah. Boiling for an hour will destroy all known disease germs.

4. Yes, especially if he were not teaching children in a close room, or if his occupation did not bring him in personal contact with children.

5. Forty days from the time the last patient was taken down.

Where a merchant's family resides over his store, one child has Diphtheria, and the father goes down stairs to attend to his business, returning only at night, none of the family going into the store, is it necessary to close the store, or to put up a danger card?

*Ans.*—If the father has no communication with the sick child, the store need not be closed, and the father may attend to his business, but the danger card must be put up, and kept posted the required time, and all children kept away from the premises. No cat or dog must be permitted to go from the family rooms to the store, or on the street, as they are liable to be petted by children, and thus mysteriously spread the disease.

Where there is a death from Diphtheria in a family, how long after such death should the family or nurses be quarantined, there being no other case in the family?



*Decisions of the State Board.*

*Ans.*—The adult members may be released so soon as proper disinfection of the premises and clothing is had. Children must not be released under at least ten days, to guard against further appearance of the disease, and then only upon authority of the local board.

Can a person who has the Mumps be excluded from the public schools?

*Ans.*—Yes. Mumps is an infectious disease. It need not be subject to quarantine, however.

## BURIAL PERMITS.

Is the township clerk, under the rule of the State Board, required to keep a record of all deaths occurring within the township, and issue a burial permit?

*Ans.*—He is not required to issue burial permits. He should keep a death record.

Where a city buries its dead outside the limits of the city in a cemetery over which it has assumed no control, do the rules of the State Board apply in such case, or is a special ordinance of the city necessary?

*Ans.*—Section four hundred and fifty-eight of the Code says, "cities shall have the power to regulate the burial of the dead; to provide without the limits of the corporation places for the interment of the dead." Under this section it seems clear a special ordinance would be necessary to regulate the burial of the dead in such cemetery. The rules of the State Board would require a burial permit before interment in such cemetery, the death having occurred within the city.

Where there is no organized cemetery associations, no sexton, and the undertaker attends to the burial, is he required to have a burial permit?

*Ans.*—Yes. The burial of a body begins when it is prepared for burial. It makes no difference where the body is finally buried. In no city or incorporated town can a burial be had without a burial permit.

Must a burial permit be obtained where a dead body is shipped into a city or town from abroad?

*Ans.*—Yes, if the interment is to be made within the limits of the corporation, or in a cemetery controlled by the corporation, though

*Decisions of the State Board.*

it be outside the limits of the corporation. Where the cemetery is outside the city limits, and is not controlled by the city, a permit would not be required for the interment in such cemetery of a body shipped from abroad. A permit is required in all cases of a death within a city or town, no matter where the interment is made. Depositing a body in a vault is an interment, and requires a permit, even though the deposition be temporary.

Where there are several cemeteries adjoining a city, one of which is a public cemetery for the city and the others are owned and controlled by private corporations or societies, should burial permits be required for interment in either or all of said cemeteries?

*Ans.*—Burial permits must be required in all cases of death occurring within the limits of the corporation, no matter where the interment. A burial begins when a body is prepared for interment. The depositing of a dead body in a receiving vault is an interment, within the meaning of the rule.

## NUISANCES.

Where a health officer has repeatedly reported to the local board of whom he is the officer, the existence of a slaughter-house nuisance, and the local board will take no action thereon, is it not the duty of the State Board of Health to have the nuisance abated? If not, what is the remedy?

*Ans.*—The State Board of Health has no executive powers in such a case. If the local board has at any time adopted the rules of the State Board regulating slaughter-houses, then complaint may be filed against the person maintaining the nuisance before any justice of the peace, for a violation of the regulations of such local board, or proceedings by a grand jury may be had; or by *mandamus* to compel the local board to take action and perform their official duty.

A person buried a dead horse on his own premises, two hundred and eighty feet distant from the well on an adjoining lot owned by another person. The well is twenty-four feet deep. The surface drainage is toward the well. The water supply of the well comes from the direction of the buried animal. The soil is sandy loam. The city marshal notified the owner of the horse not to bury it where it is buried. The owner of the well cannot drink water, nor eat food cooked with it, and asks the city to enforce the removal of the animal. What remedy has the owner of the well?

*Decisions of the State Board.*

*Ans.*—It is clearly the duty of the local board to have the nuisance abated, especially as the animal was buried contrary to the order of the city marshal, though a removal now will not give immediate relief, if ever. There is no fixed limit to the injurious saturation of the earth, and the consequent pollution of the water in such cases. It has been demonstrated that it can be carried more than a mile.

Where a hog-pen is maintained as a nuisance in close proximity to dwelling-houses, what is the duty of a local board of health regarding the same?

*Ans.*—The members of a local board of health are public officers. It is their duty to protect the people within their jurisdiction from all sources of filth, causes of sickness and all infectious or contagious diseases. The law is mandatory, not directory. It says they shall do so. Neither does it say they may put off their duty until "after harvest," but they shall meet at stated periods to make the necessary regulations therefor. If they fail in this they are guilty of neglect of official duty, and are liable to indictment, and the penalty thereof. A hog-pen in close proximity to dwelling-houses should not be permitted, and where a decent regard is had to public health they are not. The State Supreme Court has decided that local boards of health have power to prohibit them. Every person is entitled to free, pure air and water, and unobstructed light, and no person has the right to deprive them of either. It is the duty of local board to secure the enjoyment of those rights so far as comes within their powers. Hog-pens, foul privies, stagnant ponds, festering cess-pools are prolific sources of disease during the heated term.

How can I get rid of a pen, in which hogs are fed on the buttermilk of eight hundred pounds of butter a day, just across the street from my residence, the stench from which has already caused considerable sickness in the family of myself and neighbors. The city council will do nothing.

*Ans.*—The State Board of Health can do nothing in the premises. The statute has given them no power in such cases. It is the sworn and official duty of a local board of health to protect its community from all sources of filth and causes of sickness. Local boards of

*Decisions of the State Board.*

an incorporated town or city have power to prohibit hog-pens within the corporate limits, and to abate them if they become a nuisance, and also to require them, if permitted to exist, to be kept clean. Failing to do this, a local board is guilty of neglect of official duty, and such failure, or neglect of duty, does not prevent the person injured from proceeding against a nuisance by injunction.

Where a nuisance is upon a homestead, which is exempt from execution, and the owner has no other property liable to execution; the owner refuses to remove the nuisance, and it is done by the local board, how can the expenses therefor be recovered?

*Ans.*—This is a question of law for the courts to determine, and of which the State Board has no jurisdiction.

Where notice is given to a person to remove a nuisance from his premises, and he neglects or refuses so to do, who is the proper person to enforce the order? Is it the duty of the health officer of the board, and has he the authority to do so without bringing the matter before the board?

*Ans.*—The health officer of a local board is an advisory officer. He is not a member of the board. He has no powers except such as are specially delegated by the board. He may enforce the orders of the board when so authorized. A city marshal, police officer, street commissioner, or constable, is the proper officer to enforce such orders.

## TRANSPORTATION OF CORPSES.

Are there any exceptions to the rules for transportation of corpses, or is there any time of the year when they are not in force?

*Ans.*—No.

Where a child died from Croupal Diphtheria in 1882, would a disinterment of the body now for transportation and burial in another county come under rule two or three for the transportation of dead bodies?

*Ans.*—It would come under rule six, which declares that all disinterred bodies shall be deemed infectious. The disturbance of such a body would be unwise. The case cited comes directly within the jurisdiction of the local board of health, and its health officer.



*Decisions of the State Board.*

When a dead body has been prepared for shipment according to the rules of the State Board of Health, can a railroad company refuse to take it inside the baggage car, and order it put on the platform?

*Ans.*—There can be no question as to the authority of a railroad company to make such regulation as they deem best regarding the carrying of dead bodies. It is quite probable they might refuse to carry them at all on passenger trains.

Has there been any change in the rules for the transportation of corpses during the past six months?

*Ans.*—Rule six has been changed so as to require all disinterred bodies to be prepared for shipment in accordance with rules two, three and five. Placing a body in a vault is deemed an interment.

Does section four hundred and twenty of the Code of 1873, providing for the payment of expenses of local boards of health, apply to cities of the second class?

*Ans.*—It does not. It applies only to townships, as the section distinctly says.

## RETURN OF BIRTHS AND DEATHS.

Where Dr. A. was in attendance in a case of obstetrics, and Dr. B. was called, whereupon Dr. A. immediately left, and the patient was delivered mechanically of a dead child, who should make return of the birth or death to the county clerk?

*Ans.*—Dr. B, the last physician in attendance; and he should report the case as a still-birth; not as a birth nor death.

Where, in an incorporated town, physicians and others neglect or refuse to report deaths to the recorder, and procure burial permits, is it the duty of the recorder to ascertain and record the deaths?

*Ans.*—It is not the duty of the clerk of a city or town to ascertain the deaths, and causes thereof, that occur within the city or town. It is the duty of the local boards of health to require all deaths in their jurisdiction to be reported to the clerk. Laws will not enforce themselves. The State Board of Health has made certain regulations regarding burial permits, and it is the duty of local boards to enforce them. Short of this, they have not done their duty as public officers.

*Decisions of the State Board.*

How are physicians supplied with blanks on which to make returns of births and deaths?

*Ans.*—It is, by statute, made the duty of the clerk of the district court of each county of this State, to furnish physicians in such county the necessary blanks on which to make their returns, and the blanks must be printed from forms prepared by the State Board of health.

Under Section five, Chapter one hundred and fifty-one, physicians are required to register their names with the clerk of the district court. Is it permissible to permit them to request the clerk, by mail or otherwise, to register their names, or must it be done by the physician in person?

*Ans.*—To this statute the Attorney-general says the old maxim "*qui facit per alium facit per se*" (what a man does by another he does by himself), applies. A physician may authorize another to register for him; he may authorize the clerk to do so for him.

Are midwives still required to register with the county clerk, and if so, may they register without examination, if they have been practicing five years?

*Ans.*—All persons practicing midwifery are required to register their name in the office of the clerk of the district court of the county wherein they reside, and to make return to said clerk of all live and still-births which may come under their supervision, on blanks to be furnished by said clerk. The penalty for neglect to make such return is ten dollars for each offense since April 3, 1880.

The statute requires that all midwives who began practicing, in this State since April 9, 1886, shall procure a certificate from the State Board of Medical Examiners, authorizing them to continue in such practice.

The right to practice midwifery does not include, nor give the right to practice medicine. A midwife cannot prescribe medicine for, nor treat the sick. To do so, a certificate must be procured from the State Board of Medical Examiners. The penalty for practicing medicine without authority is a fine of fifty to one hundred dollars, and imprisonment. A person is deemed as practicing medicine who makes a practice of prescribing or furnishing medicine for the sick.

*Legislative Recommendations.*

Where a physician attended a patient ten days, and on the tenth day discharged the patient in a rapidly convalescing condition, but four days after relapse occurred, resulting in death, whose duty is it to make return of the death to the county clerk, the attending physician not having seen the patient since discharged?

*Ans.*—The statute says physicians shall make a return to the clerk of the courts all "births and deaths which may come under their supervision." The evident meaning of the term "supervision," as used in the statute, is having the care of. In the case cited the physician who attended the patient would be deemed as having had supervision of him, and be required to make the return.

## LEGISLATIVE RECOMMENDATIONS.

Repeating what has been said in each previous report of the State Board, another two years' practical experience emphasizes and more fully demonstrates the imperative necessity for conferring greater power upon the State Board. Complaint upon complaint, and petition upon petition have been made by individuals, and entire communities, for relief from the existence of nuisances menacing and dangerous to the public health; and where investigation showed that either members of the local board of health, or prominent persons, were interested pecuniarily, socially or politically in the object of complaint whereby no relief could be obtained, through the agency specially vested with power to give relief, thus defeating entirely the intent and purpose of the law. In such cases, where from local causes and local influences the health laws of the State, and regulations of the State, are ignored and disregarded by local boards, authority should be vested in the State Board of Health to secure to communities the full benefit of the statute. As an impartial and disinterested body, it should have mandatory authority regarding all matters concerning the public health, and

*Legislative Recommendations.*

its orders and regulations be given the force and effect of law. It should at least be given the same powers that are given to local boards, and be made co-extensive with the State limits.

Vital statistics are an important factor in the development of sanitary science. They are especially important in pursuing an intelligent investigation of the causes, character and climatic conditions regarding the diseases and mortality of the State, and more effective measures should be provided to secure such statistics. Attention is, therefore, called to the report of the special committee on page 15.



## Financial Statement.

## FINANCIAL STATEMENT.

RECEIPTS FROM JUNE 30, 1887, TO JULY 1, 1889.

Cash by warrants on State Treasurer.....\$ 9,900.08

## EXPENDITURES.

Salary of Secretary.....\$ 2,400.00  
 Expenses of Board meetings..... 770.84  
 Contingent office expenses..... 6,724.94  
 Refund to State Treasurer..... 4.50  
 \$ 9,900.08

## METEOROLOGICAL TABLES—COMPARATIVE STATEMENTS.

1889—IOWA CITY—1890.

Elevation above sea level, 640 feet.

YEARS.	COMPARATIVE MEAN TEMPERATURE (DEGREES).												COMPARATIVE PRECIPITATION (INCHES).												
	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	Total for Year.
1889	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1890	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1891	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1892	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1893	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1894	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1895	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1896	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1897	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1898	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
1899	70.6	73.1	73.1	61.1	60.7	55.1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0

\* Observations were made by Prof. T. S. Parvill.

## METEOROLOGICAL TABLES—CONTINUED.

1820—MUSCATINE\*—1874.

Elevation above sea-level, 520 feet.

[illegible]

\* Observations were made by Prof. T. S. Parvin.

Lat.,  $41^{\circ} 30' N.$ ; Long.,  $96^{\circ} 30' W.$  Elevation above sea level, 615 feet.

[illegible]

Lat., 41° 35' N.; Long., 90° 40' W. Elevation above sea level, 849 feet.

1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------



## METEOROLOGICAL TABLES—CONTINUED.

1874—DUBUQUE—1880.

Lat., 42° 30' N.; Long., 90° 44' W. Elevation above sea level, 665 feet.

YEAR.	COMPARATIVE MEAN TEMPERATURE (DEGREES).												COMPARATIVE PRECIPITATION (INCHES).												Total for Year.
	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	
1874	72.3	72.5	70.2	69.2	67.1	65.4	63.4	61.2	59.2	57.2	55.2	53.2	51.2	49.2	47.2	45.2	43.2	41.2	39.2	37.2	35.2	33.2	31.2	29.2	1.08
1875	71.0	70.3	70.3	69.3	67.3	65.3	63.3	61.3	59.3	57.3	55.3	53.3	51.3	49.3	47.3	45.3	43.3	41.3	39.3	37.3	35.3	33.3	31.3	29.3	1.02
1876	71.0	70.3	70.3	69.3	67.3	65.3	63.3	61.3	59.3	57.3	55.3	53.3	51.3	49.3	47.3	45.3	43.3	41.3	39.3	37.3	35.3	33.3	31.3	29.3	1.02
1877	70.1	71.4	71.4	70.4	68.4	66.4	64.4	62.4	60.4	58.4	56.4	54.4	52.4	50.4	48.4	46.4	44.4	42.4	40.4	38.4	36.4	34.4	32.4	30.4	1.02
1878	70.6	71.5	71.5	70.5	68.5	66.5	64.5	62.5	60.5	58.5	56.5	54.5	52.5	50.5	48.5	46.5	44.5	42.5	40.5	38.5	36.5	34.5	32.5	30.5	1.02
1879	68.0	70.6	71.6	70.6	68.6	66.6	64.6	62.6	60.6	58.6	56.6	54.6	52.6	50.6	48.6	46.6	44.6	42.6	40.6	38.6	36.6	34.6	32.6	30.6	1.02
1880	71.1	73.2	72.8	71.2	69.2	67.2	65.2	63.2	61.2	59.2	57.2	55.2	53.2	51.2	49.2	47.2	45.2	43.2	41.2	39.2	37.2	35.2	33.2	31.2	1.02
1881	70.2	72.2	71.2	69.2	67.2	65.2	63.2	61.2	59.2	57.2	55.2	53.2	51.2	49.2	47.2	45.2	43.2	41.2	39.2	37.2	35.2	33.2	31.2	29.2	1.02
1882	69.7	72.5	72.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	1.02
1883	68.6	70.0	68.4	67.8	65.8	63.8	61.8	59.8	57.8	55.8	53.8	51.8	49.8	47.8	45.8	43.8	41.8	39.8	37.8	35.8	33.8	31.8	29.8	27.8	1.02
1884	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	1.02
1885	71.0	73.0	73.0	71.0	69.0	67.0	65.0	63.0	61.0	59.0	57.0	55.0	53.0	51.0	49.0	47.0	45.0	43.0	41.0	39.0	37.0	35.0	33.0	31.0	1.02
1886	71.0	73.0	73.0	71.0	69.0	67.0	65.0	63.0	61.0	59.0	57.0	55.0	53.0	51.0	49.0	47.0	45.0	43.0	41.0	39.0	37.0	35.0	33.0	31.0	1.02
1887	71.0	73.0	73.0	71.0	69.0	67.0	65.0	63.0	61.0	59.0	57.0	55.0	53.0	51.0	49.0	47.0	45.0	43.0	41.0	39.0	37.0	35.0	33.0	31.0	1.02
1888	71.0	73.0	73.0	71.0	69.0	67.0	65.0	63.0	61.0	59.0	57.0	55.0	53.0	51.0	49.0	47.0	45.0	43.0	41.0	39.0	37.0	35.0	33.0	31.0	1.02
1889	71.0	73.0	73.0	71.0	69.0	67.0	65.0	63.0	61.0	59.0	57.0	55.0	53.0	51.0	49.0	47.0	45.0	43.0	41.0	39.0	37.0	35.0	33.0	31.0	1.02

1874—KEOKUK—1880.

1874	70.5	70.4	70.7	67.0	65.4	63.7	61.2	59.7	58.4	56.9	55.4	53.9	52.4	50.9	49.4	47.9	46.4	44.9	43.4	41.9	40.4	38.9	37.4	35.9	34.4
1875	71.0	70.5	70.5	68.5	66.5	64.5	62.5	60.5	58.5	56.5	54.5	52.5	50.5	48.5	46.5	44.5	42.5	40.5	38.5	36.5	34.5	32.5	30.5	28.5	34.4
1876	71.0	70.5	70.5	68.5	66.5	64.5	62.5	60.5	58.5	56.5	54.5	52.5	50.5	48.5	46.5	44.5	42.5	40.5	38.5	36.5	34.5	32.5	30.5	28.5	34.4
1877	71.0	70.5	70.5	68.5	66.5	64.5	62.5	60.5	58.5	56.5	54.5	52.5	50.5	48.5	46.5	44.5	42.5	40.5	38.5	36.5	34.5	32.5	30.5	28.5	34.4
1878	70.6	71.5	71.5	70.5	68.5	66.5	64.5	62.5	60.5	58.5	56.5	54.5	52.5	50.5	48.5	46.5	44.5	42.5	40.5	38.5	36.5	34.5	32.5	30.5	34.4
1879	70.6	71.5	71.5	70.5	68.5	66.5	64.5	62.5	60.5	58.5	56.5	54.5	52.5	50.5	48.5	46.5	44.5	42.5	40.5	38.5	36.5	34.5	32.5	30.5	34.4
1880	72.1	73.9	73.9	71.9	69.9	67.9	65.9	63.9	61.9	59.9	57.9	55.9	53.9	51.9	49.9	47.9	45.9	43.9	41.9	39.9	37.9	35.9	33.9	31.9	34.4
1881	72.1	73.9	73.9	71.9	69.9	67.9	65.9	63.9	61.9	59.9	57.9	55.9	53.9	51.9	49.9	47.9	45.9	43.9	41.9	39.9	37.9	35.9	33.9	31.9	34.4
1882	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4
1883	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4
1884	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4
1885	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4
1886	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4
1887	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4
1888	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4
1889	71.5	73.5	73.5	71.5	69.5	67.5	65.5	63.5	61.5	59.5	57.5	55.5	53.5	51.5	49.5	47.5	45.5	43.5	41.5	39.5	37.5	35.5	33.5	31.5	34.4

1874—OMAHA—1880.\*

Lat., 41° 18' N.; Long., 96° 0' W. Elevation above sea level, 1113 feet.

1874	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1875	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1876	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1877	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1878	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1879	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1880	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1881	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1882	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1883	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1884	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1885	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1886	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1887	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1888	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1889	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1890	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1891	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1892	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1893	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1894	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1895	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1896	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1897	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1898	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1899	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6
1900	73.1	73.0	72.5	68.7	65.6	63.0	60.4	58.8	57.2	55.6	54.0	52.4	50.8	49.2	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.4	34.8	33.2	31.6

*Normals of Temperatures for Twenty Years.*

## NORMALS OF TEMPERATURES FOR TWENTY YEARS.

The following table is compiled from observations of Prof. T. S. Parvin, from 1861, to 1871, and from those of Prof. G. Hinrichs, of the Iowa Weather Service, from 1871, to 1880, and are the result of nearly thirty thousand observations, which were made at Iowa City. The values given, are for each decade of each month.

MONTHS.	MEAN TEMPERATURE, DEGREES F.				RAIN-FALL IN INCHES.			
	I.	II.	III.	Month.	I.	II.	III.	Month.
January .....	.52	.60	.60	1.72	18.7	19.1	20.2	19.4
February .....	.55	.55	.70	1.80	22.0	24.4	27.1	24.4
March .....	.80	.95	1.10	2.85	25.6	32.5	37.2	35.1
April .....	1.30	1.39	1.10	3.50	43.3	47.9	51.6	47.6
May .....	1.20	1.20	1.35	3.75	55.5	60.0	63.8	59.9
June .....	1.65	1.65	1.55	4.85	66.3	68.8	71.8	69.0
July .....	1.65	1.27	1.20	4.12	73.7	74.1	73.8	73.9
August .....	1.42	1.65	1.85	4.92	73.1	71.8	69.6	71.3
September .....	1.80	1.55	1.25	4.60	64.4	62.9	59.4	62.9
October .....	1.10	.95	.90	2.95	55.0	50.3	45.1	49.9
November .....	.95	.82	.70	2.47	40.7	35.8	29.2	35.3
December .....	.60	.50	.50	1.60	26.3	23.2	20.2	23.1
Total for the year—mean .....				30.13				47.47

## APPENDIX.



---

# VENTILATION

BY

J. C. SHRADER, A. M., M. D.,

OF

THE STATE BOARD OF HEALTH.

---

Presented at the May meeting, 1889, of the Board and ordered printed.

---

*Resolved*, That the Board is in nowise responsible for the sentiments and opinions entertained in the following papers, prepared by special request of the Board, the respective author of each paper being responsible for its contents.—*Resolution adopted by the State Board of Health and ordered printed in the Biennial Report.*

---

*Appendix—Ventilation.*

---

## VENTILATION.

*“Man's own breath is his greatest enemy.”*

It is not in the external atmosphere that we must look for the greatest impurities, but in our own houses the blighting, withering curse of foul air is to be found.

The reason cities are so much more healthy than the country, is not because the air in the street is so much more impure, but because the houses are so built together that the vast ocean of air cannot get into and through them, to purify them as it does in the houses in the country.

It is the belief of a very good authority that a family living in the filthiest street in a city, were they careful to have a constant current of air passing through the house night and day, would be more healthy, other things being equal, than a family spending their Winters in the finest house, if kept air-tight in the healthiest location in the city, and their Summer in the country, especially if they were always careful to exclude the night air from their bedrooms.

Dr. Benjamin Franklin says some people are as much afraid of fresh air as persons in hydrophobia are of fresh water—veritable airophobia. They consider fresh, cool air an enemy, and carefully close every crevice through which it might be admitted, whereas they should look upon fresh water as a friend, and to even sleep with an open window is not so unwholesome as the air within a close room that has been often breathed and not changed.

Physicians have of late years happily discovered, after a contrary opinion had prevailed for ages, that fresh and cool air does good to persons suffering from Small-pox and other fevers. It is to be hoped that, in another century or two, we may all find that it is not bad even for people in health.



*Appendix—Ventilation.*

It is not improbable, however, that the more rapid evaporation of moisture toward evening, may carry with it the volatile particles of corrupted animal and vegetable matter to an extent slightly in excess of that which occurs in the morning; but it is believed these would not equal the greater contamination from burning coals, and the usually greater stillness of the air, producing partial stagnation, so that the air would be a little nearer pure at night than in the day-time.

How unmistakably do all these investigations prove what we ought to have known and accepted without a moments hesitation, that the Creator, who made such vast and such minute provision for supplying every living creature with a constant and copious supply of fresh air, and made it so important for their existence that they cannot live a moment without it, has made the air at night just as pure and wholesome as in the day-time.

We can trace the scourge of foul air to our houses, and much of it to our bed-rooms. Never stop a fire-place in Winter nor Summer, where any living being stays night or day. If you are so fortunate as to have a fire-place in your room, paint it; when not in use adorn it with a bouquet of fresh flowers every morning, if you please, or do anything to make it attractive; but never close it.

If we breath one single breath, in the entire day, of *impure* air, it will weaken us, deduct from our capacity to attend to our daily duties, or shorten our lives, in exact mathematical proportion to the amount of impurity in that one single breath. Now we breathe about twenty times every minute, twelve hundred times every hour, twenty-eight thousand times every day; and nothing but absolute and perfectly pure air answers the exact requirements of perfect health. You can realize how difficult it is for one to mingle freely in the society of his fellow men, under existing circumstances, without being subjected to being poisoned by the foul air. I have no patent to present to you, which shall secure to you at all times perfectly pure air, without any farther trouble on your part. There are no two constitutions precisely alike, any more than there are two human faces, or two hand-writings alike, and there are no two hours in our entire existence in which all the physical conditions

*Appendix—Ventilation.*

of our body are precisely the same. Therefore, you must feel fresh air is worth taking some trouble to obtain. You must then make it a *study how* to obtain it without chilling or overheating your body, in Winter and in Summer, at night and in the day-time; when you are lying down, and when you are sitting up; before eating and after eating; before exercising, while exercising and after exercising; when you are well, and when you are sick; when you are alone and when you are in the crowded cars, or in a crowded room; in wet weather and in dry; and for the ever-varying changes of the external atmosphere—all these conditions require separate and intelligent thought. Thus it appears that in all climates, and under all conditions of life, the *purity of the atmosphere* habitually respired, is essential to the maintenance of that power of resisting disease which even more than the ordinary state of health, is a measure of the real vigor of the system; for, owing to the extraordinary capability which the human body possesses of accommodating itself to circumstances, it not unfrequently happens that individuals continue for years to breathe a most unwholesome atmosphere without apparently suffering from it, and when they at last succumb to some epidemic disease, their death is attributed solely to the latter, the previous preparation of their bodies for the reception and development of the zymotic poison being altogether overlooked.

It is impossible, however, for one who carefully examines the evidence, to hesitate for a moment in the conclusion that the fatality of epidemics is almost invariably in precise proportion to the degree in which an impure atmosphere has been habitually respired, and that by due attention to the various means of promoting atmospheric purity, and especially efficient ventilation and sewerage, the rate of mortality may be enormously decreased, the amount and severity of sickness lowered in at least an equal proportion, and the fatality of epidemics almost completely annihilated. And it cannot be too strongly borne in mind, that the efficacy of such preventive measures has been most fully substantiated in regard to many of the very diseases in which the curative power

*Appendix—Ventilation.*

of medical treatment has seemed most doubtful, as, for example, in Cholera and malignant fevers.

Instances have occurred in which the carbon dioxide (carbonic acid) exhaled by large numbers of persons crowded together in small apartments has been most destructive to human life. But carbon dioxide produces injurious effects, even when it exists in the air in quantities too small to cause asphyxia, as for example, when not more than *one* per cent is present. Thus, in ill-ventilated apartments the presence of an excess of carbon dioxide in the atmosphere interferes with the proper oxygenation of the blood; for, as already mentioned, less and less carbonic dioxide is exhaled as the proportion of that gas increases in the inspired air. Headache, oppression of the senses, lassitude of the muscles, and languor of the mind are the results; the oxidation of the effete matters of the blood is imperfectly performed or prevented, and they accordingly accumulate in that fluid; the pulmonary and cutaneous exhalations become still more loaded with such substances, and, together with the carbonic dioxide itself, and the ordinary exhalations from the skin and lungs—with which the air in such confined apartments is already infected—produce still more depressing effects upon, and ultimately injurious consequences to, the system.

The escape and entrance of sufficient quantities of air are indispensable for the removal of the noxious products thrown off from the living body, and for the renovation of the atmosphere; this is to be accomplished, consistently with warmth and comfort, by *artificial ventilation*. The deterioration of health from neglecting to sleep in pure air is shown in many ways. (Many competent authorities attribute to this the deposition of Tubercle.)

In the larger part of the country called civilized, man is obliged to provide for himself an artificial climate during several months of the year. We find a good deal of difference of opinions as to what this climate ought to be, among those who enjoy its varied conditions; even science has not yet said its last word in respect to some most essential points. The air provided should be originally pure, or as pure as is possible under given circumstances. There are great variations in the quality of air in different cities, arising from density

*Appendix—Ventilation.*

of population, nature of fuel, character and occupation of the inhabitants; and, again, from climate-prevailing winds, and winds at the time of observation, hygrometric condition, normal or abnormal.

Perhaps the most common sources of impurity in the house-air are found in the cellars. These rooms are often damp, mouldy, unvisited by sun or fresh air. They often contain the family stores of fuel and provisions, the ash-heap, and other sources of dust or stench. Many persons calling themselves good house-keepers neglect their cellars; a neglect which certainly would not continue if they knew the extent to which the air from cellars tends to rise into the rooms above. No part of the house should be kept more scrupulously neat. Cellar air is constantly seeking to pass into the rooms above. It appears that air has a strong tendency to rise from any room in the house to the one above it, regardless of doors or flues. It passes in great quantities through floors.

The evil effects of insufficient ventilation, though very certain and very serious, are not immediate, nor such as to attract attention at first, except in very aggravated cases with excessive overcrowding. The power of the organism to adjust itself to surrounding circumstances is very great, and perhaps as great in regard to the endurance of foul air as anything else. Yet this power is greater in seeming than in reality, for at last such air produces disease and shortens life. Its effects are manifested in diseases of the respiratory organs, acute and chronic, and it is now generally admitted that the undue prevalence of Phthisis in troops is due to the foul air of the barrack rooms. Some persons are much more susceptible than others to the effects of impure air, and will suffer from headache, languor, loss of appetite, etc., where others would experience little inconvenience.

The best definition of the term "injurious to health" in this connection is, perhaps, that suggested by Dr. Ballard, *i. e.*, that exposure to offensive effluvia causes bodily discomfort or other functional disturbance, continuing or recurring as the exposure continues or recurs, and tending by the continuance or repetition to create an appreciable impairment of general health and strength,



*Appendix—Ventilation.*

to render those exposed more liable than others to attacks of disease, and more apt to suffer severely when attacked, and, in the more serious forms, to the direct production of disease and the shortening of life. The mortality of epidemic and contagious diseases, both local and general, has been repeatedly demonstrated to be proportional to the impure condition of the atmosphere of houses and localities. On the other hand, a decrease in the amount and severity of zymotic diseases, and in the rate of mortality induced by them, has been shown to follow sanitary improvements in different towns.

There is much carelessness about the source of air which is drawn into furnaces for heating, and sent up into rooms. Bad air, malarial air, is known to settle upon the ground in many cases. The ground level is less reached by the renovating breezes than higher levels. As a rule, openings for drawing the outer air into the heaters had better be at points above the children's heads, and covered with wire netting.

Regarding the influence of air in the causation of disease, Dr. Russell has established, by a large body of statistics, the fact that house accommodation is much the greatest factor in determining the death rate; that the greater the number of persons living in one room, the more limited the air space, the more impure the air, the higher the death rate.

The conclusion arrived at by Dr. Henderson, from a study of Dr. Russell's pamphlet, is that our common diseases are dependent for their existence upon causes that are material; that this material is present in large quantity in the air of crowded dwellings, and occasions the prevalence of these diseases in such localities. Dr. Henderson concludes that spores may normally traverse the pulmonary membrane, and pass alive into the blood.

More than two thousand years ago Hippocrates, in giving advice to a young disciple, touching the field he should select for his future practice, says: "When you have selected the city that is to be your residence consider well its situation, how it lies to the winds and to the rising of the sun. Consider, also, the waters which the

*Appendix—Ventilation.*

inhabitants use, whether marshy and soft, or hard and running from rocky situations. Also, the ground, whether naked and deficient in water, or wooded and well watered; also, the mode in which the inhabitants live, whether they are fond of eating and drinking to excess, or are fond of exercise and labor. From these things you must proceed to *investigate everything else*. For if you know all these things well, you cannot miss knowing either the diseases peculiar to the place or the particular nature of common diseases, and you will thus be able to foretell what epidemic will attack the city, either in Summer or Winter."

Orton says, in speaking of this matter, "that twenty centuries have passed since Hippocrates wrote these words, but the young physician of our time might ponder them with profit, for in them is plainly contained the great law of public hygiene—that the diseases of a community are invariably connected with the conditions in which it lives."

Eighty years ago, Dr. Benjamin Rush, one of the great lights of American medicine, said: "The means of preventing pestilential fevers, is as much under the power of human reason and industry, as the means of preventing the evils of lightning or common fire. I am so satisfied of the truth of this opinion, that I look for the time when our courts of law shall punish cities and villages for permitting any of the sources of bilious and malignant fevers to exist within their jurisdiction."

Orton says: "We have it largely in our power to defend ourselves from these scourges, and the ability creates an obligation than which none can be more weighty or imperious. We do not rest until our homes are measurably protected against fire and flood. Why suffer fevers to waste them and pestilence to sweep away their rising promise? In the light of modern knowledge, of experimental demonstration, it is an easier task to protect a city from wide-spread disease than from floods or flames." "Far down the future I see a fair city rise. Its streets are not of gold, but they are free from all defilement. Its foundations are not of precious stones, but are laid in well cemented masonry. It has no walls

---

*Appendix—Ventilation.*

---

great and high, but nothing that hurts or destroys is suffered to enter it. A river flows through it, but its waters are clear as crystal. It is not the city of God; it is on *this* side of Jordan. It is the city of human possibilities, the city which men shall build at length, under the illumination of science and the inspiration of christian love."

---

## POTABLE WATER

BY

PROFESSOR FLOYD DAVIS, M. Sc., Ph. D.,

CHEMIST OF IOWA STATE BOARD OF HEALTH.

---

*"He who learns the rules of wisdom without conforming to them in his life,  
is like a man who labored in his fields but did not sow."—SAADI.*

---



---

*Appendix—Potable Water.*

---

## POTABLE WATER.

### I. PURE WATER.

Water is a chemical compound of hydrogen and oxygen, which is widely diffused in nature. As a solid, it exists as snow and ice; as a liquid, it constitutes streams, lakes and seas, and in a state of minute subdivision, mist and clouds; while as a colorless gas, it is always a constituent of the air. Natural waters are always impregnated with certain foreign constituents which give to them their varying properties; and in the examination of water for sanitary purposes, it is not the water which is analyzed, but its impurities.

The palatability of water depends upon its occluded gases, which are principally oxygen, nitrogen, carbonic anhydride and hydrogen sulphide. These gases are readily absorbed, and they give to the water an agreeable taste, and a sparkling brilliancy. The high degree of palatability of spring-water is mainly due to its carbonic anhydride. Distilled water, or water deprived of its gases by boiling, is insipid or "flat;" but by aeration and acidification it regains its palatability. Water must be more or less impregnated with gases before it is even suitable to the dietetic needs of man; for when water deprived of its gases, is used for purposes of experiment, it is found to be prejudicial to health, as the stomach cannot gratefully receive and advantageously appropriate it.<sup>(1)</sup>

Researches in etiology have shown that the health of an individual, or of a community, depends largely upon the purity of the water supply. It is not chemically pure water, however, that is needed for the maintenance of perfect health, for such water does not exist in nature. As chemically pure water contains nothing injurious to the system, it likewise contains nothing beneficial, and for healthy persons, such water is not the most wholesome. The

---

<sup>(1)</sup> Van Nostrand's Engineering Magazine, December, 1872, p. 263.

*Appendix—Potable Water.*

healthy human system ordinarily requires mild cathartics and other mineral salts for the continuity of health. These, in part, can be best furnished to the system as the mineral constituents of potable water. The wholesomeness of water is therefore increased by the presence of small quantities of certain mineral salts, in solution, which act as laxatives, and which are essential to the development of animal tissue; but drinking water should be free from organic impurities. As a rule, chemists condemn all waters which are contaminated with sewage, such contamination being shown by chemical and microscopical analyses, and by an examination of the sources of supply. From a sanitary standpoint, pure water may be defined as water which is unobjectionable for general domestic use, and especially that which may be used with perfect safety for drinking purposes.

Some waters are so unpotable that the appetite does not demand the amount required for the normal functions of the body. Such waters not only lessen bodily vigor and frequently produce disease, but an insufficient supply of any water is manifested by great pain, relaxation of muscular strength and of mental vigor, and diminution in the elimination of pulmonary carbonic anhydride and bodily excretions. So, when we consider that about seventy(?) per cent of the human body is composed of water, which is being constantly eliminated, the need of maintaining a copious supply of pure water becomes apparent; but an abundance of water is no more necessary to the support of life than its purity is to the continuity of health. People may habitually drink impure water and still live, but its use unquestionably affects the human frame and tends to the degeneration of a race. Experience shows that even slightly impure water may be productive of a host of ailments for which the sufferer finds no apparent cause; for the results are often so slow and gradual as to evade ordinary observation, and the evil is borne with the indifference and apathy of custom. It is only when striking and violent effects are produced that public attention is arrested.

A water which is constantly used for domestic purposes should have the following qualities:

(\*) Human Physiology, Seventh Edition, Dalton, p. 36.

*Appendix—Potable Water.*

1st. It should be free from odor and taste.

2d. It should be free from dead vegetable and animal organisms, and should contain only such living forms as are purifying agents.

3d. It should at all seasons of the year be well aerated, uniform in temperature, and free from suspended matter.

4th. It should contain only a small quantity of mineral matter in solution, and be free from all the poisonous salts.

For persons afflicted with renal diseases, distilled water in its crystalline purity is probably the most healthy beverage, for it acts upon the kidneys as a powerful therapeutic agent in the solution and removal of the waste products of the body. Upon this point Professor Charles Mayr(?) says: "Those who have never drunk pure water do not realize what an effect such water has upon the kidneys; its effect is better than that of acetates, nitrates, opiates or alcohol, and for people with tendency to kidney diseases or Dropsy there is no better drug than pure water. Of the thousands of chemical compounds and waste products found in the human system, many require pure water for their solution and elimination; and water so overloaded with salts as average well-water will not work satisfactorily."

## II. INORGANIC IMPURITIES.

Water is the most nearly universal solvent in nature, and as it passes into the earth, charged with atmospheric gases, it dissolves many salts. When it reappears again on the surface in springs, and flows away in streams, it is often heavy laden with mineral constituents; but the streams and lakes in granite regions are very nearly pure. The oceans and inland seas are the final reservoirs of flowing water, and they become saline from the concentration of their mineral matter, through evaporation. Sea water contains about two thousand grains of total solids per gallon, while the waters of the Great Salt Lake and the Dead Sea each contain about twelve thousand grains.(\*)

(\*) Report of New Jersey State Board of Health, 1887, p. 338.

(\*) Manual of Mineralogy and Petrography, Dana, p. 252.



*Appendix—Potable Water.*

From an examination of the water supplies of sixty-five English and Scotch cities and towns, Dr. H. Letherby,<sup>(\*)</sup> an eminent English chemist and sanitarian, concluded that the rate of mortality was inversely as the amount of mineral salts in the water supplies.

Only certain constituents, however, are beneficial to health; others are deleterious; and a water which contains too large an amount of mineral salts should be avoided, as it is liable to produce derangements in the alimentary canal.

When the amount of mineral constituents in water becomes so excessive as to give it decided medicinal properties, the water is styled mineral or abnormal. Many salts have a characteristic taste, and the nature of mineral waters can, therefore, often be determined by the sense of taste alone. Mineral waters are classified according to the principal substance in solution. Thus a chalybeate water has in solution an excess of an iron salt, usually carbonate or sulphate, and which, upon standing exposed to the air, generally deposits a yellow precipitate of carbonate of iron; a saline water has in solution an excess of some salt, like sodium chloride, or sodium and magnesium sulphate; a carbonated, effervescent or acidulous water has carbonic anhydride in excess; while a sulphur or hepatic water contains an excess of hydrogen sulphide. Upon standing, hepatic waters become somewhat turbid and deposit sulphur.

Saline waters, when used occasionally and moderately, are beneficial to health, owing, in part, to the cathartic action of the sulphates and phosphates of the alkalies and alkaline-earth, which are usually found in such waters; but their exclusive use, or the prolonged use of waters containing too much salts in solution, should be avoided. Saline waters often afford relief to persons afflicted with Inflammatory Rheumatism, when they are frequently used for bathing purposes. Carbonated waters are not only highly palatable, but they are very beneficial to persons suffering from Dyspepsia. But waters containing much hydrogen sulphide are

*Appendix—Potable Water.*

not really wholesome, as they will produce Diarrhea,<sup>(\*)</sup> especially if organic matter be present; but in small quantity hydrogen sulphide is not in any way injurious to health.

Some salts are productive of Indigestion, and in many cases Constipation and visceral obstruction are induced by the use of mineral waters. Chalybeate waters not unfrequently induce in the drinker, Headache, Indigestion and Dyspepsia. A drinking water should not contain more than one fifth<sup>(\*)</sup> of a grain of iron per gallon. Calcium and magnesium chlorides and sulphates will produce Chronic Diarrhea, and if the water also contains ammonium and calcium nitrates and sodium chloride in excess, and is used freely, it is sometimes the cause of Dysentery. Dyspepsia is also frequently produced by water containing calcium and magnesium salts. Goitre, so frequently found among the inhabitants of some of the valleys of Switzerland, is caused by the excessive permanent hardening constituents of the water. A water containing not more than seven<sup>(\*)</sup> grains of salts per gallon is said to be injurious to many persons. "With regard to the total quantity of impurities admissible in good drinking water, the Sanitary Congress which met at Brussels decided that water containing more than thirty-five grains of impurity in one gallon is not wholesome, and that there should not be much more than one grain of organic matter."<sup>(\*)</sup>

The normal carbonates of the alkaline-earth, magnesium and iron, are practically insoluble in pure water.<sup>(\*)</sup> But the bicarbonates of these metals, which are readily soluble, are formed by the union of carbonic anhydride and water, with the normal carbonates, and there is scarcely a natural water which does not contain a small amount of them. It is claimed by some eminent authorities that small quantities of these bicarbonates in drinking water are beneficial to health; but experience has also shown that large quantities

(\*) Practical Hygiene, Parkes, Seventh Edition, p. 56.

(\*) Water Analysis, Wanklyn and Chapman, Sixth Edition, p. 61.

(\*) Practical Hygiene, Parkes, Seventh Edition, p. 56.

(\*) Report of American Public Health Association, Vol. I, p. 338.

(\*) "About one grain of calcium carbonate to the grain is usually stated to be the proportion dissolved, but it has been pointed out lately by Allen, that this is an understatement, since solutions have been obtained containing twice this amount."—[Examination of Water for Sanitary and Technical Purposes, Leffmann and Baum, p. 36.]

•

*Appendix—Potable Water.*

of these salts are sometimes injurious. If in excess, they are decomposed in passing through the system, and give rise to renal and bladder difficulties, which often culminate in Gravel. The bicarbonates are not generally found in well-waters in excessive or dangerous quantities; but the continued use of spring-water which originates in limestone rock will eventually give rise to disease, for communities which use only limestone water are generally afflicted with diseases which arise from overworked kidneys. These bicarbonates are the constituents of temporary hardness in water, and they can be removed by boiling, as by this operation bicarbonates are decomposed into normal carbonates, which precipitate, and carbonic anhydride and water which escape. Water is usually rendered permanently "hard" by the solution of the sulphates of calcium, magnesium and iron.

The salts of some elements, like arsenic, antimony, barium, chromium, zinc, copper and lead, are dangerous poisons, and water containing even traces of them should always be avoided. Lead poisoning is not unfrequent in some cities where the water for domestic use passes through lead pipes. Aerated water tends to dissolve lead, forming a hydrate, which in presence of carbonic anhydride in excess, forms a slightly soluble bicarbonate of lead. Chlorides and nitrates in water also tend to form insoluble compounds on the inner surface of the pipes, which prevent further action of the oxygen upon the lead. Lead pipes should, therefore, only be used in conveying drinking water, which contains an excess of sulphates or normal carbonates in solution. Indeed, it is doubtful whether lead pipes should be used at all for a water supply, as a water which contains a sufficient quantity of the necessary salts to prevent the solution of lead, is liable to produce derangements in the alimentary canal.

Potable water often contains suspended mineral matter, such as sand and clay, and it is believed that an excessive turbidity caused by these, is productive of intestinal difficulties, Indigestion, Dyspepsia and Diarrhea. The character of the suspended matter can only be fully determined by means of the microscope.

•

*Appendix—Potable Water.*

III. VEGETABLE IMPURITIES.

The turbidity of water is sometimes produced by decomposing organic matter, which is, with the exception of pathogenic germs, the most deleterious of all impurities.

Although the products of vegetable decay indirectly produce malarious diseases, they are not in themselves especially injurious to the human system; they merely furnish a pabulum in which certain disease germs flourish, for the malarious influence is attributed by medical science to micro-organisms. These living germs are most frequently conveyed to the system in the air, but the most dangerous types of malaria are caused by polluted water, which seems to be a more concentrated and dangerous poison than malarious air. And in the production of remittent fever<sup>(1)</sup> by malarious surface-water, it is poticeable that the disease is always of a more aggravated type than when caused by exhalations from miasmatic soil. So, water which shows by analysis that it contains decomposing vegetable matter, should always be avoided.

By the drainage of swamps and the cultivation of the soil, communities have often freed themselves of much sickness of a dangerous, malarious character. Decaying wood, like pump-stocks and storage-tanks, often produce harmful results, through the water, and the decomposition of sawdust<sup>(2)</sup> in water is a fruitful source of all forms of malarious fever.

Many cases are on record from the American Civil War, in which the use of surface-water, impregnated with the debris of plants, like cellular tissue and chlorophyl, also produced Diarrhea; but when such water was filtered the disease abated.<sup>(3)</sup> The water supplies of some of the eastern cities have at times a decidedly fish-like odor, which Professor Lattimore has shown to be due to the presence of *Alga*, perhaps in a state of decomposition. The little filaments of decomposing *Alga*, when seen under the microscope, are usually changed in color and broken down in structure. It is

(1) Water Supply of U. S. Capitol, 49th Congress, 1st Session, Ex. Doc. No. 154, pp. 8-9.

(2) Report of Michigan State Board of Health, 1882, p. 155.

(3) Practical Hygiene, Parkes, Seventh Edition, p. 37.



*Appendix—Potable Water.*

the opinion of the most competent judges that waters containing such filaments, if used for a considerable length of time, are very injurious to health; and certain *Algae* in a water supply are sometimes accompanied by an alarming mortality of fish.<sup>(14)</sup> Pond water, in which there is a copious growth of aquatic plants, is said to produce intestinal worms.

Recent investigations<sup>(15)</sup> have shown that many varieties of *Algae* are probably capable of producing an objectionable taste and odor in water, which, in case of the grass-green varieties, are especially rancid; but power to produce these changes is entirely independent of color. *Nostoc*, a greenish, gelatinous, translucent variety of *Algae*, which develops rapidly in wet places after a rain, is a frequent source of contamination of water; and it is of especial interest in this connection as being the chief source of the unpleasant "pig-pen" odor of water. The intensity of the physical exponents, taste and odor, may be taken as a measure of the rapidity of decomposition of the *Algae* present in water at any given time, and they are consequently a measure of its cryptogamic pollution.

But there are certain living *Algae* that may be taken as a measure of the organic pollution of water. Thus, the *Flagellata* are generally found in water containing decaying infusions of vegetable and animal matter, and they have been detected in the dejections from Cholera and Typhoid Fever patients. The *Beggiatoa alba*, a species of *Algae* closely resembling some forms of *Bacteria*, is also only found in stagnant waters, and it is, therefore, indicative of harmful pollution.

Some waters which come from clay soil have so strong an odor of hydrogen sulphide and sulphuretted hydro-carbons as to be undrinkable, and yet the organic matter in them will not often warrant their condemnation. These gases are probably produced in the decomposition and reduction of sulphates, by decomposing organic matter, and by living *Bacteria* and low forms of *Algae*. According to Professor Nichols,<sup>(16)</sup> decaying organic matter, in water, under

*Appendix—Potable Water.*

favorable conditions of temperature, reduces sulphates to sulphides, and from these, hydrogen sulphide is liberated by the acid products of decay.

The genus *Beggiatoa* only exist in water containing some form of sulphur, when free from iron.<sup>(17)</sup> These organisms probably possess the power of extracting sulphur from decomposing organic matter containing it, with the liberation of hydrogen sulphide. They also possess the power of extracting sulphur from sulphates in water, appropriating the sulphur in an amorphous state into the protoplasmic mass of their cell structure, with the liberation of the balance of the sulphur as hydrogen sulphide. The presence of hydrogen sulphide in a water supply is, therefore, no reliable indication of organic pollution.

Pure water in thin layers is almost colorless, but in considerable volume it has a decidedly bluish tint, which comes from its power to absorb, reflect, and transmit white light. Rain-water is sometimes highly colored with vegetable matter from the roofs of buildings, but it is often the healthiest of drinking water, on account of the stability of its organic matter. The chlorophyl of unicellular *Algae*, growing in water, often colors the water green. Peat gives to water a brownish color, but analyses and long continued use demonstrate that such water is usually wholesome. It is true that such water has sometimes a laxative effect upon the system, but its action is only temporary, and so can in no sense be injurious. Peat water is often used for drinking purposes on long ocean voyages, on account of its power of retaining freshness.

## IV. ANIMAL IMPURITIES.

The products of decomposition of animal matter are always more dangerous to the human system than those from vegetation, as some of them are highly nitrogenous; and water which is contaminated with the animal accumulations of sewers, cess-pools, and privies, is a most loathsome and dangerous poison. A microscopic examination of polluted water often reveals the presence of hair, excreta, intestinal epithelial cells, and living organisms. Such water should

(17) Water Analysis, McDonald, p. 23.

(14) On the Micro-Organisms in Hemlock Water, Rafter, p. 16.

(15) On the Fresh Water *Algae*, and Their Relation to the Purity of Public Water Supplies, Rafter, p. 2.

(16) On the Fresh Water *Algae*, and Their Relation to the Purity of Public Water Supplies, Rafter, p. 16.

*Appendix—Potable Water.*

be absolutely condemned for all sanitary purposes, as the impurities could only come from sewers and privy-vaults, and the living organisms feast upon the products of decay.

Animal matter is highly putrescible, and water containing it is liable to produce putrefactive changes in persons drinking it. The nitrogenous matter decomposes by oxidation and disintegration, through the agency of micro-organisms, producing in its earlier stages, *Plomaines*, bodies which are closely allied to the vegetable alkaloids, but more susceptible of decomposition. Although the *Plomaines* are present in very small quantities in polluted water, yet they are very active in their physiological effects, and produce harmful results when taken into the system. Other products of decomposition furnish a suitable pabulum for the accumulation and multiplication of germs of disease. Many contagious and infectious zymotic diseases are produced by water polluted with decomposing animal matter, and indeed, it is highly probable that certain diseases are seldom produced in any other way.<sup>(18)</sup> Polluted waters are often deceptive, since they generally have an agreeable taste and are highly palatable.

In the Fall of 1887, Typhoid Fever became epidemic in Ottawa, Minneapolis, Pittsburgh, and many other cities, and it was found on examination that in every case known to the writer, the disease was communicated through potable water. In Pittsburgh the circumstances were especially interesting. The south side of the city was supplied by the Monongahela Water Co.'s works, and the fever was located in districts supplied by that company. Upon chemical and microscopical examination of the water, the pollution was traced many miles above the city to a ravine into which drained the privies of houses where four Typhoid Fever patients had been located several weeks before.<sup>(19)</sup>

From 1856 to 1866 there were twenty-one thousand deaths from

(18) "There is abundant proof that drinking water has been instrumental in the spread of the following diseases: Cholera, Typhoid Fever, Dysentery, Diarrhea, Diphtheria, Malaria, Cholera Infantum, and Cerebro-spinal Meningitis; and in addition to these, certain low forms of fever to which no other name than Continued Fever can be given."—[Report of Brooklyn Commissioner of Health, March 10, 1884, p. 19.]

(19) Report of Special Committee on South Side Water Supply, Pittsburgh, December 23d, 1887.

*Appendix—Potable Water.*

Cholera, and one hundred and fifty thousand deaths from Typhoid Fever, in England and Wales;<sup>(20)</sup> while now in all of Great Britain twenty thousand persons die and two hundred thousand suffer annually from Typhoid Fever, and the majority of cases are produced by polluted water.<sup>(21)</sup>

In Michigan the annual mortality from Typhoid Fever is about one thousand, while ten thousand persons are annually afflicted with this disease.<sup>(22)</sup>

In the United States thirty thousand people die annually from this fever alone. The mortality from Typhoid Fever in many of the eastern cities is proportional to the quantity of sewage which enters the water supplies.<sup>(23)</sup> The annual death rate from this disease per one hundred thousand inhabitants in Brooklyn is about fifteen, in New York city twenty-five, and in Boston forty; while in the city of Vienna, from 1851 to 1874, while impure well-water and a supply from the Danube were used, the annual death-rate was from one hundred to three hundred and forty per one hundred thousand inhabitants. By the use of spring-water in place of the former supplies, the mortality from Typhoid Fever, in Vienna, has been greatly reduced. During the last three years the annual death-rate in that city has only reached eleven per one hundred thousand inhabitants.

Some of the lowly-organized animal scavengers, which assimilate the decomposition products of organic matter, are injurious to the human system, but the majority of them are harmless, and nearly all of them are purifying agents.

Polluted water is generally infested with *Infusoria*.<sup>(24)</sup> This is especially true of stagnant surface-water, and the water from many surface wells. Recent investigations in biology demonstrate that nitrogenous food is necessary for the development of such life in water; but there are certain conditions not yet clearly understood,

(20) Report of Brooklyn Commissioner of Health, March 10, 1884, p. 78.

(21) Report of Michigan State Board of Health, 1884, p. 116.

(22) Report of Michigan Sanitary Convention, December 5 and 7, 1887, p. 24.

(23) Report of Committee on the Pollution of Water Supplies, American Public Health Association, 1888, p. 5.

(24) "The Animal World of Well-waters," Popular Science Monthly, June, 1889, pp. 251-257.



*Appendix—Potable Water.*

favoring the transformation of harmless organic matter, in presence of nitrogen salts and phosphates, into a favorable pabulum for the growth of micro-organisms.<sup>(25)</sup> Phosphates are not usually found in potable water, and the presence of infusorial life in water free from phosphates, is, therefore, very reliable evidence of its pollution.

The ciliated embryos of certain *Entozoa* are sometimes found in potable water. They are generally very active in early life, but finally lose their ciliated covering and perish, unless they find their way into the body of some animal drinking the water.

*Cyclops*, or water flea, is one of the most common forms of *Entomostraca* that are found in potable water. Dr. H. C. Sorby<sup>(26)</sup> has shown that the number of certain of the *Entomostraca* in water may be taken as a measure of its organic pollution, for an increase in sewage is indicated by an increase in their total number, or by an alteration in the relative number of each species, or by both. It is not known whether *Infusoria*, *Entomostraca*, and certain forms of microscopical animal life are the agents or the companions of disease, but serious outbreaks of Fever, Diarrhea, and Dysentery have been produced by water swarming with these forms of life.<sup>(27)</sup>

*Leeches* are sometimes accidentally swallowed in potable water. They are liable to attach themselves on the pharynx, and when once fixed they seldom fall off spontaneously. Coughing, nausea, and spitting of blood are produced by them, and repeated bleeding from the larynx produces anæmia.<sup>(28)</sup>

## V. BACTERIA IN WATER.

Living germs are even more dangerous in drinking water than animal organisms and dead organic matter. Some diseases, such as Cholera, Typhoid Fever and Diphtheria, are generally believed to be produced by micro-organisms, which, like the spores of some plants, are thrown off with the excretions of persons suffering with

<sup>(25)</sup> On The Micro-Organisms in Hemlock Water, Rafter, p. 4.

<sup>(26)</sup> On the Micro-Organisms in Hemlock Water, Rafter, p. 23.

<sup>(27)</sup> On the Use of the Microscope in Determining the Sanitary Value of Potable Water, Rafter, p. 11.

<sup>(28)</sup> Practical Hygiene, Parkes, Seventh Edition, p. 78.

*Appendix—Potable Water.*

the disease, and they find their way mainly through the water supply, to those who, from predisposing causes, are in a suitable condition for the reception and multiplication of the germs and the production of the specific form of disease. These pathogenic micro-organisms are known as *Bacteria*, and the diseases which they produce, zymotic, in consequence of their course resembling a process of fermentation; but only few *Bacteria* are pathogenic. The most common forms of these organisms are not more than one fifteen thousandth or one twenty thousandth of an inch in length, and it has been estimated that it would require four hundred million of them of average size, to cover one square inch of surface. In their multiplication, a single germ becomes the causative parent of thirty or forty million descendants in a day.

In an interesting investigation<sup>(29)</sup> at the city of Paris it was found that in a cubic metre of air above ground there were ten thousand germs; in the sewers, thirty-six thousand; in old houses, forty thousand; and in the hospital of Petie, seventy thousand. And these organisms are absorbed by water exposed to the air.

Dr. Percy F. Frankland<sup>(30)</sup> has found that average river-water, like the Thames, contains about twenty thousand germs per cubic centimetre, and that this number is greatly reduced when the water is submitted to storage and filtration; but there is no reliable artificial method for their entire removal, except by the agency of heat.

*Bacteria* are almost universal in all kinds of matter. They inhabit the air we breathe and the food we eat, and even the purest water is never free from them. The harmless forms of *Bacteria* have their uses in the economy of nature. It is to them that we owe the phenomena of fermentation and decay, as they effect a transmutation in organic substances, and finally elaborate them into organic products. By the united efforts of *Bacteria*, sugar is converted into alcohol, and the cork of the champagne bottle is discharged with explosive violence. While one class of *Bacteria* is thus engaged in making alcohol, another class is fermenting it into

<sup>(29)</sup> Water, Moore, p. 7.

<sup>(30)</sup> Report of Maine State Board of Health, 1887, p. 316.

*Appendix—Potable Water.*

acetic acid; and other classes still are servants to the baker in raising his bread.

Each group of pathogenic *Bacteria* has its specific organ for attack. Thus the *Bacillus Tuberculosis* generally has its seat in the lungs; the *Typhoid Bacillus* penetrates the mucus membranes of the intestines and accumulates in the spleen; and the *Bacillus of Diphtheria* produces extensive layers of false membranes in the fauces. Each group has its own distinctive character; some seem to evolve higher types of life; some prey upon and seem to devour others; and they are quite probably the cause or the result of every zymotic disease.

In some instances, *Bacteria* are capable of being conveyed to great distances in water, without losing the vitality necessary to produce disease. Indeed, it is a very difficult matter to deprive some forms of *Bacteria* of their vitality; they may be frozen or even heated to the boiling point of water and yet many of them are not destroyed. They may be kept dried for years, and when placed in a favorable medium are yet capable of producing disease.

The noted outbreak of Typhoid Fever at Lausen, Switzerland, and at Plymouth, Pennsylvania, has shown that the dejections from a single Typhoid Fever patient are sufficient to poison the water supply of a whole town, and give rise to an extended outbreak of fever. It is, therefore, apparent that human faecal matter is very dangerous, as it may contain germs capable of setting up a specific form of disease. As sewage is largely made up of this kind of matter, it is a very dangerous form of pollution. Sewer gases are also productive of disease,<sup>(21)</sup> especially when the atmosphere is heavy, as it then favors the accumulation of the products of decomposition and the production of germs. Wherever *Bacteria* are found abundantly, decomposing nitrogenous organic matter is always present; and Pasteur has shown that *Bacteria* do not multiply without a putrefactive environment, but remain infertile until they perish. These germs only flourish in a neutral or alkaline medium, such as is produced by decomposing sewage matter, when

<sup>(21)</sup> Report of Michigan State Board of Health, 1885, pp. 64-65.

*Appendix—Potable Water.*

aided by heat, and all standard authorities agree that these alkaline waters are dangerous for drinking purposes. Water which contains an excessive quantity of the alkaline carbonates tends to make the system alkaline, and physicians often find it necessary to put patients suffering with digestive, intestinal, and renal diseases, upon distilled water as a beverage, and with happy effects.

In the healthy human system germs do not thrive, as the reaction therein is acid. But in persons afflicted with digestive disorders, in which the gastric juice is restrained, pathogenic germs find a fertile soil and multiply with inconceivable rapidity. A free supply of gastric juice will kill and digest them.<sup>(22)</sup> A good corrective for alkaline polluted waters is sulphuric acid. This arrests putrefaction and destroys the germs. Workmen, whose employment, location and habits, favor an attack of zymotic disease, sometimes prevent an epidemic by drinking water acidified with one or two drops of sulphuric acid per pint of water.<sup>(23)</sup> Sulphuric acid is also often used with great advantage in treating cases of Cholera and Typhoid Fever, by giving ten to thirty drops of acid in water three times a day. Hydronaphthol is also recommended as a corrective for polluted water; it is a powerful germicide and is harmless to the human system. Pyridine, a constituent of tobacco smoke, is also a powerful destroyer of *Bacteria*. It is a fact worthy of notice that men who use tobacco are less susceptible to zymotic infection than those who do not use it, and that women are more frequently attacked with Diphtheria and Typhoid Fever than men.

In the production of contagious and infectious diseases, it appears that the organic matter throws the *Bacteria* into a state of excitement in which they seize upon the membranes of the body and develop the functional disturbance known as disease, and this disturbance is in proportion to the degree of pollution of the water; while in pure water the *Bacteria* remain in latent condition.<sup>(24)</sup> Slightly

<sup>(22)</sup> The Sanitary Era, October 1, 1888, p. 76.

<sup>(23)</sup> Report of Examination of Water from the River Schuylkill, Cresson, pp. 13-14.

<sup>(24)</sup> Report of Connecticut State Board of Health, 1886, pp. 294-298; Report of Kansas State Board of Health, 1886, pp. 228-235; Report of Kansas State Board of Health, 1887, p. 303.



*Appendix—Potable Water.*

contaminated water often produces zymotic diseases in weakly persons, while persons of robust health may withstand its action. But it is impossible to banish disease from a town whose water supply has been even slightly contaminated with the dejections from fever patients, as the weakly inhabitants will contract the disease first, from the almost inappreciable amount of infection contained in the water, and from them the disease will spread to those who have resisted its action in a diluted condition.

## VI. WATER SUPPLIES.

*Rain-water.*—There is a popular idea that rain-water, as it falls, is perfectly free from impurities; but in fact, the first fall of rain after a drouth is swarming with living organisms, which multiply and perish, polluting the water with the products of their decomposition. Even the purest air contains myriads of motes which can be seen in the sunbeam with the naked eye, and they are washed from the air by the descending rain. The exhalations which rise from decomposing organic matter, and float in the atmosphere, are also carried down in the rain or even humid air, so the first rain that falls during a storm is always more or less impure, and unfit for drinking purposes; but the air becomes purified in a short time, and the rain that falls thereafter is approximately pure water.

The British Rivers Pollution Commissioners concluded that "half a pint of rain-water often condenses out of about three thousand three hundred and seventy-three cubic feet of air, and thus in drinking a tumbler of such water, impurities, which would only gain access to the lungs in about eight days, are swallowed at once."<sup>5</sup> These impurities consist of ammoniacal salts, nitrous and nitric acids, sodium chloride, calcium compounds, and organic matter; and the solid impurities usually amount to two or three grains per gallon. And when the water has drained from the roofs of buildings, after a dry season, the additional impurities consist of dust, dead insects, excreta of birds, and probably dried disease germs. As the rain falls, it becomes thoroughly aerated; but rain-water has usually a

*Appendix—Potable Water.*

flat, smoky taste, caused by the absence of carbonic anhydride and alkaline salts.

In some of the southern cities,<sup>(\*)</sup> near the Gulf of Mexico, where it is impossible to secure a supply of pure well or spring-water, rain-water is used extensively for domestic purposes. It is very important in the construction of cisterns for storage of drinking water that great care should be exercised in preparing the walls against any leakage from cess-pools and privies. Rain-water, when collected toward the end of storms and properly filtered through sand and charcoal, is perfectly wholesome, provided there is no drainage into the cistern.

*Well-water.*—The purity of well-water depends mainly upon the depth and situation of the well, and the nature of the surrounding soil. Deep wells, when properly made, are generally free from organic impurities, but their waters are impregnated with hardening salts. Artesian well-water is also free from organic impurities, but it is usually highly mineralized. Deep well-waters are not best suited to the digestive powers of man; and every intelligent groom and herdsman knows that such waters are also more prejudicial to horses and cattle than even the water of a muddy stream.

The abundance of filth in densely populated cities renders the soil unfit for the filtration and storage of water, and surface wells in such soil furnish only a polluted and dangerous supply, as the water is not sufficiently aerated for the oxidation of its organic matter. These wells are frequently situated in too close proximity to dwellings, stables, cess-pools, privy-vaults, and other sources of pollution, and they are thus frequently important factors in disseminating disease.

Rain-water, as it passes into the earth, extracts from the surface soil great quantities of impurities, like decaying vegetation and the filth and excrement of animals, which it carries down into the circulating currents, and it often happens that the drainage of cess-pools and privies finds a direct channel into the well. The germs from diseased patients thus find their way to the water supply, and

<sup>5</sup>Report of Connecticut State Board of Health, 1885, pp. 254-255.

(\*) Potable Water, Eklin, p. 9.

*Appendix—Potable Water.*

many surface wells are nothing more than receptacles for diluted excrementitious matter.

It is said that the circulation of water is so thorough in the earth that if a barrel of kerosene oil be placed ten feet under ground, every well within a quarter of a mile will be contaminated, and the oil will be apparent to the taste.<sup>(7)</sup> It has been demonstrated that in compact soils, the level of the ground water is influenced by pumping, for a distance of two hundred feet in all directions around a well, while in loose, gravelly soils, the circle of influence may have a radius of more than two thousand feet.<sup>(8)</sup> This produces a circulation of water toward the center, and consequently a washing of the filth of the soil into the well. No stable, cess-pool, privy-vault, or other source of contamination should be within this radius.

Many severe outbreaks of epidemic diseases have been traced to the use of surface well-water in cities, and there is strong reason to believe that sporadic attacks of Typhoid Fever often occur in isolated country homes from the same cause. When scientific views concerning the pollution of well-waters are disseminated, surface wells will be rapidly abandoned by the intelligent classes.

In the ordinary method of bricking or walling a well, no protection is offered against surface drainage, and a deep well thus constructed is no better than a surface well. Open wells should always be walled with hydraulic cement above the water line, to prevent the admission of filth. Surface contamination is also prevented by the use of deep "drive-wells;" with these the only pollution comes from the downward circulating currents. Wooden curbing for wells is a serious source of danger, as the wood soon becomes rotten, contaminates the water, and promotes the growth of fungi.

*Spring-water.*—Springs are fountains of water which flow from subterranean channels. This term is sometimes incorrectly applied to mere shallow pits, filled with water oozing from marshy surroundings, and with little or no visible outflow. The water which gathers into the subterranean channels descends from the earth's surface; and if the surface water is polluted, the springs which

<sup>(7)</sup> Water, Moore, p. 31.

<sup>(8)</sup> Water Supply, Nichols, pp. 100-114.

*Appendix—Potable Water.*

receive their supplies from it are liable to be impure. The organic constituents, in filtering through the earth, oxidize to harmless inorganic products, if the filtering bed is sufficiently deep; but disease germs are not thus destroyed.

Spring-water which flows from hill or mountain sides is generally cold, and has a uniform temperature the year round. Springs are also superior to wells on account of their freedom from the accumulated matter which is always found on the surface of well-waters.

Average porous soil contains about two hundred and fifty times as much carbonic anhydride as does air, and this is taken into the percolating water as it filters into the subterranean channels, and it renders the water especially palatable. It is this carbonic anhydride in water which dissolves limestone, converting it into soluble bicarbonates.

It is, therefore, evident that springs furnish us the best water, as they are generally free from organic pollution, and their waters are very palatable from the gases held in solution. "A perfectly pure spring-water is certainly the most healthy beverage in the world. Such waters are abundant, and can now be easily obtained. It will be a happy day for us all when their use shall have become general or universal for drinking purposes."<sup>(9)</sup>

*River and Lake-water.*—Rivers are the natural drains of the territory through which they flow, being fed by smaller streams, springs, rains and surface drainage. "They are the receptacles of all the waste products of the inhabitants of the district; they receive the contents of sewers, cess-pools and privies; the offal of distilleries, slaughter-houses and tanneries, and the refuse of factories. Into them are thrown carcasses of dead animals, as the most expeditious method of burial. From swamps they receive the matter of vegetable decomposition, and are discolored by flowing over beds of peat."<sup>(10)</sup> The factories that are especially objectionable are dye works, sugar refineries, starch works, and glucose works. Rivers are sometimes polluted by the filth from stock yards.

The Prussian government protects its public water supplies by

<sup>(9)</sup> Hand-book for Water Drinkers, Austin, p. 13.

<sup>(10)</sup> Water Supply, Dickinson, p. 5.



*Appendix—Potable Water.*

forbidding the discharge of sewage into its rivers. Many of the organic substances which are washed into rivers from cities situated on their banks, undergo decomposition, and give rise to products, some of which have the power to produce disturbances in the human system, and others to propagate the germs of disease.

River-water, below the discharge of city sewage, is a filthy and dangerous beverage, and notwithstanding its natural purification by sunlight, by oxidation and by living organisms, it may never become free from disease germs. A stream which has received much filth in its course, should be considered objectionable for domestic use, unless the volume-ratio of the filth to the water is inappreciably small. The pollution of streams in rural districts, from the decay of vegetation, is always greatest in the Fall, and that from suspended matter, is always greatest in the Spring.

River-water originating in mountainous districts is unquestionably the best for city supplies, as under ordinary conditions it is softer than well or spring-water, and it is freer from organic and living matter than surface wells and stagnant lakes and ponds. The objections that are offered against the use of river-water are on account of its high temperature, frequent turbidity, and its liability to contamination; and it is true that some rivers furnish water only fit for hydrant and manufacturing purposes. But by the use of ice, efficient systems of purification, and proper precautions against pollution, river-waters are generally excellent supplies for cities and towns, where an abundance of pure water is needed. In the deep well system for the purification of water, the wells receive only a part of their water from the river, on whose bank they are situated, as the ground-water is constantly flowing toward the river channel.

Lakes are the reservoirs into which rivers and other streams empty, and their waters are not widely different from their sources of supply. These great bodies of water remain cold during Summer, and they become somewhat purer by the sedimentation of their suspended matter. Pond-water often becomes unfit for domestic use, from the growth of *Algae* and fresh water *Sponges*.

*Appendix—Potable Water.*

## VII. NATURAL PURIFICATION.

Streams are partially purified by the sedimentation of their suspended matter<sup>(1)</sup> which takes place as the velocity of the current diminishes. A stream which is very turbid after a heavy rain may soon become clear, owing to its diminishing velocity, and the insoluble matter either sinks to the bottom or is precipitated along the banks. The retarding influence of tidal waves also assists in the precipitation of suspended matter; and Barus<sup>(2)</sup> has shown that the sedimentation of fine particles is promoted by the action of salt water, so there is a rapid precipitation of silt where rivers enter the sea. As the mineral matter subsides, it generally carries down with it much of the flocculent, organic matter that would otherwise remain in suspension for many days.

An apparent purification of polluted water is effected by dilution, and the self-purification of many streams is largely due to this cause. Some of the chemical waste products of factories, when poured into rivers in large quantities, are sufficient to render the water wholly unfit for domestic use, but in the course of a few miles the pollution becomes so much diluted that the water is rendered harmless. In some cases, however, these products furnish a rank growth of *Algae*, and the water is thereby rendered so objectionable that even fish cannot survive in it. This is the case with the Iowa River pollution.<sup>(3)</sup>

The mineral impurities of streams are sometimes removed by mingling their waters with other streams of a different nature, or by flowing over rocks which act chemically upon them. This is beautifully illustrated in the purification of the Schuylkill River before it reaches Philadelphia.<sup>(4)</sup> This river receives the drainage from many mines, and is in its upper course highly charged

(1) "The water of the Mississippi contains forty grains of mud per gallon; and it is estimated that this river carries four hundred million tons of sediment per annum into the Gulf of Mexico. The Ganges is said to carry down six billion, three hundred and sixty-eight million cubic feet annually."—(Report of American Public Health Association, Vol. I, p. 336.)

(2) Bulletin, No. 36, United States Geological Survey.

(3) Monthly Bulletin, Iowa State Board of Health, July, 1889.

(4) Examination of Water for Sanitary and Technical Purposes, Löffmann and Beam, pp. 10-11.

*Appendix—Potable Water.*

with iron salts and free mineral acids, and its water is unfit for domestic and manufacturing purposes. In its course, the river passes through an extensive limestone district, and into it are emptied several large streams, highly charged with calcium bicarbonate. The free acids are thus completely neutralized, and the iron and much of the calcium are precipitated. At Philadelphia the water is soft and superior to the water at the source of the river or at the middle Schuylkill region, as it contains only traces of iron and a small amount of calcium sulphate.

Running water, especially when it flows over cataracts or is thoroughly agitated in the air, absorbs oxygen to such an extent that its organic matter becomes rapidly oxidized; and the purification of water is also greatly promoted by the agency of sunlight. This is one of nature's most efficient methods of self-purification, and "the pure water of mountain streams and swiftly-running brooks and rivers owe their freedom from organic impurities largely to their continued and violent contact and admixture with atmospheric air."<sup>(15)</sup> Some organic substances easily oxidize into ammonia, nitrites, nitrates, and carbonic anhydride, while others, like muscular fibre, may remain for months in water, and still be recognized under the microscope. These chemical changes take place most rapidly in Summer, owing to the favorable conditions of heat, light and motion; but in Winter the oxidation is retarded by the low temperature and the ice formations which shut out the light and air and impede the motion of the water.

The pollution of English streams is carried to such an enormous extent that the waters of many, where city sewage enters them, are actually offensive. In their course, the water and banks become blackened from the formation of sulphide of iron, and with this formation the Sewage Fungus appears. Further on in their course, the black color of the water and the Fungus decrease and disappear, and in their place vegetation is luxuriant, fish abound, and the water becomes clear and apparently pure, from its dilution and oxidation, and from the agency of vegetable and animal life. The

<sup>(15)</sup> Water Supply of U. S. Capitol, 49th Congress, 1st Session, Ex. Doc. No. 154, p. 20.

*Appendix—Potable Water.*

distance which running water requires for its apparent purification, depends mainly upon the extent and nature of its pollution, the inflowing streams, and the agitation of the water in its course, and it is safe to say that it generally requires from five to twenty miles.<sup>(16)</sup>

But self-purification is no guarantee that running water is perfectly wholesome at any distance below a point where it was certainly polluted with the contents of sewers and privy-vaults, or the products of decomposition of vegetable and animal matter. The question, to what extent must impure water be diluted or oxidized to render it safe for domestic purposes, cannot be answered. Mere dilution of polluted water does not render inoperative the action of living *Bacteria*, owing to the marvelous rapidity of their reproduction; and under favorable conditions, it requires only a few days for pathogenic *Bacteria* to render water exceedingly dangerous, even though in other respects it is comparatively pure.

In freezing, water is partially purified,<sup>(17)</sup> as this operation eliminates a large portion of its suspended matter, but the inorganic salts, and the organic constituents, are only partially removed. The experiments of Dr. C. P. Pengra<sup>(18)</sup> show that water in freezing is only freed of about fifty per cent of its organic crystalloids, twenty per cent of its colloids, forty per cent of its mineral salts, and ninety per cent of its *Bacteria*. It is, therefore, evident that ice may be a prolific source of disease, and many dangerous epidemics<sup>(19)</sup> have been caused by it. The impurities excluded in freezing remain in the unfrozen water, in a concentrated and more dangerous form, and this may in part explain why Typhoid Fever so often prevails, and is of such a severe type, during cold Winter weather.

<sup>(16)</sup> Report of Massachusetts State Board of Health, Vol. VII, p. 146.\*

\*The Royal Commissioners concluded, however, that running water is so slowly purified that there is not a river in England sufficiently long to dispose of a moderate amount of sewage, through natural agencies.

<sup>(17)</sup> On *Bacteria* in Ice and Their Relations to Disease, Prudden: Our Ice Supply and its Dangers, Prudden.

<sup>(18)</sup> Reports of Michigan State Board of Health, 1882, pp. 48-50; and 1884, pp. 70-81.

<sup>(19)</sup> Report of Massachusetts State Board of Health, Vol. VII, p. 463; Report of Connecticut State Board of Health, Vol. II, p. 90.



*Appendix—Potable Water.*

The soil may act as a mechanical purifier of water, by the removal of suspended matter as the water filters through it, and as a chemical purifier, by its oxidizing and other chemical action upon the organic impurities, whether they are held in suspension or solution. The filtering power of soil is found to vary greatly.<sup>(40)</sup> Sand and gravel act mainly as mechanical filters, while ferric oxide is the oxygen carrier of the soil. In general, a coarse soil is not so efficient in its mechanical and chemical action as a similar finer one; and every soil which has been charged with organic impurities is unquestionably inefficient. Even a good filtering soil which receives an excess of impurities, becomes, at last, ineffective.

Too much confidence, however, is often ignorantly placed in the purifying power of the soil. From experiments instituted by the National Board of Health,<sup>(41)</sup> it appears that sand and gravel interpose absolutely no barrier between wells and the *Bacteria* of cess-pools, privy-vaults, and cemeteries, lying even at great distances from them. In further support of this view, one celebrated case will suffice: In August, 1872, an outbreak of Typhoid Fever occurred at Lausen, near Basil, in Switzerland.<sup>(42)</sup> The village water supply was from a spring at the foot of the Stockhalden. Suspicion was attached to this water, for it was found that the six houses using well-water were free from the disease, but scarcely one of the others escaped. Upon investigation it was found that Typhoid Fever had occurred at a farm-house on the opposite side of Stockhalden, and that the drainage from this house went into a brook, a part of which was lost in the mountain, about a mile distant from Lausen. Large quantities of salt were thrown into the stream and the salt was soon detected in the Lausen supply, thus proving the connection between the two. Several hundred pounds of flour were then thrown into the stream, but not a trace of it was detected in the water supply, showing the thorough filtration of the water in passing through the mountain. The case was elaborately investigated by Dr. A. Hagler, of Basil, and it is of the greatest

<sup>(40)</sup> Report of Michigan State Board of Health, 1876, pp. 110-111.

<sup>(41)</sup> Report of National Board of Health, 1883, p. 582.

<sup>(42)</sup> Nature, Vol. XIII, p. 447.

*Appendix—Potable Water.*

interest in showing that the most thorough filtration through soil is insufficient to remove Typhoid Fever germs from polluted water.

Finally, we are indebted to low forms of life for much of the self-purification of water. The decomposition of organic matter is the joint work of a number of independent organisms, the results of one class following those of another until organization is entirely destroyed.

The *Entomostraca* and other low forms of animal life, owing to their fecundity, are very important factors in removing organic impurities from water. Some of them seem to act mostly as catalytic agents, producing chemical changes by which the noxious organic constituents are converted into harmless products.

Notwithstanding what has been said concerning decomposing *Algae*, the living forms of *Algae* should not be considered an unmitigated evil, as most of them are really purifying agents, since they assimilate the dissolved organic matter in water. They also assimilate the carbonic anhydride, ammonia, and nitrogen acids produced by lower forms of cryptogamic life. The main function of *Fungi* in the purification of water is apparently the oxidation of organic carbon.<sup>(43)</sup> Next of importance is the great army of *Bacteria*, which embraces many families of similar physical structure, but the families are endowed with very different chemical powers. They sweeten water by a chemical process necessary for their own nutrition; and our water supplies would become magazines of deadly poisons, were it not for the myriads of these micro-organisms which attack dead organic matter, and cause its elements to enter into new and useful combinations. One class of *Bacteria* converts the nitrogen in nitrogenous organic matter into ammonia; another class elaborates this ammonia into nitrous and nitric acids; while another class is engaged in converting organic carbon into carbonic anhydride. Experiments<sup>(44)</sup> show that sterilization of polluted water arrests the decomposition of its organic matter, for ozone and hydrogen peroxide fail to oxidize it; but when such water is subjected to biological agencies, it is purified as usual. Indeed, it

<sup>(43)</sup> Report on the Waters of the Hudson River, Chandler, January, 1885, pp. 7-14.

<sup>(44)</sup> Report of Kansas State Board of Health, 1887, pp. 328-329.

*Appendix—Potable Water.*

appears that the removal of organic impurities is more of a biological than of a chemical question, and in considering the natural purification of water, the action of micro-organisms should have the first rank, even though some of them are pathogenic.

It is well known that these chemical changes are more rapidly effected when the water filters through the pores of the soil, than when it is stagnant, or even when it is flowing in the current of a stream. This is explained by the fact that the purifying *Bacteria* mainly have their abode in the three or four feet<sup>(35)</sup> of surface soil of the earth, and that they so modify the organic matter of water as it passes through this layer of soil, that the roots of living plants can absorb and assimilate it.

## VIII. ARTIFICIAL PURIFICATION.

*Processes.*—Water may be artificially purified by any of the following processes: Boiling, distillation, aeration, sedimentation, precipitation and filtration.

*Boiling.*—By boiling polluted water for some time, the living organisms in it are always partially, and generally entirely destroyed. *Algae* and *Fungi* are easily killed in this way. Professor Tyndall<sup>(36)</sup> has shown that there are periods in the life of *Bacteria* when they can resist the action of boiling water; but as they soften before propagation, water containing them, can be completely sterilized by repeated boiling, for at the proper time, this not only destroys the *Bacteria* but it destroys their spores as well. In order, then, to guard ourselves against these organisms, polluted water should never be used for drinking purposes, without first being boiled for some time (two or three hours), as this prolonged operation thoroughly sterilizes it. Indeed, it is perhaps true that the two most effective measures which can be taken in avoiding zymotic diseases, consist in boiling all the water and milk that we use for drinking purposes.

<sup>(35)</sup> Report of Committee on the Pollution of Water Supplies, American Public Health Association, 1888, p. 11.

<sup>(36)</sup> Practical Hygiene, Seventh Edition, Parkes, p. 79.

*Appendix—Potable Water.*

*Distillation.*—Water may be freed from its solid impurities by a process of distillation. In this way, inland bodies of water and the seas, become saline from the concentration of their mineral constituents, while water in its crystalline purity evaporates from the surface. In the first part of distillation, the occluded gases are liberated, and they pass over with the distillate. It has also been claimed that *Bacteria* and their spores are carried over with the distillate, but the evidence is very unreliable. The flatness of distilled water, which is always objectionable at first, is said to be preferred by some people who have accustomed themselves to it; but this objection can be partially overcome by aeration. Distilled water is not generally used for drinking purposes, except by persons afflicted with renal and bladder difficulties. But it is said to be used regularly on the coast of Chili,<sup>(37)</sup> where it is made from sea water, and it is used oftentimes on long ocean voyages and expeditions, where fresh water cannot be obtained. As coal will distill about eight times its weight of water, there is an advantage in conveying coal instead of fresh water on board of ships.

*Aeration.*—Artificial aeration is a process by which we imitate nature in the purification of water. This oxidizes organic matter to harmless products, and renders the water highly palatable. As a process, aeration was introduced by Lind more than a century ago, for the purification of water on the western coast of Africa. This process has since been used on a large scale in Russia, by allowing the water to flow down a series of steps, passing through wire gauze as it descends, and it has also been used on a small scale in Paris. But artificial aeration has only recently been introduced in this country for city water supplies. In 1883,<sup>(38)</sup> Professor Albert R. Leeds demonstrated by laboratory experiments, that the temporary offensive contamination of the Schuylkill water at Philadelphia, could be removed by oxidation, and at his suggestion the Philadelphia Water Company removed the objection by pumping air under great pressure into its supply. At a subsequent date, the water supply of Hoboken, New Jersey, became extraordinarily

<sup>(37)</sup> Water Analysis, Wanklyn and Chapman, Sixth Edition, p. 167.

<sup>(38)</sup> Water, Moore, pp. 72-74.



*Appendix—Potable Water.*

offensive in odor and taste, and an examination by Dr. Leeds showed this water also to be deficient in oxygen. In September, 1886, the evil was removed by artificial aeration, and the impurities were diminished and vegetable growth ceased.

The water of the Greenwood Cemetery Water Works, Brooklyn, New York, some time since became nauseous from the accumulation of a greenish, vegetable slime. Examination revealed the fact that the water was deficient in dissolved oxygen, and that it contained an unusual number of *Diatoms*. The problem was, therefore, to devise a process which would remove the pabulum necessary for their growth. An amount of air equal to one tenth of the water, under a pressure of eighty pounds per square inch, was found sufficient to oxidize the pabulum, and the water was rendered clear and sparkling by this artificial aeration.

Under great pressure, air oxidizes nitrogenous substances to inorganic products, and it therefore deprives the minute forms of life of the pabulum on which they thrive, and they are rendered latent. But it must not be understood that mere aeration effects these transformations, for experiments<sup>(46)</sup> have clearly demonstrated that without the aid of biological agencies, there is no oxidation, and no purification from the aeration of water. Oxidation is, indeed, but a finishing process, and, therefore, after coagulating and filtering out the bulk of impurities, a vigorous aeration, under high pressure, in such a manner as to cause the oxygen to reach every portion of the water should be effected, and the oxidation then completed so far as possible. The excessive air should then pass to the filtering beds, and in its slow passage through them assist in the separation and removal of the organic impurities. From such a system water would emerge from the pipes highly charged with air, clear, sparkling, and as wholesome as the best standard of nature's purified springs.

*Sedimentation.*—In this country, the water for city supplies is often only partially purified by a process of sedimentation. This process is frequently used for the waters of the Mississippi and

*Appendix—Potable Water.*

Missouri Rivers. The water is allowed to remain at rest for some hours, in large, shallow settling basins, in which much of the suspended organic matter subsides, and thus mechanically removes much of its organic matter; but owing to the expense of constructing, maintaining and operating settling basins, their use is not more extended. Other systems of greater sanitary merit do the work of purification more beautifully and to the satisfaction and delight of the water consumers. After subsidence of the impurities, the water is drawn off, and at regular intervals the sediment is removed from the basins. If the water contains finely divided particles of clay, then the subsidence is so slow that for purifying purposes this process is a failure, and the softer the water the more slowly the sedimentation. It is said that the fine argillaceous matter in the River Rhone requires four months of undisturbed repose for its subsidence. Time is, therefore, an important element in the purification of water by this process.

If the water is contaminated with sewage, or with the decomposition products of vegetable and animal matter, the sooner it is used the less harm it will generally do. "To detain it in a settling basin, especially in Summer, long enough for even its suspended mineral matter to go to the bottom, is to brew a sort of devil's broth out of the putrescent ingredients, that will grow more poisonous every day it is kept."<sup>(47)</sup> As the growth of micro-organisms is prevented or at least retarded by the absence of sunlight, it has been found advantageous to store water, after sedimentation and filtration, in covered reservoirs. Dr. Percy F. Frankland<sup>(48)</sup> has found that the twenty thousand germs per cubic centimetre in the Thames River water are reduced to about four hundred by subjecting the water to sedimentation and filtration; but from ninety-five and five tenths to ninety-eight and nine tenths per cent of the micro-organisms in the London water supply are claimed to be removed by filtration alone.<sup>(49)</sup>

<sup>(46)</sup> Water, Moore, p. 72.

<sup>(47)</sup> Report of Maine State Board of Health, 1887, p. 316.

<sup>(48)</sup> Report on Water Supply of East Saginaw, Michigan, p. 4.

<sup>(49)</sup> Report of Kansas State Board of Health, 1887, pp. 328-329.

*Appendix—Potable Water.*

*Precipitation.*—Many substances have been found useful in precipitating the impurities from water. Among those that have been mentioned are carbon, borax, ferric chloride, potassium permanganate, alum, calcium hydrate, and sodium carbonate. The choice of a substance depends upon the nature of the impurities, the use of the water, and the magnitude and expense of the purifying system. A few points concerning some of these substances will suffice.

Ferric chloride<sup>(63)</sup> to the amount of two and one half or three grains per gallon of water has been used successfully in Holland in removing argillaceous and finely divided organic matter from water. It is a powerful oxidizing agent, and when followed by a solution of sodium carbonate, it gives excellent results, as the carbonate precipitates the iron, which entangles and removes the organic matter.

Potassium permanganate (in solution as Condy's red fluid) is an excellent purifying agent, as it partially destroys organic substances by oxidation, and its manganese is generally precipitated as the binoxide, carrying with it much of the suspended matter present. A yellowish line is sometimes produced in the water by the finely divided particles of oxide of manganese, and although this may be objectionable to the sense of sight, it has perhaps no ill-effects upon the human system. This reagent readily removes any offensive odor from water, but the degree of oxidation of the organic matter depends somewhat upon the structure of the organic matter and the temperature of the water. Potassium permanganate is not a complete purifier of water, but it does work which alum cannot do.

Alum has been used for centuries in China and India to purify water. It is especially efficient with waters containing calcium bicarbonate, and it clarifies them by precipitating the calcareous and argillaceous impurities, and in their removal it is itself precipitated as calcium sulphate and aluminium hydrate, which coagulate and remove the albuminous matter. So perfect is its self-precipitation that rarely can we find a trace of alum in the filtered water.

<sup>(63)</sup> Water, Moore, p. 76.

*Appendix—Potable Water.*

Professor Leeds has shown that alum has also the remarkable property of removing *Bacteria* from water. This is the coagulant used in the Hyatt system of purification. The amount of alum used is from one half to six grains per gallon of water. Alum can be obtained for one and one half to two cents per pound; so its use under the most unfavorable circumstances is very inexpensive.

Clark's process for softening water by precipitating its lime as a normal carbonate, has been successfully used in several European water supplies, and also for private consumers. This is accomplished by adding to the water in settling basins a sufficient quantity of calcium hydrate, in solution, to completely neutralize the carbonic acid, and thus precipitate all the lime as a normal carbonate. This carbonate mechanically precipitates the clayey substances, and effects a nearly complete removal of the coagulated, gelatinous and albuminous matter, as well as a complete removal of the coloring matter. Professor Edward Frankland has shown that Clark's process is very efficient in removing living organisms from water. The completion of the removal of lime is determined by means of a solution of silver nitrate. So long as the bicarbonates remain in solution the silver nitrate gives a white precipitate with the water; but as soon as the bicarbonates are removed, then a brownish or yellowish precipitate is formed. The objections offered against this system are that if organic matter is present in large quantity the chalk will not readily precipitate; the expense of constructing settling basins is very great; and the accumulated chalk needs frequent removal from the basins, and consequently entails much expense. A modern improvement in this process, known as the Porter-Clark process, consists in a remarkably rapid separation of the precipitate by means of a filter-press, which obviates the difficulty of sedimentation, and dispenses with the expensive settling basins.

Sodium carbonate, or salsoda, is frequently used in softening water for laundry purposes, as it precipitates the hardening salts as normal carbonates.

*Filtration.*—The purification of water by filtration for city supplies has become quite general in Europe and most parts of the



*Appendix—Potable Water.*

United States. The essential object attained in this method, when the water is to be used for domestic purposes, is the removal of the pabulum or infectious matter, on which disease germs multiply and develop. Experience shows that this is best effected by first coagulating and filtering out the organic matter, in part, and then complete its removal by rapid oxidation under high pressure. A large per cent of the *Bacteria* are thus removed in filtering, and the remaining few are rendered latent, and the water becomes harmless and palatable.

A filter should not only be capable of arresting suspended matter, but also all substances in solution which are physically or chemically dangerous, and it should so retain them that the water cannot wash them out again. It should also be so constructed that it can be used for some time without deteriorating the quality of the water.

Filtration effects purification in three distinct ways:

1. By straining, in which the efficiency and rapidity of the operation depends upon the size of the pores.
2. By adhesion of the impurities to the filtering substances, in which the efficiency depends upon the nature of the filters, and the relative surface of the filter pores to the water filtered.
3. By sedimentation within the pores of the filter, and the efficiency here depends upon the size of the porous cavities and the rate of filtration.

Professor Edward Frankland, of the Royal Commission, has thoroughly investigated the efficiency of the various methods of purifying water, and the following are the results of his observations upon filtration:“(1)

1. A proper filtration may entirely deprive water of its living organisms.
2. By storing water in receptacles which are biologically unclean, living organisms may be introduced and rapidly multiplied.
3. Filters lose their efficiency by constant use, and instead of removing *Bacteria*, they finally increase the number of these organisms.

(1) Journal of the Society of Chemical Industry, December, 1885.

*Appendix—Potable Water.*

4. Some substances which manifest no chemical action on water, are very successful agents in removing living organisms from it. Such are charcoal and coke.

5. The best results are attained when the filtering substances are frequently removed.

6. What is gained in the rapidity of filtration is lost in its efficiency.

Sand is the material most frequently used in filtering-beds, although, compressed sponge, animal and wood charcoal, coke, brick, porous tiles, unglazed earthenware, sandstone,“(2) carbide of iron, and spongy iron have been suggested.

Animal and wood charcoal, coke and spongy iron are the only substances which can be relied upon for the removal and destruction of organic matter. Charcoal condenses oxygen in its pores, and as water passes through it the organic matter is rapidly and powerfully oxidized, the charcoal acting as a catalytic agent. But it is necessary that charcoal filters be frequently removed and exposed to the air, or sometimes reburnt, that they may become purified and absorb a fresh supply of oxygen, for a filter that is kept constantly in use soon become worthless.

Dr. Percy F. Frankland has found that powdered coke as a filtering material completely removes micro-organisms from water; and Salamon and Matthews“(3) have further shown that the action of the coke is due mainly, if not entirely, to the presence of iron.

In constructing filters for cisterns, care should be taken to so arrange the parts of the filter that all organic matter possible may be removed, and that no color may appear in the water. For this purpose the conducting pipe from the roof should lead directly to the filtering box, in which there should be layers of charcoal, gravel, and sand of such a thickness as to effect this purification. The water should only flow into cisterns during the Winter and Spring months, when the atmosphere is clear and the rain pure.

(2) “The Japanese use porous sandstone hollowed into the form of an egg, and set in a frame over a vessel, into which the water drops as it percolates through the stone. The Egyptians adopt the same method for clarifying the water of the Nile.”—[American Cyclopedia, Second Edition, Revised, p. 180.]

(3) Journal of the Society of Chemical Industry, 1885, p. 261.

*Appendix—Potable Water.*

The filters should be cleansed at least once a year. Under proper management a supply of pure, cold, cistern water may always be at hand. Cisterns are sometimes constructed in two vertical compartments, separated from each other by a porous brick partition, laid in hydraulic mortar. The water is allowed to flow directly into one of the compartments, and filter through the brick wall into the other, from which it is drawn for use. At first, this is a very successful means of filtration, but the partition soon becomes charged with impurities, and finally does more for contamination than for purification.

Any filtering medium, like sand, and uncompressed charcoal and coke, which has pores larger than one twenty-five thousandths of an inch in diameter, cannot successfully mechanically remove *Bacteria* from water. But Pasteur has devised a sanitary filter which eminent authorities claim is germ-proof. The filtering material in this is a fine porcelain imported from France. These filters, which are only suitable for domestic purposes, consist of two concentric tubes, the outer one being connected with the water pipe, and the inner tube is the porcelain filter. The water is admitted to the annular space between the two tubes, and it filters through into the central space, from which the clear, sparkling water is drawn. These filters are so constructed that they can be easily and daily cleansed. Other forms of sterilizing filters are in use, but the writer is not prepared to attest to their efficiency.

*Systems for central filtration.*—One of the simplest and cheapest methods<sup>(67)</sup> of securing filtered water for city supplies is to sink wells or pits to a depth of ten to forty feet into the soil, near the bed of a river or lake, and from them pump the water for general distribution. These wells are inclosed with iron or masonry walls, which prevent an influx of surface soil-water. The river or lake water only enters them at the bottom, and it is thus subjected to filtration through natural soil. These wells generally receive a portion of their supply from the ground-water, and if this flows from underneath a densely-populated city it is liable to be impure. But this system gives satisfactory results when the wells are sunk

<sup>(67)</sup> Water Supply, Diekluson, pp. 10-11.

*Appendix—Potable Water.*

below an impervious stratum, for this separates the surface water of the city from the influx to the well.

In the Filter-bed system<sup>(68)</sup> the basins, as usually constructed, are from ten to sixteen feet in depth. Their size varies from twenty thousand to one hundred and fifty thousand square feet, and is determined by estimating that ninety gallons of water can be filtered per day through each square foot of surface. These basins are made water-tight by masonry, concrete or puddled clay walls. In the bottom are radiating drains, upon which is a layer of broken stone some two feet in thickness; then layers of coarse gravel, fine gravel, and finally the true filter, which is a layer of fine sand, from one to four feet in thickness. The water is kept from one to four feet in depth above the filters, and it is purified in its downward passage through the sand, and flows through the drains to a clear-water basin. When the filters become clogged the water is drawn below the surface of the sand, and a layer of sand from one half to three fourths of an inch in thickness is removed, together with the debris which has accumulated on its surface. This practice is continued until the sand becomes too thin for efficient filtration, and then a new filtering-bed is prepared. This system is especially applicable to the purification of river water, but the sand only acts as a mechanical strainer.

In the Bishof system the sand of the filtering bed is mixed with a prepared spongy iron, which is said to successfully remove organic matter from the water, and thus render it wholesome. If the water contains a large amount of fine sand, a preparatory filtration is necessary, and if there is also a large amount of salts in solution, then the water is liable to be impregnated with salts of iron derived from the filtering-bed.

The Anderson system, so successfully used in purifying the Antwerp water supply, consists in passing the water slowly through revolving iron cylinders, having inside projecting shelves. These cylinders are about two thirds filled with iron borings, and are slowly revolved, so that some of the iron pass into solution as

<sup>(68)</sup> Water Supply of U. S. Capitol, 48th Congress, Ex. Doc. No. 154, pp. 13-15.



*Appendix—Potable Water.*

ferrous hydroxide. Every particle of the water passing through the cylinder is thus brought into direct contact with the iron, and the ferrous hydroxide successfully removes the odor from the water and precipitates the organic matter, which is removed by filtering through sand, and in filtering the ferrous salt is oxidized and removed. Professor Edward Frankland has shown that prolonged agitation with solid particles in the water completely destroys the living organisms; but the Anderson process, at Antwerp, only partially sterilizes the water. The quantity of nitrogen is reduced to one half or one third the amount which the water originally furnished. At Antwerp, the time required for the water to pass through the cylinder is about three and one half minutes, and for the completion of the purification, about six hours.

The Tweeddale system,<sup>(69)</sup> devised by Col. William Tweeddale, of Topeka, Kansas, has proved very efficient on a small scale, and gives promise of great satisfaction for the purification of city water supplies. The lime is precipitated as in the Clark process; then a sufficient quantity of carbonate of iron is added to render insoluble the organic matter. If the water is hard and clear, a small quantity of clay is then added. The water is then violently agitated by means of an air injector, after which the water is allowed to stand for ten minutes to complete the reaction. The water is again violently agitated from fifteen to twenty-five minutes, after which the impurities are allowed to settle, and the water is removed by decantation. The impurities must be frequently removed from the tanks. The time required for the clarification by this process, is from three to four hours. In this system the water is softened, the organic matter is largely precipitated and the balance oxidized to inorganic salts, while the living organisms are mostly destroyed.

In the Hyatt system of purification, the inconvenience and difficulty attending the frequent removal of sediment and sand in the previous methods, are obviated. In this system the filters can be easily, cheaply and thoroughly cleansed. The impurities are coagulated by means of alum, and the water then passes to the steel filtering chamber where they are removed. This is a vertical cylinder,

*Appendix—Potable Water.*

having a diameter nearly twice its height. Through the middle is a horizontal diaphragm capable of withstanding the hydrostatic pressure necessary for rapid filtration. The lower section of the cylinder is filled with the filtering material, which consists of two parts of coke and three parts of sand. The upper part of the cylinder is used for washing the filtering material, which is transferred to it at regular intervals in a state of violent agitation by hydraulic currents, and the impurities flow away through pipes situated near the surface. The water is admitted through pipes to the upper part of the lower section of the cylinder, and it is drawn out through perforated cups which admit the water but exclude the sand. The efficiency of this system depends more upon the successful precipitation and entanglement of germ life by the coagulant than upon the merits of the filter. Aerating systems are also attached to large plants, and are said to give excellent results. The Hyatt system is not only one of the most perfect for central purification, but it is also successfully used for private supplies.

<sup>(69)</sup> Report of Kansas State Board of Health, 1887, pp. 330-331.

---

# STREET PAVEMENTS

CONSIDERED

FROM A SANITARY STANDPOINT.

By L. E. ANDREWS,

ASSISTANT SECRETARY, STATE BOARD OF HEALTH.

---

Read before the Board, May 30, 1888, and ordered printed.

---



---

*Appendix—Street Pavements.*

---

## STREET PAVING.

The tendency of every intelligent community, organized in corporate capacity, is toward physical improvement. To get out of the mud is a step in that direction. Street paving is the first movement. Hitherto utility and economy, durability and cost, have been the dominant consideration. Very little, if any, thought has been given to sanitation.

For traffic, first came the cobble-stone, irregular in size and tenacity, accessible generally, tough, durable, but destructive to vehicles, disastrous to horses, detested by drivers, and exceedingly filthy.

Next, irregular quarried rock, soon succeeded by cubes of trap-rock, or granite, early discarded because of the necessitated heavier vehicles with broader tires, and injury to animals, for the oblong, narrower, so-called Belgian stone blocks.

For light traffic, macadam of broken stone and gravel, are used.

In western cities, where stone is rare and expensive, wooden blocks in cubes or round, laid by various processes, are utilized.

It is estimated that where stone is used, one half the area of space is filled with other material. The blocks are irregularly worn and displaced by traffic, the joints are widened, into which flows the filth of the street, forming a putrescent mass to ooze into the underlying soil. A removal of this paving discloses a greenish, black earth, saturated with sulphuretted hydrogen, of decidedly offensive odor, positive evidence of pollution. In hot, dry weather this sickening mass throws off by evaporation and dust, the germs of disease.

The quite general impression that the atmosphere ends where the ground begins, is a delusion as false as it is dangerous. The air of

*Appendix—Street Pavements.*

houses may be, and often is, deteriorated and poisoned by emanations from filthy soil. It has been positively demonstrated in Europe, and also in this country, that the death-rate of Consumption is diminished by drying the sub-soil.

Evaporation of filthy soil causes diarrheal diseases, particularly in Autumn, when there is predisposition to intestinal disorder. The heated air of the house draws in the contaminated air from the polluted surrounding soil. Air may contain organic matter, in the form of dust, which is the carrier of specific poisons.

Dr. Henri Napias said before the Congress of Industrial Hygiene, in 1884:

Dusts in the air are all dangerous. Mineral dusts are the most dangerous, because, besides being sharp, and liable to cut the tissues, very many are poisonous. Dusts of organic origin are frequently vehicles for the conveyance of infectious germs. Various affections of the lungs are caused by breathing these dusts, among which may be counted Phthisis (Consumption).

Prof. W. M. Williams has demonstrated the fact that dust is repelled from warmer to cooler bodies, whether those bodies be solid or gaseous. If the walls of a room, the floor and ceiling, be warmer than the air of the room, the dust will be repelled from the walls, etc., to the air, while if the air be warmer than the walls, the dust will be projected to the walls.

This being true, it is evident that, for sanitary reasons, those methods are best for warming rooms that heat the air most.

## DUST.

Sanitarians are most interested in dust and impurities of the air created by man and animals, because they relate more directly to the public health. Says Adolph Cluss, in *Popular Science Monthly*:

Vapors still more noxious than those from the road-bed, rise from the gutters, the sub-soil of which is saturated more deeply by more concentrated filth. Crowds of children, whose tender lungs breathe the air immediately over this miasmatic soil, contract constitutional predispositions which doom them to a languishing and miserable life, and render them an easy prey to epidemic.

*Appendix—Street Pavements.*

In Paris sanitary regulations have so far advanced as to prohibit the shaking and beating of carpets within the city, because of the danger believed to exist, that many of the carpets are removed from houses in which contagious diseases have prevailed, and in the process of beating the germs of disease are dislodged.

Prof. Tyndall demonstrated by repeated experiments that a large proportion of the dust in London houses was composed of organic matter, in which horse manure was a large component part.

Mr. C. Tiehborne, in 1870, said the "street dust of Dublin was composed mainly of stable manure and triturated stone."

In 1861, Eiselt and Bechi, after an investigation of the dust of London houses, found it consisted of horse dung, grindings of shoe-leather and starch corpuscles.

The street dust of New York, on examination, was found to be composed of sand, carbon, fibres of cotton, fragments of vegetable tissues, granules of starch, pollen of grain, micro-organisms, and fungi, the latter abundant. When water was added to the specimens, *Bacteria* and *Vibrionese* made their appearance in a few hours.

M. Miquel found two million one hundred thousand *Bacteria* in a single gramme of dust from the Rue Monge, in Paris. Observations for six years, showed an average of three thousand nine hundred and ten *Bacteria* in a cubic metre of air in Rue de Rivoli, in the same city.

It is estimated that over five hundred and forty-one thousand tons of stone are annually ground to dust on macadamized streets in London, and one hundred and fifty thousand tons in Paris, which largely finds its way into the Thames and Seine rivers, requiring constant dredging thereof. Whirled into the atmosphere by wind, this dust, mixed with manure and other street filth, lodges in houses, suffocates shade trees and plants, and is unfit for respiration.

## NOISE.

A serious and important objection to any pavement, is noise and vibration. Permanent injury to health among people with feeble,



*Appendix—Street Pavements.*

sensitive nerves is a frequent result from the noise and vibration of stone-paved streets.

Fonsagrives, Professor of Hygiene, at Montpelier, says:

I cannot consider such perpetual vibration of the nerves as harmless, even for those who have been born and bred in the midst of noise. It is a very general cause of erethism, and to it must be ascribed the prevalence of nervous temperaments in large towns. With hysteria (from noise), at eight years of age, what shall be said of invalids?

The noise of a stone pavement also means wear and expense. Over one hundred and eight thousand tons of granite pavement are ground into dust each year in the streets of London.

Macadamized streets are less objectionable from noise, than where granite is used, but they are little else than dust-mills. No description is necessary of the misery of the dwellers along a macadamized street. Extremely filthy in wet weather, they are intolerable in dry weather.

In all large cities of Europe, stone has been abandoned for paving, and smooth, quiet surface is being laid.

## ASPHALT.

Asphalt is being extensively substituted for stone. It has been thoroughly tested, and, whether laid in blocks, or compressed, with satisfactory results. The most serious objection to it is its cost and smoothness, the latter confining its use to grades of one foot in fifty. It is impervious to water, easily cleaned and noiseless. It may be tunnelled for laying water or gas pipe, or removed and replaced without showing the cut. It is non-absorbant. Briefly stated, asphalt paving is composed of crushed limestone and Trinidad asphaltum, subjected to a pressure of three thousand pounds to the square inch, at a temperature of two hundred and fifty degrees Fahrenheit. It has been in use twelve years. In 1887, over one hundred and sixty-five lineal miles of it were laid in various cities of the United States.

*Appendix—Street Pavements.*

## WOOD PAVEMENT.

In the West, the expense of stone and asphalt has by necessity thrown the choice to other material. Wood pavement of several kinds has been thoroughly tested: First, the Nicholson, and other patented devices; next, the cedar block. The Nicholson, and similar patents have been entirely abandoned, for purely economic reasons. The cedar block has not proved so successful as expected. The sub-base of plank is laid when green, coated with tar; the blocks are laid also when green, with the transverse joints filled with gravel and tar; the upper face of the block faced with tar and sand. Frequently the placing of this paving, follows close upon the closure of gas, sewer, and water-main trenches, without settlement, causing subsequent depression and crevices in the pavement for the admission of water and filth. In this latitude, the upheaval by frost is considerable. In the Summer the blocks crack from sun-heat, thus admitting water to the wood cells and fibre, and hastening decay. When wet, the blocks are slippery, and on heavy grades give uncertain foothold to horses, thereby endangering life and limb. As cedar blocks are usually laid, they quickly become a mass of decaying vegetable matter. Absorption increases with disintegration, until they become also fully saturated with the filth of the street. Tarring of the green boards upon which they are placed, adds to the objection; it closes the cells, prevents the escape of moisture, hastens fermentation, and soon the wood becomes a mass of "dry-rot." A well known physician of Chicago, declares that "on a warm morning, after a shower, on streets paved with cedar blocks, the affluvia arising from the fermentation and decomposition of the blocks can be actually tasted, and be seen rising like a fog, and laden with disease germs, which in dry, hot weather are driven into dwelling houses, causing diphtheria and other diseases, to an alarming extent."

To secure a more permanent and durable foundation for these blocks, cement is sometimes used instead of boards, which only increases the sanitary objections. The cement holds the accumulated filth and moisture beneath the blocks, thereby hastening and increasing fermentation and decay, and rendering more noxious the

*Appendix—Street Pavements.*

affluvia from the fermenting mass. Such a base for wood paving should never be permitted in any community having proper regard to sanitary conditions.

In the city of Basle, wood paving was tried on one street and abandoned as unsatisfactory. Eighteen months ago, the roadway over the Goethe bridge in Hanover, Germany, was paved with a new material called India Rubber. Since then, an entire street has been paved with it in that city, and it is being laid in the streets of Berlin and Hamburg. It is reported to combine great elasticity with the hardness of stone, noiseless, more durable than asphalt, not slippery, and not affected by temperature.

**BRICK.**

Public attention is turning to brick. It is no innovation. In the Netherlands of Europe, highways have been paved with brick for more than half a century. In West Virginia it has been used for sixteen years, in the city of Charleston. In Bloomington, Illinois, it has been used fourteen years. Decatur, Illinois, has nearly all her streets paved with it. In Ohio it has been adopted in several cities, and its mileage is increasing every year.

Dr. James E. Reeves, the eminent sanitarian, and late President of the American Public Health Association, and Secretary of the West Virginia State Board of Health, writes:

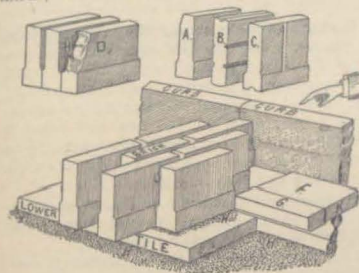
"It affords me much pleasure to bear testimony to the superior quality of the street paving, which has been done in Wheeling with vitrified blocks, or artificial granite, as I am in the habit of calling the blocks. Chapline street—the busiest street in the city—was laid in the Fall of 1883, since which time every possible test has been made of the work. The line of the horse car track shows even to this date not the least wear or unevenness, a condition which proves the nature of such paving. It is not only durable, but smooth as the best of the sidewalks, cleanly, comparatively noiseless and easy to the feet of horses and protective of all wheeled carriages. In a sanitary point of view it is absolutely priceless. No other material in use for street paving can be compared with it for cleanliness. Beside it is the easiest to keep clean and in good repair."

Clay is the ore of aluminum, and when properly mixed and vitrified, becomes an igneous rock, unaffected by heat, water or frost.

*Appendix—Street Pavements.*

It has a greater resisting power against shock than granite, is homogeneous, slightly elastic, has no grit which will bite steel or iron; will neither act upon, nor be acted upon by horses' shoes; has a more perfect bearing than stone; can be laid more compact; is noiseless, dustless, non-absorbent, and therefore healthful.

The brick used are of various forms. In eastern cities they are of the common, oblong form. Later devices mould them with one-third the base one-quarter of an inch thicker than the upper two-thirds, as shown in the diagram. A sub-base of properly rolled sand is laid on the road-bed, over which is laid vitrified tile blocks eight inches square, and two inches thick. Over the tile is thrown a thin stratum of fine, clean sand, upon which the brick are placed, with the base in contact, thus leaving a space of one-half inch to be filled with sand. This furnishes a durable, smooth pavement, yet with good foot hold for horses; easily cleaned; and nearly, if not quite impervious to water. For repairs, only so much area as actually required, need be removed. It is quickly replaced and ready for the traffic without delay.

**REQUISITES OF PAVEMENT.**

The requisites of pavement, and the material, are here given in the order of quality: The conclusions are based on the best and most extensive authorities published.

1. *Economy.*—The best is the cheapest. For cost; asphalt, granite, brick, cedar blocks.
2. *Rapidity of Construction.*—Asphalt, granite, cedar blocks, brick.
3. *Facility for Removal and Replacement.*—Brick, asphalt, granite, cedar blocks.



*Appendix—Street Pavements.*

4. *Durability*.—Brick, granite, asphalt, cedar blocks, macadam. The deterioration of cedar blocks, resulting from fermentive decay, is greater from the bottom upward, than from the wear of traffic. Blocks that had been laid three years, taken from a heavy grade on the streets of Des Moines, leading to the capitol, were saturated with sulphuretted hydrogen, and showed nearly entire destruction of the fibre from the bottom upward. When thoroughly dried, the blocks disintegrated.

5. *Firmness for Foot-Hold*.—Brick, asphalt, granite, cedar blocks. Observations made in Paris, to discover the liability of horses to fall on pavements, extending over eighty-one thousand miles travelled, and eight hundred thousand horses, showed one fall to five hundred and eighty-three miles on asphalt, four hundred and thirteen miles on granite, and two hundred and seventy-three on wood.

6. *Smoothness*.—Asphalt, brick, cedar blocks, stone. The smoother a pavement, the easier kept clean; the less noise; the less wear of vehicles; the greater pleasure to the rider or driver; the greater comfort to the invalid; and the greater economy of horse power. The latter is an item of considerable importance. Rudolph Hering has demonstrated that if one horse can move a load on a level iron rail, it will require one and two third horses to move the same on asphalt, three and one third on best granite blocks, five on ordinary granite blocks, seven on good cobble-stone, thirteen on bad cobble-stone, twenty on ordinary earth road, and forty on sand road.

7. *Cleanliness*.—Experience has shown that stone pavement cannot be kept clean; cedar blocks may be, on the surface. Asphalt may be kept perfectly clean. Brick afford little or no lodgement for filth.

8. *Imperviousness*.—From a sanitary stand-point, imperviousness to moisture is an all important requisite of street pavement. Every sanitarian is cognizant of the danger from soil contamination and pollution; that a filth-sodden soil has a bad influence upon health by the effluvia emanating therefrom. The constituents of street filth are multifarious—excreta and urine of animals, garbage, kitchen water, house slops, solid and liquid human excreta. With a pervious pavement this foul mess is washed and soaked into the soil, exposing wells to pollution, and dwelling-houses to poison by "ground air."

The logical deduction is, that is the best pavement which is most impervious to moisture, from which water passes away the quickest with the least absorption or percolation, and which can be the most thoroughly and easily cleaned. A careful investigation of all the literature accessible (quite extensive), leads me to the firm conclusion that asphalt is the best, and brick the second best material for sanitary street paving.

It is pertinent here to say that the sanitary and economical value of pavement consists in preserving it intact as first placed. Sewer

*Appendix—Street Pavements.*

gas, water and other trenches should be made sufficiently prior to paving, to secure complete settlement of the earth.

All removal and replacement of pavement should be done by the city, through its proper officers, at the expense of the person benefited.

In conclusion, it is urged in the interest of health, comfort, convenience and economy, that more attention should be given to paving the streets and alleys of cities and towns. Pavements are not luxuries for the comfort and convenience of the wealthy alone, but are conservators of health for the masses, who are exposed to the injurious effect of impure air and dust.

## INDEX.

	PAGE.
ACTINOMYCOSIS—	
or lump-jaw, poisoning from eating meat .....	91
ANALYSIS—	
of water from Oxford Junction.....	14
De Soto .....	20
permissible, potable.....	77
of water, rules for obtaining.....	160
ANDREWS, L. F.—	
on increase of insanity .....	69
street pavement.....	253
ATTORNEY-GENERAL—	
decisions of .....	147
compulsory vaccination in schools .....	149
generally.....	149
abatement of nuisances .....	151
powers of the State Board of Health .....	152
BACTERIA—	
in potable water.....	226
BARTHOLEW, PROF. ROBT., M. D.—	
on typhoid fever, its prevention.....	33
BIRTHS—	
and deaths must be reported by all physicians and midwives .....	134, 191
several physicians, who shall report.....	190, 192
BURIAL—	
in cemetery outside of city or town, what required.....	186
no cemetery association, undertaker must have burial permit.....	186
corpse shipped into a city, permit required.....	186
permits required for all deaths in city or town.....	186, 187
begins when.....	187
deposit in a vault, is.....	189



	PAGE.
CEMETERIES—	
in cities and towns, objections to .....	106
contagious diseases from .....	107
pollution of wells from .....	107
burial in, what required .....	186
CHICKEN-POX—	
not included in quarantine regulations .....	180
CLERK—	
of local board, must make full report of contagious disease to	
State board .....	xii
compensation .....	142, 106
must keep a record of deaths .....	186
district court must furnish physicians return blanks .....	ix, 191
CONSUMPTION—	
cause and prevention .....	121, 256
is contagious .....	121
not hereditary .....	123
conveyed through meat and milk .....	127
rules for prevention of .....	126
CORPSES—	
amendments of rules for transportation of .....	6
transportation of, rules for .....	101
no exception to rules for shipment of .....	189
shipment of, infectious disease .....	189
power of railroads to refuse .....	190
disinterred bodies, change of rule .....	190
CROUP—	
membranous, to be quarantined .....	8
DAVIS, PROF. FLOYD—	
on impurities of potable water .....	213
DECISIONS OF SUPREME COURT—	
physicians must report births and deaths .....	134
expenses in Small-pox cases, how paid .....	135, 138, 141
compensation of physician .....	137, 141
erection of pest-house .....	139
nursing and care of sick .....	140
local boards cannot act through committees .....	143
must appoint health officers .....	143
meet to establish quarantine .....	144
power to abate nuisances .....	144
expenses for pest-house, how paid .....	139
for physician in Small-pox cases .....	141
quarantine by committee of local board invalid .....	143

	PAGE.
DECISIONS OF ATTORNEY-GENERAL—	
compulsory vaccination in schools .....	147, 149
generally .....	148
abatement of nuisances, by local boards .....	151
quarantine powers of the State Board of Health .....	152
DECISIONS OF THE STATE BOARD—	
contagious diseases, danger signals .....	154
kerosene oil accident, notice to State Board .....	154
must be inspected within this State .....	154
local board, powers to prevent contagious disease .....	155, 156, 159, 166, 176 178
vaccination, duty of .....	155, 160
must decide when conflict of diagnosis .....	155, 164
enforce the health laws .....	156
may require vaccination of school children .....	157
must quarantine suspected infectious disease .....	159, 182
compensation of .....	160
may procure water analysis, when .....	160
to close schools, when .....	162
power to exclude pupils from school .....	163
cannot disregard rules of State Board, 163, 169, 170, 172	
duty of, to put up danger signals .....	164
must appoint a health officer .....	164, 170
provide health officer continuously .....	164
may or may not adopt rules of State Board .....	165
regulations, ordinances, penalty .....	165
must act when contagious disease reported .....	144, 166
quarantine by committee of, invalid .....	143, 167
kerosene accident, what to do .....	166
well, wood curbing, pollution .....	166
may protect against rabid dogs .....	167
power to quarantine against contiguous territory .....	167
must establish quarantine as a body .....	167
disinfection by sulphur abolished .....	167
compensation of clerk of .....	167
quarantined sick persons, who may attend .....	171
diagnosis disputed, board may decide .....	171
must regulate all fees and charges, when .....	173
violation of, regulations of, penalty .....	174
infectious disease, closure of schools .....	175
quarantined persons must have subsistence .....	176
quarantine period of forty days .....	16, 182, 183
when it begins .....	185
nuisances, power to abate .....	187, 188
hog-pen .....	188
cemeteries, in cities and town, burial permits .....	186
corpses, transportation, disinterment .....	189
rights of railways .....	190
reports of births and deaths, attending physician .....	190, 192
midwives .....	191

DIPHTHERIA—	PAGE.
outbreak at Rochester .....	9
Oxford Junction .....	11
early symptoms of .....	24
membranous croup is .....	24
danger of infection from kissing .....	25
is a filth disease .....	32
caused by low water .....	81
impure milk .....	83
danger signal, who to put up .....	132, 154, 164
when diagnosis doubtful .....	28, 132, 156
in public schools, what to do .....	102
incubation period of, after exposure .....	177
quarantine, period of .....	16, 178, 183
of head of family .....	30, 75, 173, 174, 178, 185
germs of, not destroyed by sulphur .....	31, 167, 185
disinfectment of persons dead from .....	189
 DISINFECTION—	
sulphur not reliable for .....	31, 167
reasons for .....	31
duty of health officer .....	132
rules of State Board must be followed .....	153, 172
 FOOD—	
for children, danger in .....	89
poisoning from meat .....	91
preserving with salicylic acid .....	99
supply, power of local board to regulate .....	159
 GOVERNOR—	
letter from, epidemic diseases .....	7, 14, 17, 192
 HEALTH OFFICER—	
powers and duties of .....	131, 168, 171, 173
compensation of .....	133, 143, 179
self-protection of, in contagious diseases .....	133, 171
must be appointed by local boards in session .....	141, 170
cannot be employed by committee of local board .....	143
must be constantly in office .....	160, 170
kerosene accident, notice to State Board .....	166
must be a lawful, and competent physician .....	169
cannot ignore rules of State Board .....	170, 172
not required to attend quarantined persons .....	132, 171
declining to serve, vacancy .....	172
qualifications of, required .....	169
cannot establish nor release quarantine .....	132, 172
is not a member of local board <i>per se</i> .....	131
must report to State Board, when .....	xi, 132
 HILL, GERSHOM H., M. D.,—	
on prevention of insanity .....	63

	PAGE.
 HORSE—	
scarlet fever in .....	75
 HOUSE PLANTS—	
and health, relation considered .....	119
 HYGIENE—	
of summer resorts, danger from .....	103
 ICE—	
from pond, danger from .....	156
 ICE CREAM—	
case of poisoning from at Adair .....	85
 INFECTIOUS DISEASES—	
diphtheria at Rochester .....	9
cause for spread of .....	15
outbreak of .....	18
Scarlet Fever .....	18
Small-pox in Jasper county .....	18
at Council Bluffs .....	19
Ainsworth .....	19
Waverly .....	19
Galvin .....	19
Clinton .....	19
Marshalltown .....	19
Nevada .....	19
Spirit Lake .....	19
Jefferson .....	19
in public schools, what to do .....	20, 163
early symptoms of .....	21
danger from mild cases .....	25
puerperal fever, its prevention .....	58, 172
quarantine of heads of families .....	75
caused by low water .....	81
impure milk .....	83
danger signal, who to put up .....	132, 154, 164
expenses of, when paid by county .....	135, 137, 141
transmitted from grave-yards .....	107
diagnosis, disputed, who to decide .....	155, 164, 171
powers of local boards .....	137, 138, 140, 142, 145, 148, 150, 152, 155, 156, 157, 159, 163, 164, 173, 178, 187
duties of local board, public schools .....	162
when reported .....	143, 164, 166, 188
affected persons excluded from public schools .....	175
posting notice of regulations, law repealed .....	139
the sick, employment of physician .....	171
puerperal fever is .....	171
membranous croup is .....	172
incubation period of .....	177



## INSANITY—

PAGE.

needs for relief of .....	50
prevention of .....	62, 72, 73
increase of in the State .....	69

## KEROSENE OIL—

what to buy and how to use it .....	109
change in rules for inspection of .....	113
must be inspected within this State .....	154
explosion of, notice to State Board .....	167

## LARRABEE, GOVERNOR—

letter to State Board .....	7, 14, 192
-----------------------------	------------

## LEGISLATIVE RECOMMENDATIONS—

increased powers of State Board .....	192
---------------------------------------	-----

## LOCAL BOARDS—

clerk of must make full report of contagious diseases to State Board .....	xii
duties of in contagious diseases .....	75, 136, 141, 159, 163, 164, 165, 168, 174, 178, 187
cannot act through committees .....	75, 141
must appoint health officer .....	141, 143
meet when exigencies demand .....	144
to establish quarantine .....	144
cannot disregard regulations of State Board .....	157
power of, to abate nuisances .....	151
who must put up danger signals .....	154, 164
powers of, in contagious diseases .....	136, 139, 140, 143, 144, 145, 151, 155, 156, 159, 164, 165, 170, 172, 173, 174, 176, 177, 178, 188
township trustees cannot act as, when .....	160
infectious disease, diagnosis doubtful .....	156
powers of, to regulate food supply .....	159
duties of, when infectious diseases not reported .....	159, 168
joint meeting of, with trustees of township, compensation .....	160
city within township, jurisdiction .....	162
must keep health officer continuously, vacancy .....	164
may authorize disinfection by attending physician .....	164
have control of sanitary regulations .....	164
regulations of, as city ordinances .....	165
complaint to, how prevented .....	156
quarantine, diseases not reported .....	159
power of, to employ physician, contagious disease .....	143, 173
expenses of, how paid .....	xi, 143, 190
of cities and towns, must require death returns, and burial permits .....	190

## McNUTT, ROBERT, M. D.—

report on ice-cream poisoning .....	85
-------------------------------------	----

PAGE.

## MEASLES—

early symptoms of .....	21
German, or rotheln .....	23
from grave-yard exhalation .....	107
closure of schools .....	162
quarantine of, period .....	177
incubation, period of after exposure .....	177

## MEAT—

poisoning from .....	91
consumption from .....	127

## MEMBRANOUS CROUP—

is contagious .....	8
must be quarantined .....	172, 177

## METEOROLOGICAL—

comparative tables .....	195
--------------------------	-----

## MIDWIVES—

must report births and deaths to county clerk .....	x, 191
register in office of county clerk .....	x

## MILK—

standard of pure .....	8, 85
cause of diphtheria and scarlet fever .....	83
rules for securing pure .....	84, 86
tyrotoxin in .....	83, 85
the murderous nursing bottle .....	88
consumption from .....	127

## MUMPS—

is an infectious disease .....	186
incubation period of, after exposure .....	177
not subject to quarantine .....	186

## NUISANCE—

abatement by local boards, when .....	144
hog-pen is .....	144
penalty for maintaining, enforced by ordinance .....	144
power of local boards to abate .....	151

## NURSING BOTTLE—

condemned, when .....	88
cause of cholera-infantum .....	90

## PEST-HOUSES—

power to build .....	139
----------------------	-----

## PHYSICIANS—

must make return of births and deaths .....	x, 134
attending contagious disease, danger signal, disinfection .....	164
must report contagious diseases, complaint, prosecution .....	156
neglect to report, duty of local board .....	161

PHYSICIANS—CONTINUED—	PAGE.
attending, not required to put up danger signal .....	164
right to prescribe liquor to sick .....	171
return of birth, last physician in attendance .....	190
neglect to return deaths to town recorder, duty of recorder .....	190
several, death, who to make return .....	192
 POISON—	
from ice cream .....	85
cheese .....	87
the nursing-bottle .....	88
lump-jaw meat .....	91
head-cheese .....	91
mad dog .....	93
 PUBLIC SUMMER RESORTS—	
dangers from .....	103
Small-pox at .....	105
 PUERPERAL FEVER—	
its prevention .....	58
is an infectious disease .....	171
 QUARANTINE—	
of Diphtheria .....	5, 90, 178
membranous croup .....	8, 172, 177
mild cases of Scarlet Fever .....	25
scarlet fever .....	5, 28, 29, 178
heads of families .....	30, 75, 173, 174
duties of health officers in .....	132, 170
local boards must meet to establish .....	144
have power to establish .....	137, 138, 140
in Small-pox, expenses, how paid .....	135
regulations of State Board, control local boards .....	152, 163, 170
by committee of local board invalid .....	143
suspicious cases, when .....	155, 180
obstruction of, by physicians, remedy .....	156
local boards must establish when in session .....	167
when diseases not reported .....	150
violation of, regulations of, penalty .....	174, 175, 176
of exposed person, unnecessary, when .....	174
families, subsistence must be furnished when .....	136, 176
school-teacher, exception to rule .....	176
measels, period .....	
definition of .....	178
period of mumps, whooping-cough, measles .....	178
of contagious diseases .....	187, 178
exception to the rule .....	178
chicken-pox not included in regulations for .....	180
object of forty days quarantine .....	184

RAILROADS—	PAGE.
accidents on .....	115
 RABIES—	
case of .....	93
what it is, and prevention .....	94
local boards may protect against .....	167
 REPORT—	
general of Secretary .....	1
of Dr. Shrader, Diphtheria at Rochester .....	9
Oxford Junction .....	11
committee, reply to governor .....	15
on Deaf and Dumb Institute .....	20
physiology in public schools .....	129
health officer must, when .....	xi, 132, 166
clerk of local board must .....	xii
 RESOLUTION—	
regarding scarlatina and scarlet rash .....	6
national bureau of health .....	6
membranous croup .....	8
investigation of epidemics by State Board .....	18
 RULES OF STATE BOARD—	
"scarlatina" .....	6
for quarantining membranous croup .....	8
visitation of members in epidemic diseases .....	8
contagious diseases in public schools .....	22
for obtaining pure milk .....	84
transportation of corpses .....	101
preventing consumption .....	126
compulsory vaccination, must be enforced .....	148
quarantine, must be obeyed .....	151, 163
local boards cannot annul .....	153
 RULES OF LOCAL BOARD—	
violations of, penalty by ordinance .....	145
 SAFETY BURNING FLUID—	
sale and use of, prohibited .....	114
 SALICYLIC ACID—	
condemned, for preserving fruit .....	99
 SCARLET FEVER—	
no distinction in form of .....	6, 175, 179
prolonged by neglect of local boards .....	18
early symptoms of .....	23
danger from mild cases—quarantine .....	25
none without desquamation .....	26
must be quarantined forty days .....	28, 178, 183
in the horse .....	79



SCARLET FEVER—CONTINUED—		PAGE.
caused by low water.....		81
impure milk.....		83
danger signal, who to put up.....	132, 154, 164	
when diagnosis doubtful.....	28, 132, 156, 164	
from grave-yard exhalation.....		107
second time, infection from.....		155
when in public schools, what to do.....		162
incubation, period of after exposure.....		177
and scarlatina distinguished.....		179
without eruption, desquamation.....		180, 181
SHRADER, J. C., M. D.—		
report on diphtheria epidemic.....	9, 11, 13	
on ventilation.....		201
SCHOOLS—		
contagious diseases in, what to do.....		22
text-books on physiology in.....		129
water-supply of, generally bad.....		81
how should be located.....		82
compulsory vaccination in.....	147, 155, 156	
contagious disease, expulsion of pupil.....		163
exclusion of pupils.....		157
measles in, closure of schools.....		162
whooping-cough, closure of schools.....		175
quarantine of teachers, when.....	176, 177, 183	
SMALL-POX—		
outbreaks of.....		18
at summer resorts.....		105
notice of, to be given, when.....		132
danger signal, who to put up.....	132, 154	
when diagnosis doubtful.....	28, 132, 156	
compensation of nurses in.....		140
physician.....	137, 141	
providing pest-house for, how paid.....		139
incubation, period of after exposure.....		177
quarantine period.....		178
STALKER, PROF. M.—		
on scarlet fever in the horse.....		75
STATE BOARD—		
meetings of.....	X, 4	
action of, regarding contagious diseases.....		5
to visit epidemic diseases, when.....	8, 18	
decisions of, generally.....		157
duties and powers of local boards.....		154
of clerks of local boards.....		167
health officers.....		168

STATE BOARD—CONTINUED—		PAGE.
decisions of, relating to quarantine.....		173
burial permits.....		186
nuisances.....		187
transportation of corpses.....		189
physicians return of births and deaths.....		190
street pavements, from sanitary standpoint.....		253
SUPREME COURT—		
decisions of, physicians return of births and deaths.....		134
expenses of, small-pox cases.....		135
physician in small-pox cases.....		141
TRANSPORTATION OF CORPSES—		
amendment to rule 6.....		6
disinterred bodies.....		189
rights of railways.....		190
TUBERCULOSIS—		
how propagated.....		121
prevention of.....		125
conveyed through meat and milk.....		127
TYPHOID FEVER—		
should be promptly reported.....		15
outbreaks of.....		19
caused by polluted well.....		18
at Alden.....		19
De Soto.....		20
Deaf and Dumb Institute.....		20
early symptoms of.....		24
its preventable causes.....		33
microbes.....		33
typhoid germs.....		38
genesis of typhoid.....		41
vitality of germs.....		42
relation of germs with man.....		45
epidemic of, traced to dairy.....		83
TYROTICXON—		
cases of poisoning from.....	85, 91	
how discovered.....		86
in cheese.....		87
how to detect it.....		88
the probable cause of cholera-infantum.....		90
in butcher's head-cheese.....		94
VACANCY—		
where health officer declines to serve.....		172
VACCINATION—		
in public schools.....	148, 155, 156	
applies to all.....		160

VENTILATION—	PAGE.
importance of.....	201
WATER—	
pollution of Iowa river .....	8
analysis of well at Oxford Junction .....	14
De Sota.....	20
potable, what is.....	77, 215
standard of potable.....	79
for school-house supply.....	81
supply at summer resorts.....	105
of school-houses generally bad.....	81
how should be located.....	82
poisoning of from grave-yards .....	107
rules for obtaining analysis of .....	160
in well, wood curbing, pollution.....	166
potable, pure.....	215
inorganic impurities.....	217
vegetable impurities .....	221
animal impurities.....	223
bacteria in.....	226
supplies.....	230
natural purification.....	235
artificial purification.....	240
WHOOPIING COUGH—	
quarantine, public schools.....	175, 178
incubation period after exposure.....	177

## FIFTH BIENNIAL REPORT

OF THE

## Commissioners of Pharmacy

FOR THE

STATE OF IOWA,

---

 1890.
 

---

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

 DES MOINES:  
 G. H. RAGSDALE, STATE PRINTER.  
 1890.