



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### **Usage guidelines**

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### **About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

*copy*

2  
45  
0414  
1A19  
LANE MEDICAL LIBRARY STANFORD

PROCEEDINGS

OF THE

STATE SANITARY CONVENTION,

Held Under the Auspices of the

STATE BOARD OF HEALTH

OF CALIFORNIA.

AT SAN FRANCISCO, APRIL 17th, 1893.

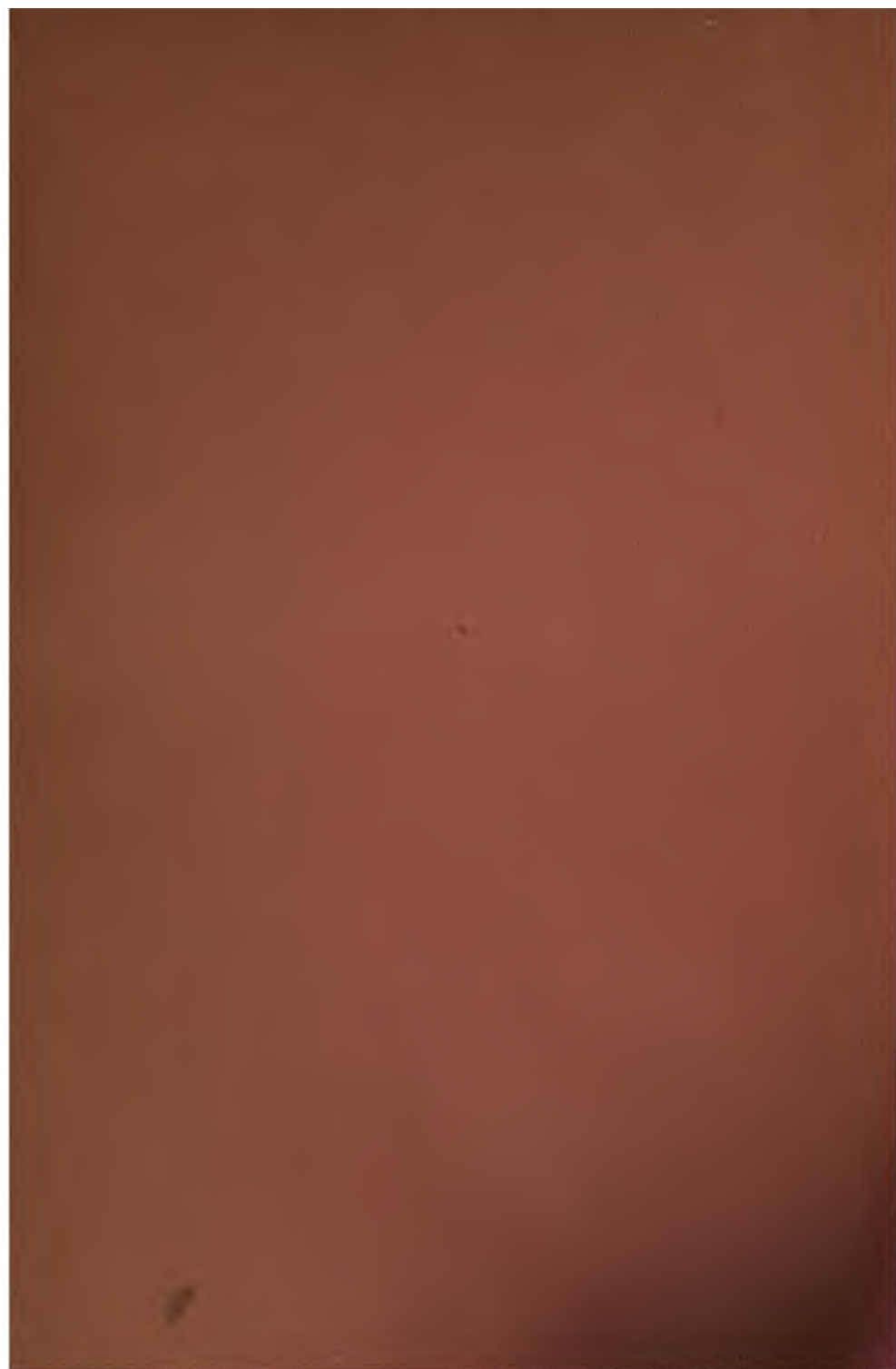


SACRAMENTO:

H. S. CROCKER COMPANY, PRINTERS AND STATIONERS.

1893.

I 27  
H 3  
20.1  
C. 2  
1893



PROCEEDINGS  
OF THE  
STATE SANITARY CONVENTION,

Held Under the Auspices of the

STATE BOARD OF HEALTH

OF CALIFORNIA.

---

AT SAN FRANCISCO, APRIL 17th, 1893.



OFFICE CALIFORNIA STATE BOARD OF HEALTH, )  
SACRAMENTO, April 30, 1893. )

*To his Excellency H. H. MARKHAM, Governor of California:*

SIR: I have the honor to present herewith the Proceedings of the first Sanitary Convention held in California.

Very respectfully,

J. R. LAINE, M.D.,  
Secretary State Board of Health.

**Members of the California State Board of Health.**

---

*President.*

C. A. RUGGLES, M.D., - - - - - Stockton

*Secretary.*

J. R. LAINE, M.D., - - - - - Sacramento

W. F. WIARD, M.D., - - - - - Sacramento

P. C. REMONDINO, M.D., - - - - - San Diego

C. W. NUTTING, M.D., - - - - - Etna Mills

WINSLOW ANDERSON, M.D., - - - - - San Francisco

J. H. DAVISSON, M.D., - - - - - Los Angeles

### *Members of the Sanitary Convention.*

|                                   |               |                               |               |
|-----------------------------------|---------------|-------------------------------|---------------|
| C. A. Ruggles, M.D. ....          | Stockton      | W. J. G. Dawson, M.D. ....    | St. Helena    |
| J. H. Davisson, M.D. ....         | Los Angeles   | Basil Norris, M.D. ....       | San Francisco |
| J. R. Laine, M.D. ....            | Sacramento    | W. D. Anderson, M.D. ....     | Vallejo       |
| Winslow Anderson, M.D. ....       |               | W. M. Lawlor, M.D. ....       | San Francisco |
| .....                             | San Francisco | L. M. Powers, M.D. ....       | Los Angeles   |
| C. W. Nutting, M.D. ....          | Etna Mills    | W. T. Cottier. ....           | San Francisco |
| J. T. Harris, M.D. ....           | Gridley       | J. H. Carothers, M.D. ....    | Martinez      |
| T. L. Magee, M.D. ....            | San Diego     | C. Schmitz. ....              | San Francisco |
| W. W. Hitchcock, M.D. ....        | Los Angeles   | S. S. Herrick, M.D. ....      | San Francisco |
| F. H. Nief, D.V.S. ....           | San Francisco | H. S. Goldberg. ....          | New York      |
| G. D. Fitzgerald, M.R.C.V.S. .... |               | W. R. Cluness, M.D. ....      | San Francisco |
| .....                             | San Francisco | Lillie Bussenius, M.D. ....   | San Francisco |
| H. R. Jackson, V.S. ....          | Oakland       | L. A. Elster, M.D. ....       | Grass Valley  |
| W. F. Wiard, M.D. ....            | Sacramento    | E. B. Robertson, M.D. ....    | Jackson       |
| H. B. Marshall, V.S. ....         | Los Angeles   | H. W. Smith, M.D. ....        | Placerville   |
| E. E. Tucker, C.E. ....           | Stockton      | E. A. Follansbee, M.D. ....   | Los Angeles   |
| R. A. Rose. ....                  | San Francisco | G. J. Phelan, M.D. ....       | San Francisco |
| J. R. Curnow, M.D. ....           | San Jose      | P. H. Thornton, M.D. ....     | Lakeport      |
| G. C. McDonald, M.D. ....         | Sausalito     | C. S. Aiken. ....             | San Francisco |
| J. T. McLean, M.D. ....           | Alameda       | W. S. George, M.D. ....       | Antioch       |
| J. T. Gardner, M.D. ....          | Petaluma      | E. H. Woolsey, M.D. ....      | Oakland       |
| H. Bert Ellis, M.D. ....          | Los Angeles   | John Sheppman. ....           | Philadelphia  |
| M. Regensberger, M.D. ....        | San Francisco | T. E. Nunan. ....             | San Francisco |
| Mrs. C. A. Ruggles, M.D. ....     | Stockton      | J. W. Thayer, M.D. ....       | Gilroy        |
| Mrs. J. C. Younglove. ....        | San Francisco | W. H. Parsons, M.D. ....      | Omaha         |
| P. G. Cotter, M.D. ....           | Yuma          | Charlotte B. Brown, M.D. .... | San Francisco |
| H. S. Orme, M.D. ....             | Los Angeles   | Mrs. Helen Moore. ....        | San Francisco |
| C. O. Brown, D.D. ....            | San Francisco | W. F. McNutt, M.D. ....       | San Francisco |
| R. S. Markell, M.D. ....          | Cloverdale    | George Cook. ....             | Oakland       |
| W. H. Mays, M.D. ....             | San Francisco | C. B. Harton. ....            | San Francisco |
| F. H. Payne, M.D. ....            | Berkeley      | — Burke. ....                 | San Francisco |
| G. J. Bucknall, M.D. ....         | San Francisco | Walter Lindley, M.D. ....     | Whittier      |
| Parshall A. Terry, M.D. ....      | San Francisco |                               |               |

At the evening session a large number appeared whose names were not placed on the register.

## CALIFORNIA SANITARY CONVENTION.

B'NAI B'RITH HALL, 121 EDDY STREET,

SAN FRANCISCO, April 17th, 1893.

The meeting was called to order at 1:30 P. M. by Dr. Winslow Anderson, of San Francisco. The proceedings were opened with prayer by Rev. Dr. C. O. Brown of the First Congregational Church of San Francisco. After the invocation, Dr. Winslow Anderson said:

On behalf of the medical profession and the people of San Francisco, I extend to you a hearty welcome. The substantial unanimity with which prophylaxis has maintained its supremacy as the main agency in diminishing the ravages of infectious disease has never been more fully appreciated by the medical profession and sanitarians throughout the State than at the present moment, and I am confident that the deliberations of this Convention will prove of inestimable value to the people of the State of California.

It is with pleasure, ladies and gentlemen, that I place in nomination for temporary Chairman, one of our great sanitarians, the President of the State Board of Health, Dr. C. A. Ruggles, of Stockton.

The election of Dr. Ruggles was declared with unanimity.

Upon taking the chair, Dr. Ruggles said:

Mr. Chairman and Gentlemen: I sincerely thank you for the honor of being selected as temporary Chairman of this, the first Sanitary Convention ever held in the State of California. It is my duty as presiding officer of this meeting, connected with the State Board of Health, to tell you why we have called you together. It is a universal opinion of medical men, especially those particularly interested in sanitary measures, that we are threatened with an invasion of Asiatic cholera. At a conference in Mexico in December last of delegates from State Boards of Health and quarantine stations from Quebec to Vera Cruz, it was unanimously decided that every effort should be put forth in stopping another call from this unwelcome visitor, and for that one particular reason have you been called together in this Convention, to unite on some plan of action to repel this threatened attack.

Another reason why you are invited here, is that all sanitary bodies of this State may act as one harmonious whole; that we may know each other better; that the State Board may act in perfect unison with all local Boards and form a closer relation with the people so that each shall feel a mutual dependence on the other for the success of good sanitary work. In my judgment this great nation is, as it were, over a slumbering volcano which is likely to burst forth no one knows how soon, and our object in thus assembling together is to interchange thought and opinion, and agree upon some plan of defense.



Our Government is almost daily receiving cablegrams to justify the opinion that our enemy only sleepeth. Continually are we receiving messages warning us of the approaching danger. If to be forewarned is to be forearmed, then is our duty very plain.

Now then, gentlemen, in the name of the State Board of Health, I bid you all welcome. The next thing that will be proper to offer before this Convention is the nomination of a permanent presiding officer. Nominations are now in order.

Dr. Martin Regensberger, of San Francisco: I take great pleasure in nominating a gentleman who has been connected with the various medical institutions of the State for the last twenty years, one of the nestors of medicine in the State of California. I nominate Dr. Henry S. Orme, of Los Angeles, as President of this Convention.

Dr. Hitchcock, of Los Angeles: I take pleasure in seconding the nomination of Dr. Orme, of Los Angeles. His reputation as a sanitarian is not only State but National, and any further commendation of Dr. Orme is unnecessary on my part.

On motion of Dr. Magee, of San Diego, nominations were declared closed, and Dr. Orme was elected unanimously as permanent Chairman of the Convention.

Dr. J. R. Laine, of Sacramento: For First Vice-President I would like to nominate a member of the local Board of Health of San Francisco, a man who not only stands high in the profession, but a man honored and respected as a sanitarian all over the Pacific Coast. I nominate Dr. William H. Mays, of San Francisco, as First Vice-President.

Dr. Mays was unanimously elected.

Dr. Winslow Anderson: I take great pleasure in placing in nomination for Second Vice-President of this Convention a gentleman who is well known as a sanitarian in the city of San Francisco, who is known to be one of the most aggressive members of our Board of Health, especially when sanitation is the subject; it is none other than our friend, Dr. M. Regensberger of San Francisco.

The election of Dr. Regensberger was made unanimously.

Dr. Magee, of San Diego, then placed in nomination for Secretary of the Convention, Dr. Winslow Anderson, of San Francisco, who was elected unanimously.

The Chairman: Ladies and gentlemen, and members of the Convention, I was asked to be present and my friend, Dr. Ruggles, requested me to make a few introductory remarks, and I have complied with his request, and prepared two or three little observations which I will take pleasure in asking the Convention to listen to.

---

#### Introductory Address by Dr. H. S. Orme.

It is with a feeling of responsibility as well as pleasure that I accept the honor of presiding over this Convention, but time has not permitted me to prepare a suitable introductory address. No work lies nearer my heart than that which has called us together and which will engage the energies and undivided attention of this the first Sanitary Convention held in California, viz: The promulgation of the great truths of sanitation, the practical application of which will ward off disease from our homes.

Be it remembered that California was among the first of the States to establish a State Board of Health, and enact sanitary laws.

Notwithstanding much has been done, much yet remains to be done to make our system perfect. Although the law of 1889 requires either a Board of Health or Health Officer to be chosen for all cities and towns, yet to this day a large number are believed to have neglected to comply. An efficient Health Officer and a local Board of Health ought to act under and in harmony with the State Board, as a central organization.

The Legislature in compliance to the demands of the people has enacted a few good sanitary laws. However, the machinery for enforcing those laws is very inadequate. Our health officers are too often appointed regardless of their qualifications or natural fitness. They receive very little or no pay for their services, and often their only reward is the ingratitude of the public.

The physician of culture and ability is so occupied in curing diseases, that he has no time to devote to preventive medicine. The remedy for all this is to pay sufficient salaries to procure competent men to devote their time and ability to preventive medicine. Thus the health of the people will be benefited a hundred fold, and thousands of dollars will be saved annually.

It was after many years of persistent, hard work, by the State Board of Health, assisted by San Francisco authorities, that we obtained a Government Quarantine Station on Angel Island, at San Diego and Port Townsend.

A word about Health Officers: On this point I cannot improve on the following from a late number of the "Journal of the American Medical Association:"

"There has probably been no time in the history of this country when trained, competent and efficient health officers were needed so much as they are now. The average health officer is appointed without any special training or qualification for the place; his tenure of office is so slight that very few feel warranted in qualifying themselves for such duties, and in no other direction is there any special incentive to full preparation for the discharge of the responsibilities that devolve upon the holder of such office. Much has recently been said with regard to the manner in which cholera was managed in England during the last autumn, but nothing was said in regard to the special knowledge required of medical officers of health in that country, before they receive such appointments. No one is eligible to such appointment in Great Britain without special training and his qualifications having been established by examination; his position is then assured and he is not subject to removal with change of administration. It ought to be axiomatic that no health officer, no health commissioner, no executive officer of a Board of Health should anywhere be appointed, until after thorough examination, or training in a subordinate capacity, and until he had evinced special aptitude for and interest in that line of work. A great misfortune in this country is that whenever a change of administration is brought about, it is considered necessary to change officers of health and to appoint a new man without any reference to his special capability. Instances frequently occur, involving great responsibility, where the appointee is wholly incompetent, and is dependent upon the subordinates in his office for information and advice; in short, is compelled to learn the duties incumbent upon him at the expense of the life and treasure of the public. Until a change is made in the mode of selection of these officers, and the tenure by which they hold their appointments is more stable, we cannot expect in this country efficient sanitary administration.

"In all civilized countries, except the United States, there are some special qualifications required for this office, and just in proportion as they are exacted, in the same proportion is the community protected from preventable diseases; from unnecessary panics with the suffering incident thereto, and from the economic loss caused thereby. Unfortunately it is generally supposed that all medical men are sanitarians; this is not the case, as their education, training and work have not generally been in that direction. It is unfortunate that in the absence of epidemics or pestilence, too little attention is paid to the protection of the public health, and, as a necessary consequence, to the selection of those whose duties require them to guard the public health. Laws should be passed in all the States defining the qualifications necessary for eligibility for appointment of health officers. This is in the direction of a civil service reform much needed."

Now I must observe that we cannot immediately change our system and conform to the better example set in Europe, but something should be done to command public confidence.

In my judgment, the proper course is to engage the services of the most experi-

enced and competent sanitarians available, and let it be demonstrated that, for once at least, sanitary qualifications solely are required. It seems to me that the gravity of the subject and this occasion warrant such frankness in expressing what I know is the conviction of many serious and intelligent men, both in and out of the medical profession. I do not deem it useful to enlarge upon this topic myself, and shall now leave it for the consideration of others.

When the masses realize the great truth that the gospel of wealth and the gospel of health are one and inseparable, then, and not until then, will California have a perfect system of sanitary laws.

For the present I am satisfied that sanitary work of a permanent character, affecting such improvements as paving, sewerage and water supply, cannot be secured for our larger cities without divorcing them from politics. In my judgment their administration, for each city, should be entrusted to a Board of Public Works in which all political parties shall be represented, the members to hold office not less than six years, and not more than one-third to retire every second year. Disease is the costliest of all conditions for a town, while the expenditure on sanitation is the wisest economy. Precautionary and preventive means to control disease will be of little avail, if they are only resorted to when an epidemic actually appears. If the local health authorities are not prepared beforehand they will have to encounter panic, confusion and the impossibility of effecting an isolation of all contagious and infectious diseases.

The only hope of safety lies in their being fully prepared and able to so act, that when the first case of epidemic disease occurs, to isolate it, so that it may not be disseminated throughout the population. Hygiene includes many studies and portions of many sciences, but the subject of subjects toward which all that it includes converges is the health of the individual and the family.

Hygiene, it is said, aims at rendering growth more perfect, decay less rapid, life more vigorous and death more remote. What goes to make the healthy home, is not for medical officers and experts only, but for all.

In a very few days the World's great Fair will open in Chicago. It has been truly said that "there are certain great local points in history toward which the lines of past progress have converged, and from which have radiated the molding influences of the future."

This great drama of the ages that is soon to be played in Chicago occupies a pivotal point in human history. From Adam to the present time, the great development of mankind will be exhibited here in one grand panorama. As this is but the culmination of the energies of past ages, it will put influences in motion that will effect the destiny of all posterity.

There is no department of human thought that will receive greater impetus from the Fair than that of Sanitary Science.

Here I should allude to the first Pan-American Medical Congress which will be held at Washington in September next. The announcement of the Section on "Hygiene, Climatology and Demography" has just been issued, and it appears that the most prominent Sanitarians of the world are expected to be present. We have reason to hope for important results from their work.

Europe will learn much from America and America will learn much from Europe. Asia and Africa will be given practical lessons in hygiene. Australia and the Isles of the Sea will drink deep from this universal fountain of knowledge.

This great Fair brings with it also a peril. The dreaded cholera may thus be transported to our shores. Europe is recognizing the danger from the past epidemic, and is cleaning up. Let America do likewise.

Possibly the mingling of the nations may hasten that glad day, predicted by many, when the practical application of preventive medicine from pole to pole will blot out every scourge, pestilence and epidemic that has afflicted humanity in the past.

Dr. Ruggles, of Stockton: One little item has escaped our attention until this moment, and that is the necessity of the appointment of a Committee on Publication, to whom shall be referred all these papers that will be read to-day. I make a motion that a committee of three be appointed and constituted a Committee on Publication.

The motion was seconded by Dr. Anderson and carried unanimously, and the Chair announced as such committee: Dr. Winslow Anderson,

of San Francisco, Dr. J. R. Laine, of Sacramento, and Dr. Magee, of San Diego.

On motion of Dr. Anderson, the President's paper was ordered referred to the Committee on Publication.

Dr. Martin Regensberger, of San Francisco: I move that a Committee on Constitution and By-Laws be also appointed.

The motion was duly seconded.

Dr. Bert Ellis, of San Francisco: Is it contemplated that there shall be a permanent organization and meetings annually, semi-annually or quarterly, or is this simply a temporary affair?

Dr. Ruggles: I hardly acquiesce in the wisdom of the appointment of such a committee, and verily believe that this is the beginning only, and not the end of conventions and meetings of this kind. Other States are having these conventions; they have them semi-annually, some of them, and it is with a great deal of shame that I, for years and years, have read the proceedings of those conventions and reflected that California has nothing of the kind. I hope it will be understood after this Convention that we meet annually at least.

A delegate inquired who was eligible to this Convention; who had a vote here.

Dr. Martin Regensberger: I should think that would be a question to debate upon. I made that motion simply for that purpose. I thought it would be well to have a Committee on Rules and Regulations, and Constitution and By-Laws in order to bring the matter before the Convention, and let the Convention debate upon who shall be eligible to a seat in this body.

Dr. Ellis: As soon as that motion is put and carried, then there will be another motion in order as to when that committee shall report.

Dr. J. H. McLean, of Alameda: It seems to me that we have neglected one important matter. We don't know who are present at this Convention; no method has been established to ascertain who are here and where they are from, so that the President is, in a measure, at a loss to know whom to appoint, perhaps, on committees that may be raised, and I would suggest that when we get through with this part of the business that the Secretary, right from his place there, call upon gentlemen who are present to make it known who they are and where they are from, and what their positions are, etc., so that we may know who are present.

Dr. Ruggles: Allow me to suggest that in the ante-room there is a book for signatures for every person who comes into the room, to show where he is from, what his position is, and all in connection therewith. And as far as eligibility is concerned, my idea is that anybody who loves sanitary science is eligible and should be welcome to a seat in this Convention.

Dr. Magee: I simply call attention to the fact that the usual way of organizing such bodies as this is to vote the usual officers and a Committee on Constitution and By-Laws. In this case we have already elected our permanent President and Secretary without the assistance of a constitution and by-laws. I suggest, therefore, that if we have a committee of this kind that it report towards the close of the session, if it is contemplated to have a permanent organization. I should be

sorry to have any disarrangement of the present organization for to-day by the reporting of a constitution and by-laws which would necessitate another election.

The Chairman: I think the members of this Convention understand the situation, that this is an effort to get together and organize, and it is very necessary that a record should be had and kept of the gentlemen present who desire to affiliate or become members of this organization at this meeting or hereafter, and I hope they will please see that their names go on the record on the book in the ante-room.

The motion of Dr. Regensberger was adopted without dissent, and the Chair announced as the committee, Dr. Ruggles, Dr. Lawler and Dr. Dawson.

On motion of Dr. Crumpton, the committee was also authorized and requested to act as a committee on credentials to report who were members of the Convention. The committee reported the names of the members, and on motion of Dr. Regensberger, the roll of membership was placed on the Secretary's desk and kept there for further signatures.

Dr. Martin Regensberger: While we are under the head of "New Business," I should like to ask how shall the expenses of this Convention be defrayed. That is a very important question.

Dr. Ruggles: I will answer that question in one moment. The State Board of Health will pay every dollar of the expenses. [Applause.]

The Chair: If there is no other business to come before the Convention, the next thing will be the reading of papers. As we have only a little time in which to hold this Convention, and I know that the papers will be short and interesting, we will proceed at once, and any business that may come up we will hold until the close of the afternoon session, or the opening of the evening session. The next paper in order will be one by Dr. J. R. Laine:

---

#### The Relative Merits of Land Quarantine and Cleanliness.

The authority vested in the State Board of Health by the codes and statutes relates to the collection of vital statistics and the manner of preventing the introduction of contagious diseases by rail. It is given a wide discretionary power in this direction, but it would be very difficult to present instances of successful efforts to prevent cholera from crossing State lines. To say that it can be done, and to argue the possibility of its accomplishment would be no more profitable than to say that it can not be done and to argue its impracticability. There are points where unsparing pains should be taken to prevent the entrance of the disease. Such efforts, even if everywhere directed with watchful and intelligent energy, must of necessity be defective. This is especially apparent where an absolute prevention is aimed at, for with but few exceptions, on our State lines, nothing but a relative quarantine is practicable. An absolute quarantine is next to an impossibility.

To argue the practicability of an absolute land quarantine it is necessary to indicate beyond doubt how we may control all character of animal life, either beneath the surface of the earth, on its surface, or in the air, and prevent them from crossing the line. It is also necessary to show our ability to prevent every atom of matter capable of carrying the germs of disease from being blown by the wind across the line. But little need be said to show the impracticability of an absolute land quarantine on our extended State lines. Many view such efforts with illy concealed contempt, yet they acknowledge the utility and efficiency of some attempt to limit the spread of contagious diseases by some kind of super-

vision and restraint which is termed relative quarantine, and which aims to do all that it is possible to do without building a wall around the State that nothing can pass. The national quarantine laws may cut no small figure on our State borders, and may aid in a large degree in hindering the onward march of the destroyer, but it would be well not to place too much reliance on our ability to check it at the State line.

If the people become convinced that it is not only possible, but easy of accomplishment, they will argue against the necessity of personal and municipal cleanliness. There is a respectable contingent that base their views on history and ridicule quarantine.

They argue that such efforts have never successfully accomplished valuable results, and that they never can. No harm can come from uncovering the failures of the past. They can in no manner dishearten those who have the resolution to make the attempt, but they may show why our fathers were unsuccessful, and our own want of success may enlighten future generations who may perhaps develop a "Jenner" to rob the stalking specter of his power to slay. History is always quoted in opposition to progress. No advance in medicine or science but has had to run the gauntlet of history quoted against it. "What has never been can never be," appears a safe dictum, but the discoveries of the nineteenth century have often given it the lie.

When we now fail to overcome obstacles we attribute our failure to our lack of observation and knowledge. This may well apply to everything not dependent on nature's immutable laws. We should not discourage an attempt at quarantine by land; but our knowledge of what it has done, or failed to do in the past, will not justify dependence upon it alone. Whatever remains to be done we must, as intelligent beings, do ourselves. We must practice and preach cleanliness.

The doctrine is rapidly gaining ground that prevalent diarrhoeas in cholera epidemics contain cholera germs, and that the dejecta of persons with choleraic diarrhoea are capable of transmitting a virulent cholera in another under the usual conditions necessary for their development.

If this be true, we cannot effectually quarantine cholera unless we also quarantine diarrhoea. We are compelled to regard the diarrhoeal affections prevailing at such times as mild forms of cholera and identical with it. If this view is well founded we must, on land at least, trust altogether to sanitation to bring about an abatement of the scourge. The soil must be rendered sterile to the disease and patient investigation continued to seek a quicker means of rendering it harmless. We may quarantine those who are in the throes of death while the persons with diarrhoea are spreading the seeds of the disease broadcast. This view is not proven, but it bears by analogy with other contagious diseases an almost convincing probability. All practitioners of large experience can recall walking cases of typhoid fever in whom the dejecta were as infectious as in those who were in bed.

Our means of defense, outside of quarantine and personal hygiene, consists in the purification of the soil, the water and the air. The Boards of Health of towns and counties should be supported with great liberality, and health officers selected for their prudence and fearlessness. At this particular juncture a capable and dauntless health officer is the most desirable official in a community. No one of us but can point out plague spots near our homes that only need their decisive action of a fearless health officer to remove. No alarm need be felt no panic precipitated, but the medical profession as a unit should explain the necessity of energetic action of a material character to the influential people in their communities, and point out what should be done to insure safety to the people. These measures should be discussed and undertaken as business enterprises, for no greater calamity can befall the industrial and business interests of a country, state or community than the presence of a death-dealing epidemic. It becomes necessary to show that if certain things are done we may feel reasonably secure. As to the rules of life and conduct to be observed during the prevalence of an epidemic it is not the province of this paper to discuss. But it is well to show that pure water, pure air and pure soil are necessary to the development of a high order of physical life, and that during a cholera season they are almost the essential conditions of our existence.

On motion, the paper was referred to the Committee on Publication.

Dr. Davisson: It seems to me that it is not right for these valuable papers to pass to the Committee on Publication without a discussion,

as they are made short purposely with the purpose of having these sanitary points discussed, and I think it would be well to take them up in the order that they are read and discuss them. And, following that line of procedure, I will say, myself, that the paper just read is one that shows a great deal of care and thought in the preparation of it, and it affords me much pleasure to approve and adopt the sentiments expressed in that paper. I fully indorse it as being up to the times in every way, and characteristic of the author.

Dr. Ruggles: Any one who knows anything about—and we all pretend to know it—the incubation of smallpox, also believes in the incubation of Asiatic cholera; that a party may land in New York, and start across this continent and pass a dozen inspectors between Yuma and San Francisco, and break out to-morrow with Asiatic cholera. Now, if you are merely going to sit down and say that quarantine is absolutely necessary and will be effective to prevent this, you are going to be sadly disappointed. The only way is to take these as you would an eruptive disease, smallpox, and quarantine it rigidly. Take a patient with Asiatic cholera in the collapsed stage, perhaps, and quarantine the case well and good; but the idea of thinking that you can successfully quarantine against the incubative period of Asiatic cholera is absurd; you will be as much mistaken as if you undertook to quarantine against the incubative period of smallpox. Therefore, too much cannot be expected of this quarantine business. I am in favor of doing the best we can on our State line; I am in favor of an inspector examining every person who comes into the State, and we will leave it to Dr. Lawlor to take care of the Golden Gate. But every passenger who comes into the State of California should be inspected; if he shows anything of the disease, stop him; if he does not, thank God for that, and hope for the future that he may continue harmless.

Dr. Anderson, of Vallejo: I come from a little country town called Vallejo. I am President of the Board of Health there, and I have been thinking what is the best thing to do, like all the other professional gentlemen, for the prevention of cholera and other contagious diseases. If you look on any map of the United States you will see red lines running across the maps which you are told represent the different railroads that run throughout the United States. You will find them branching off everywhere throughout the United States. Of course it is well known that wherever railroads go it is very easy to distribute these contagious diseases. Now, what I want to get at is this, those red lines—red always denotes danger, but in this case instead of red it should be ochre, or something about that color, which would represent the lines of human excrement that are spread from San Francisco to New York, and all over the United States. What is at present called the American system of closets on cars makes the cars nothing more than death distributing places. It is no use for us to try to prevent or stop cholera from coming here if these dump-holes on the railroad cars continue. Take the bacillus of typhoid fever, smallpox, or any contagious disease that science has proven can be distributed broadcast, take one patient and let him come along on the cars and distribute his filth right along as he comes; some poor workingman comes along and stirs it up fixing up the ties, and what is the consequence? The health officers in these little villages may do their best,

the water may be the purest, the air may be perfectly pure. It may be not some "sweet Auburn, loveliest village of the plain," it may be in the heart of the Rocky Mountains, where the water is so pure that any one would be tempted to "give a goblet of it in His name." But what is the result? Some workingman, probably, or some tramp may come along there, traveling from house to house for his breakfast or for his dinner, and leave the bacilli to some charitable person who has given him breakfast. And what we must do is not to go rambling around in theories, but to strike right at the head—at the source.

Dr. Martin Regensberger: I agree perfectly in a great many points with the paper of Dr. Laine, but there is one question which I think we are almost powerless to solve. The task of quarantining the State and quarantining the United States is a very difficult one, and with all the quarantine measures that we are trying to bring forward, the probabilities are that, almost to a certainty, we will have the cholera in the United States. The main question is, if we have it here in California, how to prevent its spread. Dr. Laine suggested that an efficient health officer would tend toward the cutting off of this dreaded disease. Gentlemen, my experience in health matters is that the health officer is almost powerless. If there was a riot in San Francisco, the probabilities are that martial law would prevail and the military would predominate over everything. They would check it. When it comes to an epidemic like cholera, the medical fraternity is powerless, the laws are lax, and we simply throw up our arms and say we are unable to do anything. And I have it right here in San Francisco, from the Health Officer here. He hears reports from different parts of the city, and attempts to remedy things in certain parts. He sends his inspectors out, they give their orders, and it ends right there. What we want is to have State laws, strict State laws, that will support our medical institutions, our sanitary institutions. That is the fundamental requisite of prophylactic medicine. As long as we have no State laws, as long as we have nothing to fall back on, as long as your health officer simply gives orders and they are not carried out, and he cannot punish people for disobeying them, just so long epidemics will prevail in every city and county in this State; just so long the talking that is going on here, the suggestions of the medical fraternity for preventing disease are null and void. I say, gentlemen, that the way to go about it is to get legislation from each individual county in the State, to get them to pledge their candidates before they go to the Senate or to the Assembly that they will look out for the health interests of this State. We should even go further and establish laws that should be carried out in every part of the country. Then, gentlemen, we will have some effect; but otherwise we talk, we talk, we talk and we don't succeed in anything. We have only recently had, out in the Western Addition, a cesspool which was an annoyance to the inhabitants of the surrounding district. There was considerable typhoid fever. Our health officer sent his assistant there to remedy the matter, and he gave orders to do it, and that was all. It ended there. The inhabitants are still suffering in the same way. We are not supported by the police authorities as we should be. But there should be a law that would make the health officer supreme over everybody. Then he could use his authority and go direct to the place and say to the people there, "If you don't do



this or this, I will arrest you," but he can't arrest anybody now. I submit a majority of you gentlemen have the same experience. You lose your interest, and you don't feel like doing any work when you are trying your best and you don't succeed.

Dr. E. B. Robertson, of Jackson, Amador County: Last September I received a communication from the Secretary of the Board of Examiners requesting me to furnish him with the name of the Board of Health and the health officer of Amador County. The laws pertaining to boards of health and health officers, outside of incorporated cities, are totally deficient. Prior to that time, in accordance with the codes, I had written a communication to our County Board of Supervisors requesting them to appoint a health officer in accordance with the code, which authorizes it for every town of five hundred or more inhabitants in the county. They proceeded to make the appointment when I referred them to the code to show their authority. But when I came to investigate the law further, I found in the County Government Bill, Section 22, of the Legislature preceding the last Legislature, that they could appoint health officers who should serve two years without compensation, and they had no authority to organize a County Board of Health; nor have they anywhere in the State of California, outside of incorporated cities, under the law of California to-day. They made the appointments, but the appointments subsequently were annulled. Unless the appointed health officer for each town of five hundred or more inhabitants has power to execute his orders, why you might as well not make the appointment; and I, for one, refused to accept the appointment, because there was no compensation for one thing, which is an item in itself; and another thing, there was no power under the law as it then existed, under the County Government Bill, to enforce any law whatever pertaining to the cleaning up of a town, its privies, sewers, etc. At the convening of the last Legislature I drew a bill amending Section 22 of the Act entitled "An Act to afford a uniform system of County Government." The amendment was intended to authorize the Board of Supervisors, in the presence of an epidemic, to appoint a health officer for five hundred or more inhabitants, and they should organize themselves into a County Board of Health, with a president and secretary, etc., whose duty it was, or should be made, to clean up the town. The object, in my opinion, was, as I addressed it to the legislators, as well as to the Board of Supervisors, that the cholera germ feeds upon filth; filth is the perfect generator of the cholera germ, and among the first things to do to avoid cholera is to put our house in order, clean up our privies and sewers, remove garbage piles, and anything and everything that would be a source of the production of cholera germs. That bill was introduced by Hon. J. L. Sargent, representative from Amador County, and passed the Assembly without amendment. He wrote me that it had passed without amendment, and was acceptable, and he thought it would become a law. Our representative in the Senate, Mr. Voorheis, said he would take charge of it in the Senate and undertake to secure its passage there. Whether that bill became a law or not I am not able to tell you, but I noticed in the proceedings of the Legislature that there was a new county government bill. Now, it appears that every man who goes to the Legislature wants to get his name up as a legis-

lator, and he is the very fellow to put things through. He knows all about it, health and all, and whether they have butchered my bill or not I do not know. The Act still stands as far as incorporated towns and cities are concerned, and they, under the law, can have boards of health.

Now I will drop that part of it and come to something that is more pertinent. Unless you can stop the hawks from flying across the State lines, and coyotes from running across them, it is perfectly futile to talk about a land quarantine. You may effect a useful purpose in sea quarantine or port quarantine. You may find it easy to quarantine cholera in the port of New York or San Francisco, but it is a totally impractical proposition to quarantine it on land, and thus prevent the ingress of cholera to this State, provided it reaches the line. It can come directly up to the line, but what is to prevent another person from bringing it on the opposite side of the line, when that line is so narrow? We know what a line is, it is a very narrow space; it don't occupy much ground, and unless you can stop everything from crossing that line it is futile and impracticable to discuss the question of land quarantine. The methods of fighting the cholera consist, for the most part, of prophylaxis. The thing, then, for this Convention to discuss, is not the quarantining of cholera, but the best method by which we can combat the scourge upon its advent.

On motion of Dr. Laine, it was decided to limit all speeches to five minutes in discussing the papers.

The reading of the next paper on the programme, that on "Etiology, Distribution and Prevention of Land and Ship Cholera," by Dr. George M. Kober of Fort Bidwell, Cal., was, on account of the absence of its author, on motion of Dr. Regensberger, deferred until the evening session, and in its place, on the suggestion of Dr. Winslow Anderson. Dr. William R. Cluness, of Sacramento, read a paper which he had prepared on the subject:

---

#### Will the Cholera Reach America this Season?

There is probably no question more frequently asked of physicians at present than this, and, like all others relating to futurity, the reply must be indefinite. If, on the other hand, an opinion were solicited as to the likelihood of its reaching us before the return of cold and frosty weather next autumn and winter, there are few who would not affirm its probability.

To arrive at an intelligent conclusion upon this subject we should take a retrospective view of the history of cholera for more than two centuries past; but, as our time will not permit such review, let us take a brief and cursory glance at the history of the present epidemic, as it is believed it will furnish sufficient evidence for the conclusions to be arrived at. Let me remind you then that its eternal home is on the Sacred Ganges, in far off India, that it is ever present in one or another portion of that vast and populous empire, and that because of the increased rapidity and facility of intercommunication between the inhabitants of that country and continental Europe the danger of its reaching America before the subsidence of the present epidemic is proportionately increased. For, as you all know, it invariably follows the channels of human travel and of commerce, neither traveling faster nor slower than the transportation of human beings or their portable effects; that neither do the winds, however adverse they may be to the direction pursued by people, nor the mountains, however high and rugged, ever form barriers to its progress, provided affected persons are transported to inhabited localities, and provided susceptible persons swallow the germs.

But let me revert for a moment, as originally proposed, to the history and progress of the present epidemic, and let me remind you that about two years since, cholera, in its own native reservation, like a restless enemy eagerly watching for a favorable opportunity of pouncing upon his unguarded and unsuspecting enemy; or, if you choose, by a decree as irrevocable as the laws of the Medes and Persians, it began spreading westward to remind the inhabitants of more favored nations that the laws of God and nature were being violated by them, and that a just retribution would surely be visited upon those who would not be warned; that filth formed the food and breeding places of cholera, and as certainly as it was allowed to accumulate unnecessarily so surely would a just God avenge the neglect and violation of His laws.

From Hindostan it was but a step over a richly prepared soil, inhabited by a dense population of ignorant, superstitious and filthy people, to Afghanistan and Beloochistan. Lingered there for a brief period of time, as if to emphasize the warnings it had already given, it moved on to Persia, where like conditions favored its spread as in the other countries already mentioned. Finding nothing there to intercept its progress, and pursuing its invariable custom, it traveled hastily northward over the Caspian Sea and the Trans-Caspian Railway to Astrakhan at the mouth of the River Volga, in Russia. Thence, as you recollect, it radiated along the various lines of travel, both by land and by water, until it invaded in an unprecedentedly brief period nearly every province of that vast empire, reaching lastly its southern provinces or those along the Black Sea. Of its direful effects in that unfortunate country, especially in those provinces in which the gaunt specter of famine had laid its blighting hand, and of the hundreds of thousands who fell victims to its ravages I need not remind you, but I do desire to recall to your minds the fact that it still prevails there, and that the most gloomy prognostications are being almost daily heralded. But let us pass on. It then appeared in Hamburg and vicinity, in the northern part of Germany, but by what route the germs had been imported no one appears to have definite knowledge. Altona and other cities and towns in the vicinity soon became infected, and ere long Holland and Belgium on the North Sea, and shortly afterwards the maritime cities of France were attacked, and shortly Vienna, in Austria, although in these latter localities it would seem to have been kept well under control. In Buda Pesth, however, and in several other localities in Austria-Hungary it may be said to have become epidemic. A few cases—twenty-six, I believe, all told—were also reported to have occurred in England, Scotland and Wales, but it was likewise prevented from spreading in any part of the United Kingdom.

Then, as we all recollect, it was imported in the harbor of New York, and even into the city itself shortly afterwards, and it would in all probability have secured a firm foothold but for the untiring efforts of the officers placed in charge and the fortunate intervention of nature's barrier, frost.

Yet who can say that these germs are more than dormant, or that they are but waiting to be breathed into active life by the fructifying influences of the summer's sun. Thus for the second time in the history of cholera did it reach America on the same year it became epidemic in Continental Europe.

And as an additional leaf in the history of cholera, let me remind you that during no epidemic thereof in any country has it ever been known to take its final departure in less than four years, and sometimes not for twelve years. And, remember, history always repeats itself; what has occurred heretofore will surely occur again. There is no such thing as chance, for the doctrine of probabilities is just as certainly governed by fixed laws as are the stars and the planets in the heavens. Hence the answer to the interrogatory, will the cholera reach us during the coming season?

Man's destiny is, nevertheless, in his own hands, and he can invite disease or he can repel it at his option. In accordance with his observance of the laws of health so will be his immunity from disease. We have been grossly violating those laws, otherwise there would be no necessity for this assemblage of the conservators of the public health.

But there is no time for sentiment, for now that this pestilential exotic is knocking at our doors and threatening to invade our territory, what shall we do to prevent its further advance and what course or line of treatment should be adopted provided it should unfortunately become epidemic in this country? These are the questions which intimately concern us as Sanitarians, and these are the problems the solution of which has induced the State Board of Health to request us to assist in solving.

As you have all been told a thousand times over, but which will bear iteration and reiteration, we should adopt *cleanliness* as our motto, for in that word is implied all that is requisite to effectually guard against cholera. Cleanliness of person, cleanliness of habits, cleanliness of premises and cleanliness of morals embrace the whole law and the gospel appertaining to the prevention of cholera.

The practical application of these precepts consists in not swallowing the germs of cholera, otherwise no one will ever have the disease which is surely generated by them. Cholera being a specific form of disease, a specific form of germ is required for its development. Concomitant circumstances, such as environment and atmospheric conditions, are likely requisite to favor the development of these germs; but if they be prevented from gaining access to the alimentary canal no individual will ever have the cholera. Those germs, although infinitesimally small, are tangible entities, and consequently cannot be generated from nothing; and all authorities are practically unanimous in the view that they cannot be inhaled excepting under very rare and exceptional circumstances. In this respect it very much resembles the typhoid germ, and like it, also, is considered a filth disease.

In cholera times all food should be exceptionally fresh and wholesome, and entirely free from all decomposition and filth. All solid foods should be thoroughly masticated before being swallowed. The water that is drank should be first boiled and allowed to cool in a thoroughly clean and well ventilated apartment; so also should all other liquids partaken of. This is of the first importance, for there can be but little doubt that more cases of cholera are due to the swallowing of cholera germs in water than all other causes combined.

All solid food should be roasted, baked or otherwise subjected to a temperature at least 212° F. for several minutes before being eaten. The stomach should be maintained in its natural condition of acid reaction. All excesses should be avoided, especially that of indulging in alcoholic beverages. The body should be bathed daily, and the hands washed as often as they are likely to be brought into contact with the mouth. The spirits should be kept buoyant and tranquil, and the mind as free as possible from worry.

By observing these few and easily practiced instructions the cholera, should it ever reach us, will pass us harmlessly by. How many of us will observe these precepts? Not many I fear. And just as certainly as cholera will secure a foothold in our midst, so surely will our whole State become a house of mourning.

As a means of sanitation and cleanliness for the masses, let me suggest that in each city or town of considerable size, or, say San Francisco as an example, the health officers be clothed with authority despotic if you will, and let them employ strong-willed, reliable and competent assistants, one for each block in the city if deemed necessary, and let a daily house-to-house inspection be made, and let them be instructed to remove absolutely everything not satisfactorily clean as rapidly as it is formed and have it promptly cremated.

All low, damp cellars, kitchens, catch-basins, house drains, privies, cesspools, yards, alleys and streets, in fact everything that is not absolutely clean and free from filth, dampness, mold or other evidence of decomposition should be daily inspected and rendered harmless.

Those in charge of the water supply of the city should be compelled to employ special watchmen to patrol the lakes which form the source of the supply, and should be clothed with arbitrary power—shotgun if necessary—to prevent the contamination of those sources, for if the fountain be impure how can the stream be pure?

All this requires the expenditure of considerable money; but health is wealth, and unless the most energetic measures be adopted *now* we are pretty certain to pay the penalty with our lives in the near future. And who can estimate the cost or the money value of the lives unnecessarily sacrificed, and who can estimate the responsibility resting upon us, the conservators of the public health?

The time will surely never come again when the bell-ringer will precede the burial cart crying aloud, "Bring out your dead, bring out your dead," nor will "the cold corpse that lies unstraightened where the spirit left it" be ever again beheld by a terror-stricken people; but the time is not far distant when those living in filth and squalor in dark and gloomy cellars, and filthy, sunless, disease-breeding hovels where the spectral forms of misery and sin congregate will be swept by the avenging God of Hygiene of their pestilential inhabitants. Woe! woe! to those when the seeds of infection become implanted in their midst, and when the germs of cholera gain access to the water they drink.

Then, as Sanitarians, let us preach daily and hourly the doctrine of cleanliness to our less enlightened fellows; let us tell them of the benefits of whitewashing, cleansing and purifying by exposure to the oxidizing and purifying influences of air and sunlight. Let us impress upon them the benefits of thoroughly disinfecting their premises, and let us teach them to open wide their doors and windows and allow the light of heaven to enter their dwellings. Let every individual constitute himself a committee of one and let him clean, and maintain clean, his individual premises, and let all filth, which has been aptly termed "dirt out of place," be constantly removed. Let all liquids, especially water, be first boiled before being drunk, and next to the maintenance of cleanliness as a prerequisite let all drinking water be boiled as already suggested.

Obviously no adequate aid for sanitary purposes need ever be expected from our Legislature, and we will evidently have to save ourselves.

Finally, let me remind you that cholera has heretofore invariably reached America when it has prevailed in Russia, Northern Germany and along the Black Sea and the English Channel. Notes of warning are almost daily cabled to us from one or another of the localities in which it prevailed last year, and usually the water examined in such localities has been pronounced suspicious. In view of these facts and considerations, let me inquire what chance have we of escaping an attack during the coming summer.

Dr. George C. Macdonald, of Sausalito, read the following paper prepared by him :

#### Cholera; Its Cause and Prevention.

Gentlemen: Under this heading, I propose taking you over the following ground:

*First*—Cholera's past history, geographical distribution.

*Second*—Researches toward the detection of the *materii morbi*, culminating in the comma bacillus.

*Third*—The comma bacillus.

*Fourth*—Prevention by inoculation, or vaccination; and

*Fifth*—Filthy general prevention measures, and the medico legal picture.

There is sufficient evidence to believe that Asiatic cholera may have been known to our forefathers in Europe as an epidemic. The first authentic account, however, dates 1669, 70-74, when it appeared among some English soldiers on continental service. In 1817, however, we have a prominent landmark; in this year the Indian epidemic started on its march toward the Western World, appearing in Bengal, and carrying destruction through the army of General Hastings while engaged in one of the many Indian wars, he being camped on the bank of the Sind. In five days he lost five thousand men. The disease attacked native and European equally; this was in November. By August his loss amounted to nine thousand. During the latter month the pestilence showed signs of abatement, only to rage with almost incredible violence among the Coolie population of the rice swamps of Jessore, where thousands upon thousands lost their lives. In past eras there may have been epidemics equally severe, but I can find no record of such. From this central pivot the disease started easterly and westerly on its march of death in the following chronological order:

#### EASTERLY.

- 1818. Burmah, Aracan, Malacca.
- 1819. Penang, Sumatra, Siam, Mauritus.
- 1820. Tonquin China.
- 1822, 23, 24. China proper.
- 1827. Chinese Tartary.

#### WESTERLY.

- 1821. Muscat, Persian Gulf.
  - 1822. Persia proper, lasting till 1830.
  - 1823. Astrakhan.
  - 1829. Orenburgh.
- Then through Tartary, revisiting Astrakhan in 1830.

1831. European tour commenced in the following order:

May, Moscow and Warsaw.

July, St. Petersburg and Constantinople.

October, Berlin, Vienna and Sunderland, a town in the North of England, whence it ravaged the British Isles for fourteen months; took ship and crossed the Atlantic in 1832, the first town in the New World attacked being Quebec. In 1837 it retired from Europe, the city of Rome being the last center affected.

Cholera has never visited the following countries: Cape Colony, Sandwich Islands and Australia.

Since the great epidemic of 1817 the disease has frequently been prevalent in India, where it may be considered to have become naturalized, causing a large mortality among the native population. The second great European epidemic appeared in 1848-9; the third, in 1853-4; the fourth, in 1865-6; the fifth, in 1885-6, and the last in 1892.

Epidemics were preceded by local outbreaks at the seaport towns, which appear in all cases to have been the point, so to speak, of a country's infection. In all epidemics the pestilence has traveled slowly at first, and in irregular waves, checked by cold, but not destroyed. Neither climate nor season, earth or ocean arrests its course or alters its features. It is as equally destructive at St. Petersburg and Moscow as in India; as fierce and irresistible in the cold of Russia as the sunburnt regions of India, and as fatal in the moist atmosphere of Burmah as in the parched provinces of Hindostan; still there is evidence to prove that the mortality curve is higher in summer and falls during the cold winter months.

Like LaGrippe, cholera is the very type of an epidemic disease, and like other diseases of a similar nature, the atmosphere has been accused as the vehicle by which the germ is transmitted. Practically the air has little or nothing to do in the matter, and plays quite an unimportant part in its transmission; but water and its allies food, merchandise, rags, filth and dust impregnated with the evacuations of the diseased persons are the true carriers of this dreaded scourge, will be my effort to plainly lay before you and prove.

It is beyond dispute that the disease follows commercial lines and human intercourse, not prevailing winds. Appearing first in seaports and thence along the line of railway, road, river and canal traffic, these main arteries acting as centers beyond which the disease is distributed until the epidemic is widespread and general.

Dr. Snow, during the early European epidemics, suspected what we now know to be true, viz., that the *materii morbi* was contained in the evacuations of those attacked, from whence came the contamination of the water supply. In illustration, I give the following observations made in London during the epidemic of 1849: The mortality and sickness was especially severe in the southern portion of that city, which took its water supply from a few surface wells, and two water companies, who derived their water from the river Thames, supplying it in a very imperfectly filtered condition. At this time all the sewers of London discharged into the river. The next epidemic, of 1853-4, was also markedly more severe in the same district; but in the meantime one of the above mentioned water companies had removed its intake from Hungerford Bridge to Thames Ditton, a district higher up and free from sewerage contamination, consequently furnishing a much purer water. At this time the two companies were acting in rivalry, so that in many streets their pipes ran side by side, and houses under the same sanitary conditions in other respects received different water supply. A careful investigation by Dr. Snow and the Registrar-General gave the following results: Number of persons supplied by company giving contaminated water, 266,515; deaths, 4,093. Number of persons supplied by company giving better water, 173,748; deaths, 461.

The facts are even more remarkable when examined in detail, inasmuch as in streets and localities which both companies supplied the disease singled out those houses furnished by the company getting its water from the contaminated Thames, which I have already stated contained sewerage. Again during the same epidemic of 1853 a remarkable localized outbreak occurred in the region of Golden Square. There had been a few cases in the neighborhood during the month of August, with a total of nine deaths. On the 30th, eight new cases appeared, which rapidly became fatal. On the 31st, 56 deaths; September 1st, 143 deaths; the 3d, 54 deaths. No less than 616 persons were attacked in this area between the 19th of August and the 30th of September, of whom 415 contracted the disease between August 30th and September 4th. Upon investigation it was found that this sudden and evanescent outbreak was due to the use of water from a pump, which

was held in high repute and drank largely of by those who lived in the neighborhood. This water was demonstrated to be poisoned by sewage.

A gentleman living in the city of Bath was the possessor of some houses near the town of Locksbrook. Cholera, which did not prevail in Bath, appeared in the latter city. The tenants complained of the well water, drainage from the cess pits having entered it. The owner visited the place to see into the matter, and in bravado he drank a glass of water. On returning to Bath the next day, he was seized with cholera, and died in twelve hours.

The following is an illustration of dust: During the prevalence of cholera on the Continent, in 1886, I was practicing in London, and called to a man suffering from all the symptoms of true Asiatic cholera. When seen he was in the algid stage, surface cold and blue, oxygen hunger well marked, no pulse at wrist, cramps, typical rice water stools. Twenty-four hours previously he had unpacked a case of wine; the material used to support the bottles was dusty hay; the package came from Marseilles, where cholera was raging. This case was reported in the "English Lancet," June, 1886.

The first genuine attempt at isolation of the cholera poison was made by Thiersch and Sanderson, who experimented with mice. When these animals were fed on material contaminated with cholera evacuations they died with all the symptoms of cholera as it manifests itself in the human subject. These experiments show that mice treated with intestinal secretions from the human cadavera less than one day old died at the rate of eleven per cent; second day, thirty-six per cent; third day, one hundred per cent; fourth day, seventy-one per cent; fifth day, forty per cent. Intestinal secretions more than six days old gave no results.

Pacini, in 1850, first supported the bacterial origin of the disease. He described the germ he called vibrios, which he observed in the intestinal canal of those dying with cholera. Klob followed him with similar observations, in 1867, but our knowledge had not sufficiently advanced to enable us to distinguish the morphological conditions, hence the absurd notion gained ground that the *materii morbi* was due to ordinary moulds and hypothetical parasites of the rice plant. In India, the perennial home of the pestilence, researches conducted at a later period by English physicians gave no certain or positive results.

Koch, during the outbreak of cholera in Egypt, in 1883, in Europe, in 1885-6, and later, Cunningham, in 1892, and other observers described the comma bacillus, which they discovered in the intestinal canal and in water in cholera infected districts. That this bacillus, despite the adverse criticisms from many able quarters, is the cause of the disease is now established. Its constant presence in the small intestine and evacuations is acknowledged by those who do not accept Koch's views. It is found at times in the mucous of the intestine, almost as a pure cultivation, provided the examination be made immediately after death. In the exceptional cases in which it has not been found, either strict search confessedly had not been made and thus overlooked, or it had actually disappeared from the bowel, especially in advanced stages of the disease where natural resistance is marked.

The comma may readily be cultivated as a saprophyte, and when injected into the duodenum (avoiding the gastric juice, acids being fatal to it) of guinea pigs, it causes symptoms of genuine Asiatic cholera and death. A drop of secretion taken from the intestine of the dead animal proves fatal to other animals when similarly treated. The comma is about .05 mm. in thickness. Under cultivation, Bray claims they take a spiral form, and that this is the normal condition of the germ, the comma being simply the diversion of the spiral. Huppe has observed in old cultures a further phenomenon, which we term arthosporous spore formation. They are therefore connected simply with the retrogressive or involution conditions common among bacteria.

Its saprophytic condition requires an abundant supply of oxygen, and when cultivated in the presence of this gas, upon a suitable moist substratum, develops rapidly, taking the place of any competitors. After some days its energy diminishes, probably due to the presence of its own decomposition products. The optimum temperature for development is that of a warm blooded animal, viz.: 37° C, but 20° to 25° is sufficient. Death ensues rapidly at a temperature of 50° to 55° C. It is not killed by being brought to or below freezing point. Perfect desiccation kills the bacillus in less than twenty-four hours. The arthosporous variety, on the contrary, according to Huppe's direct observation, continues capable of germination for four weeks after desiccation; but, as a matter of direct observation, new vigorously vegetating germinations may proceed from cultures after

ten months. Huppe suspects that the new growths always spring from arthrosporous variety, and that this is a specifically resistant resting stages of comma bacillus of cholera. The viability of the comma, according to Cunningham and Sirena, of Palermo, under various conditions, are as follows: In spring water, it dies from five to eight days; well water, twenty-four hours to six days; sterilized, three months; sea water, four days; sea water impregnated with sewerage, twenty-four to forty-eight hours. Its length of life in water and moist substances depends upon the amount of saprophytes, or other antagonistic microbes. The richer the vehicle is in putrifiactive organisms the more rapid is the destruction of the comma. Dr. Heines' experiments with milk shows that the bacillus remains virulent until acid fermentation is set up, its extreme vitality being six days; in butter and like substances, one month; but in butter which had become caseous, and cheese curds, its life was prolonged for hardly a day; boiled milk sustains them for long periods, provided the milk had become infected after heating; in beer they live from five to ten hours; white wine, five minutes; red wine, fifteen minutes; cold coffee, two hours; imitation coffee, containing chicory, five hours; cold, weak infusion of tea, nine days; strong infusion of tea, one hour; infusion of cocoa, an indefinite length of time. Boiling absolutely destroys the comma, as also do acid solutions.

#### PREVENTIVE MEANS BY VACCINATION.

It is proved by experimental research that the comma bacillus is never resident in the tissues of the body, and if injected into them dies. Their habitat is solely the alimentary canal, and here they generate, or by their presence cause to be generated, the chemical poison which, on absorption into the general circulation, give rise to the train of symptoms we designate as Asiatic cholera, so that for the purpose of vaccination it is not necessary for us to inject the comma bacillus itself into the blood, but only the generated chemical poison. I have given these preliminary remarks so that what follows may be plainly understood. All vaccinations and inoculations act in one or two ways, either as septicæmia, in which case the micro-organisms are injected into the tissues, where they proliferate, or "intoxicate," in which case it is the poisonous material formed by the germs themselves. Cholera inoculation belongs to this latter class, the vaccination, therefore is not bacterial, but chemical.

Again we have been led to expect from a knowledge of Pasteur's inoculation for hydrophobia, and of the mutability of the character of microbes, and of their capacity to be artificially turned into vaccines of a fixed and determined nature, that by them or their products we could, by inoculation, give tolerance to certain diseases, provided the vaccination is progressive, for a dose required to effect immunity given at once would prove rapidly fatal; we therefore have to commence with solutions, increasing the dose at intervals until sufficient has been injected to protect the recipient.

Cholera inoculation follows this rule. We therefore have number one vaccine, a weak carbolized solution, containing the chemical poison, but no active organisms, and number two vaccine, or exalted vaccine, being the strongest obtainable cholera virus, which is both chemical and bacterial. Inoculation, however, does not give complete immunity, but only relative, viz., enabling the system to tolerate such quantities of the cholera poison as may be expected to be absorbed from the intestinal tract during the interval which elapses between the invasion of the alimentary canal by the comma bacillus, and the natural elimination of that bacillus which invariably takes place when convalescence becomes established. Haffkin's vaccination does not aim at the impossible task of establishing complete tolerance, for supposing the bacillus could not be discharged from the intestine they would multiply to such an extent, and such an enormous amount of the chemical poison generated, that the acquired protection would consequently be swamped. Under these circumstances the vaccination would succumb just the same as the unvaccinated, but would hold out a few hours longer, therefore the utility of the method depends upon whether the tolerance produced is sufficient to tide over the critical hours which supervene upon the outbreak of the choleraic symptoms.

It would be out of place here to enter into the minutiae of the manufacture of the vaccines, suffice to say that the virus has to be cultivated in the peritoneum of animals, preferably guinea pigs, under great difficulties in regard to aseptic, as many as thirty animals having to be used before the vaccine has obtained its maximum virulence. Thus obtained, it is cultivated on agar-agar, after which an emulsion of sterilized broth is made, which is injected into the tissues; this is the exalted vaccine, containing the living comma. The carbolized vaccine is formed



from the above by diluting a tube of agar-agar cultivation with a 0.5 per cent solution of carbolic acid. In this latter preparation the comma is dead, only the chemical poison retaining its potency. Carbolyzed vaccines will retain their power for six months, and are consequently the best for the general vaccination purposes, or where those to be operated on are distant from the laboratory. The symptoms produced by the operation as manifested by the fifty persons already treated, which include French, Swiss, Russian, English, and American, are a rise of temperature, local sensitiveness at the seat of inoculation and some oedema commencing in about three hours; the fever and indisposition disappear in about thirty-six hours. The symptoms following the second inoculation are rather more marked, but of shorter duration; the whole recalls a sensation of bad cold in the head, lasting one or two days.

#### THE MEDICO LEGAL PICTURE.

It now remains for the practical sanitary physician to formulate some definite programme by which we hope to prevent the entrance of the disease into this country, or it having obtained footing, to curtail the epidemic.

Personally, I have perfect contempt for so-called quarantine regulations, which are always carried out in a slipshod manner. It is useless to take unfortunate passengers from an infected ship, subject them to all the discomforts, delays, loss and injury of personal baggage and effects, while freight ships carrying sugar, rags and all kinds of merchandise (as did the steamers from Hamburg in the late epidemic), gain free entrance and their cargo spread broadcast through the land. Again this year, instead of rigorously closing our ports, we are opening them widely, both to people and foreign commodities for the "World's Fair." If cholera does not gain a footing here it will not be because we have failed to encourage its importation. Quarantine, to be effectual, means complete isolation; nobody and nothing should cross the frontiers of the United States until cholera has died out in Europe. No ships from infected districts should be permitted within three miles of our shores. Such a condition of affairs is, as you can see a commercial impossibility. It is of more moment to consider the best course to pursue in order to curtail the epidemic when it is really here, and to put our houses in order that the enemy may not find us napping. We have seen that the disease is due to a germ, that the mode of entrance into the body is almost always by food or drink, and that dirt, warmth and moisture are favorable to its cultivation and propagation. San Francisco has many dangers to encounter. Her water supply is favorably situated for contamination; she has no sewerage of any account; what there is is worse than useless, and in many cases would be a direct factor in helping to spread the disease; a large amount of the house plumbing is defective and fraudulent, her sources of milk supply and dairy produce more than suspicious; many of the houses are old and rotten, and there are plenty of wooden sidewalks to harbor diseases of all kinds beneath their decayed planking. The Potrero swamp still exists, with all its odoriferous enchantment, and Butchertown still rears its gory head as a standing menace.

The antagonism of the very people themselves to the health laws, and the obstacles thrown in the way of health officers by all classes when they are faithfully performing their duty, and protecting the lives of those who are doing everything in their power to injure and annoy them, is a matter of daily occurrence. Cholera is essentially a preventable disease, and, as it is preventable, those are surely to blame who, when the opportunities are given, do not succeed in preventing it. Such neglect cannot now be urged as an outcome of ignorance, it is therefore the duty of the Board of Health to teach all classes the duties which, in case of an epidemic, they not only owe to themselves, but to their neighbors, and to support the health officer in his arduous task. For this purpose I propose that the Board of Health distribute printed slips in English, French, German and Chinese, containing the following information, couched in simple, unmistakable language:

"Keep your houses well ventilated, light, and thoroughly dry; do not wash the floors, but give them a dry scrub. See that your air shafts, traps and drains are in perfect order; see that your dust bin is frequently emptied and its contents disinfected with the public disinfectant fluid. Burn in your stoves all rags, vegetable refuse, as cabbage leaves and potato peelings; sever all direct communication of the waste pipe with the drain; cleanse and wash out all your water pipes and tanks; let every drop of water used in your house for drinking or washing be boiled before use. Do not use water which has been standing for six hours without again boiling. Never use ice in any form; it may contain the germ of the disease; in

the same way, and for the same reason, avoid ice cream and candy, or tin provisions. Never use a filter, for if not kept perfectly clean and in working order, they are simply death-traps. Do not eat any raw fruit or salads, or bread more than twenty-four hours old. Bake your own bread, if practicable; if not, use toast. Take no milk unless it has been previously boiled. Use no syrups of any kind; no butter; avoid weak, cold tea; hot coffee is the best drink. Take four wholesome meals a day. Do not overload the stomach. A meal may consist of any sort of nutritious food; fresh and thoroughly cooked meats, fish, toasted bread, well boiled green vegetables and potatoes, plain farinaceous puddings, eggs, etc.

"Alcohol must be taken in great moderation, and only at lunch and dinner. Cooking utensils should be kept scrupulously clean, and boiled after use. Avoid purgative medicines; excesses, irregularities of every kind; over fatigue, prolonged watchings, excitement and undue mental strain, or anything which would exhaust or irritate the nervous system. If troubled with looseness of the bowels, send for your medical attendant; in the meantime go to bed, choosing an airy room; keep warm, and should cramps come on, apply hot applications to the stomach, flannels rung out of hot water sprinkled with turpentine are excellent. Drink hot lemonade; if weak, take one or two teaspoonsful of old brandy well diluted. Soiled bedding and clothes should be immediately destroyed by fire. Drink one half a pint of the following mixture every morning: Take thirty drops of diluted sulphuric acid, to which add half a pint of boiled water, and add as much sugar as needful."

In addition to the foregoing, we must have hospitals to receive the infected. Those made of galvanized and railway iron are the best. Their cost is but slight, and they are rapidly erected. Ambulances are also necessary, in order that we may convey the patients from their homes to the hospitals; but the most important feature of all is to form a corps of efficient and honest inspectors, to each of whom is to be assigned a district, where they are to make daily house to house inspections, to see that the sanitary laws and disinfections are carried out, to report all cases of wilful neglect or defiance to the Board so that the offender may be immediately arrested and punished, and the premises put in a sanitary condition. It is also necessary that the Board should supply and have on hand large quantities of disinfectants, preferably chloride of zinc, which is easily handled and very effectious; to see that all cases of diarrhoea be at once notified to the health officers, who shall place a yellow flag on all premises where suspicious cases are or have occurred. The denial of all public funerals, and the cremation of all bodies of those who have died from the disease, together with their clothes and effects, excepting jewelry; the daily flushing of the main drains and watering of the streets with disinfectants; the closure of all cess pits and private wells; the power to close laundries or work shops at a moment's notice; closure of all public and private schools; public inspection of all dairies and market gardens; and lastly, the obtaining of a certain amount of carbolized vaccine, which should be distributed to the health officers with printed instructions as to how to perform the operation of inoculation, so that all who desire may have that protection which science has afforded.

---

#### Remarks by Dr. C. E. Ruggles, President of the State Board of Health.

*Mr. President and Gentlemen of the State Sanitary Convention:*

I do not propose to occupy your time to any great extent by reiterating any of the many points already expressed in relation to Asiatic cholera, but to offer some very few practical thoughts as to facts and conditions by which we may be confronted; how soon no one can tell. It is a universally conceded fact, recognized by almost all, if not entirely so, of those interested in sanitary science, that the communicability of cholera is in the excreta of the patient; that the comma bacillus is only found in the discharges from the alimentary canal, and that to communicate the disease to another the bacillus must be transferred, so to speak, from the intestine of one to the intestine of another; and it is further admitted beyond controversy, that the drinking water is the most common medium of that communicability. I do not wish to be understood that water is the only medium of communication; I think it possible for the dejecta to lodge on the clothing of the sick one, and then to become dry and scale off in an impalpable powder, and be wafted along, and by that means enter the mouth by inhalation, and by the

swallowing process find their way to the alimentary canal. Of course the danger from that source is small by comparison with the contamination of the drinking water, but it goes to show beyond any question the necessity of either the total destruction of the clothing by fire, or its thorough disinfection by fumes of sulphur, or by bi-chl. hydrarg.

The similarity of the means of communication of Asiatic cholera and typhoid fever justify me in presenting them at this time for your consideration. As is well known by you all, the typhoid bacillus has its habitat in the alimentary canal, and by the excreta from it is the disease carried from sick to well, and mostly, if not entirely, through the same medium as in cholera, viz., the drinking water; so that the same advice as to precaution and prevention of one will apply to the other.

I think I am justified in saying that cholera is no more communicable than typhoid fever, and equally as easy controlled; that the same rules of destruction and disinfection in use in one instance will be applicable in the other.

The fact that water is the medium of communication of both cholera and typhoid bacilli in almost every instance is so well known that it would be a waste of time and almost an insult to your intelligence to suppose it necessary to more than simply mention the instance where the town of Plymouth, Penn., was nearly depopulated by poisoned water supply from a reservoir contaminated by dejecta of typhoid fever patients miles away; and to the city of Hamburg, made a pestilential spot by cholera germs deposited in the river Elbe.

The fact that our river water is often contaminated and pumped up into reservoirs to supply some of our cities needs no argument to convince you; but how about our drinking water from dug or bored wells? I might truly say, happy is the people who have corporation water works, one general supply, pure and uncontaminated by too intimate relation with some neighboring privy vault, and who have a good system of sewerage. The fact that water will percolate through an almost incredible distance of earth, has been so clearly and positively, as well as chemically demonstrated, that there is no necessity of more than making mention of the fact. Therefore, a village, or town, or even a city of larger pretensions dependent on cesspools and honey-combed by privy vaults, with no decent system of sewerage, is to be pitied for the dangers to its citizens from the before-mentioned prison germs, is great indeed. The ordinary cesspool or privy vault, at least in my neighborhood, is a shamefully unsanitary constructed concern. A hole, 10 or 12 feet square, and deep enough to go through the clay stratum, or hard pan so called. That is the great desideratum with the builder, so that the contents of that privy may pass through the loose dirt below the clay or hard pan, whither, he knows not and cares not.

This poor, deluded, ignorant privy builder, unconsciously, is the means of spreading a typhoid epidemic by this system of percolation to the drinking water in either his own well or that of his neighbor. I believe I am perfectly free from exaggeration in asserting that a privy vault thus constructed has a capacity of contaminating any well of drinking water within fifty feet on either side of it.

It is often asserted, as a negative argument to this proposition, that most wells are lined or cased down a distance of from sixty to ninety feet with iron pipe, and therefore it can resist the effects of this percolation. Experience has shown the fallacy of this, because very soon, by exposure to air and moisture, that iron pipe oxidizes, is perforated with holes, and is a very positive medium of communication for the typhoid or comma bacillus from intestinal canal of one to that of another. The ignorant, uninstructed owner of the privy vault is therefore the unconscious instrument of doing much injury. How much trouble, how much danger, how much death might be averted, if sanitarians did their entire duty in instructing that ignorant privy vault builder, that the excreta from his typhoid afflicted family must be thoroughly disinfected before being cast in the vault; that one act should be the very beginning of preventive measures, and will be the ending thereof if destroyed by chemicals as soon as they leave the body of the patient. Experience teaches, and the public should bear it in mind, that this fever germ, as well as cholera germ, may be much multiplied after leaving the body, and that this enormous increase, to a wonderfully dangerous extent, takes place when introduced into places which present the favorable conditions of moisture, warmth and filth. Hence the vital necessity of care not to plant the dangerous seed in soil congenial to it. Having determined the possibility of these disease germs being cast into the privy vault, and there multiplying to such dangerously enormous extent, and their finding their way through the method of percolation to the drinking water, and to the intestinal canal of one obliged to drink the water, the question may

consequently and naturally be asked in the language of a certain celebrated New York politician: "What are you going to do about it?" Very briefly will I attempt to answer that query:

*First*—I would advise and compel, if necessary, the perfect disinfection of the discharges, the complete destruction and death of the bacilli, be they typhoid or comma, immediately upon their leaving the body of the patient.

*Second*—I would advocate to the extent of my ability, a complete, perfect system of sewerage for city or town, and strive to have the necessary legislation to compel connection of every house with that system. If that was not practicable, I would insist upon the construction of all privy vaults after a plan adopted by the State Board of Health, of Ohio, viz: To be built with 8-inch brick wall, and cemented inside so as to be perfectly tight, with no possibility of leaking; ventilated with pipes extending in mid air fifteen or twenty feet; to be cleaned out as often as health officer directs.

Dr. S. S. Herrick, of San Francisco, read a paper prepared by him, as follows:

#### Disposal of the Waste of Cities.

The suitable disposal of the refuse of cities is a serious question in relation to the comfort and health of their inhabitants. It has engaged the special attention of the American Public Health Association, and in 1887, a Committee on the Disposal of Waste and Garbage was created, which has made three reports. The last, made in 1891, furnishes much of the material used in this article.

It is obvious that conditions vary so much in different cities, that no detailed plan could be made applicable to all. With reference to night soil, proximity to the sea or a large lake or river affords an outfall which will long continue to be used, though we hope that eventually so great an amount of fertilizing material will not be allowed to run to waste. The application of sewage to cultivate lands has been in successful operation in many inland cities and towns of Europe, and even on the sea coast. A beginning has been made in the United States, and in California, Los Angeles deserves the credit of taking the lead. So far few of these enterprises have been made self-supporting, but in all the value of the land irrigated has been greatly enhanced, and at Pullman, Illinois, it is said that some profit above annual expenses has already been derived from sale of products. Similar examples might be instanced in England, France and Germany. As to San Francisco, it is not to be expected that any other disposal will soon supersede the consigning of night soil to the bay; but it is to be hoped that Sacramento and San Jose may not long delay imitating the example of Los Angeles, and may be followed by other inland cities.

The problem here has reference chiefly to the disposal of household garbage, shop refuse and street scrapings, which has not advanced beyond the primitive and barbarous plan of the open dump on vacant lots. The offenses thereby committed against the senses are too familiar to need description at home, and I shall not attempt to expose their abominations to those who have been spared the spectacle. My object is rather to inform those who suffer from such mismanagement how other communities have succeeded, with no great expense, in abating the nuisance. I should not recommend the custom which I observed in 1854, at Buffalo and Cincinnati, where kitchen and market refuse were thrown on the street to hogs, which enjoyed "the liberty of the town." The custom has probably gone out of public observance, but an accompanying table shows that these animals are still made useful in retirement at a number of the smaller cities. The plan of burying in pits outside the city limits, as at Chicago and Toledo, must soon be abandoned, for want of space, and, if effectual, must cost more than cremation.

The great desiderata are, the avoidance of long haul, economy of working appliances, and utilization of valuable products, while obviating all offense to the senses. A variety of apparatus has been devised to meet these requirements, some of which will here receive attention.

It must be observed that any mode of utilization, except the Chelsea process hereafter to be described, requires street sweepings and ashes to be kept separate

from animal and vegetable refuse, which is an important deviation from the primitive dumping process, whether on land or water. The former substances can be used for filling low places within city confines, and are generally worth the cost of hauling. San Francisco has outgrown suitable limits for disposal of kitchen refuse by feeding swine. Owners of stables willingly haul manure to gardens within a reasonable distance and give it away, but much still has to go to the dumps. It is practicable to dry, compress and bale such matter, so that it might be transported to the country, but whether its value to farmers would leave a margin of profit after paying carriage is a question to be settled with transportation companies. The latter ought to favor a scheme calculated to increase crops and advance their business.

Within the last eight years cremation furnaces for dealing with garbage have been put in operation in a number of the cities of the United States; the Merz, Engle, and Rider Furnaces being mostly employed. At Montreal, with a population of one hundred and fifty thousand, a contract has been made with the inventor of the Mann Furnace, to collect and cremate the garbage for forty-three thousand dollars annually. It is removed from every house twice a week, being deposited in barrels upon the sidewalk. This would make the average cost for each family about one dollar and fifty cents per annum, while in San Francisco the expense is double to have it removed to the dumps.

The cost of operating the Mann Furnace is estimated at twenty-five cents for every ton of ordinary refuse consumed. The apparatus used at Montreal cost eighteen thousand dollars, and is said to consume one hundred cubic yards, or forty tons, with three tons of coal.

The Engle destructor, used at Des Moines and Minneapolis, has been found to dispose of refuse, consisting largely of carcasses, for less than twenty cents a ton.

The Merz or Vienna system was used in six or seven cities of the United States in 1891. The process is not cremation, but desiccation in closed cylinders by steam at a temperature of about 300° F. This dryer is surrounded by a larger cylinder, and steam is admitted into the space between the two. Each dryer contains about three tons of garbage, and the process occupies six hours, during which time about sixty per cent of weight is evaporated. Reference to Table 1 shows that there is some complaint of odors, but the dried stuff is almost inodorous. After drying, the matter is subjected to the action of benzine, to extract the fat; the benzine is distilled from the dissolved fat, and the dry residue is then suitable for a fertilizer. Of its value I am not informed, but much depends on the cost of transportation. This process is applicable as a whole to kitchen refuse only, separate from ashes, etc. The drying feature might be applied to stable manure, after fixing the ammonia by a dilute acid; but cost of transportation might debar the practicability.

The Rider Garbage Furnace, as used at Pittsburg and Alleghany City since 1888, consists of two chambers of nearly equal size, separated by a bridge-wall of fire-brick three feet thick, with a semi-circle opening in the upper portion between the two, and both are covered by an arched dome of brickwork. The front chamber is the furnace proper, with a grated floor for consumption of coal, and the garbage is thrown through charging holes in the dome upon the floor of the second chamber. A smokestack, eighty feet high, is at the farther extremity of the second chamber. The furnace used at Pittsburg cost three thousand seven hundred and fifty dollars. In 1889 its average work was thirty tons, or seventy-five cubic yards daily, at an expense of nearly thirty-six cents a yard, or ninety cents a ton. Six men were employed, but it was thought that four would suffice. At Alleghany City, the plant cost five thousand seven hundred dollars, with estimated capacity of thirty tons daily. Two or three men are employed, only in the daytime, and the operating expense is said to be about one hundred and fifty dollars a month. The Rider Furnace is reputed to be operated without offense to the senses.

The Engle Garbage Cremator was devised in 1886, and has undergone several improvements since. The first one was built at Des Moines, and in 1891 there were nineteen in use in various cities and towns. The process includes the consumption of all gases produced in the utilization of heat from consumption of garbage for its continuation. A rectangular brick structure has a furnace at each end and a garbage grate between, to which the refuse is fed through holes above. The gases are entirely consumed, and the garbage itself contributes heat to continue the combustion, which goes on day and night. These cremators are of four different sizes, with corresponding cost. The largest, adapted to the needs

of a population of twelve thousand to twenty-five thousand, is thirty-two by nine by twelve feet, with a brick chimney nine feet square and seventy-five to one hundred feet high; and will consume seventy-five cubic yards of miscellaneous refuse easily in twenty four hours, including large animals, like horses. This work requires three men, and one or two tons of coal daily. The cost of a plant of the smallest size, for a population of two thousand to three thousand, is estimated at two thousand five hundred dollars to three thousand dollars, including the covering-house, platforms and approaches, but not the site.

Mr. Rudolph Hering, C.E., of New York, describes some services, which he has examined in England, and which appear far superior in point of economy to the foregoing. The furnace destructor used at Southampton cost altogether eighteen thousand six hundred dollars. The amount of refuse daily consumed is from twenty-five to fifty tons, at a total annual expense of one thousand one hundred dollar, or seven to fourteen cents per ton. The process is so perfect, that no coal is needed, when well under way. The clinkers remaining are used in making roadways and paving slabs. The ashes have some value as a fertilizer.

Still better appears to be the system in use at Chelsea, operating on the refuse of Kensington and Westminster. The stuff is passed successively through several revolving cylindrical screens, of gradually diminishing mesh from ten to two and one-half inches to one-half inch in diameter. In this way all matters that can be utilized are sorted. Much is used as paper stock. Animal and vegetable refuse, after drying, is used for manure. Bottles and fragments of coal and metals, when separated, have some value. Even the ashes are mixed with clay, to make bricks. Altogether it appears that this plan is somewhat better than self-supporting; but I am not informed whether the company have the expense of gathering the refuse.

In 1883 a crematory was established at London, in which the garbage is dried on platforms arched over in the fashion of a reverberating furnace. The platforms slope to a central fire, and the dried matter is pushed there from time to time. When well under way, the furnace needs no other fuel, and there is surplus heat to drive a steam engine for lifting the wagons to be dumped and to work up the residue into mortar with lime.

Another plan is described in Vol. XVII of the "Sanitarian" for 1886. Household refuse is placed in a retort and subjected to a process of fractional distillation. First melted fat is drawn off through a cock; on raising the heat, ammonia passes over; illuminating gas is produced at a higher temperature. Some coke remains in the retort, and the ashes contain potash. Cheap coal and close management might afford some profit.

The average amount of garbage and waste of the city of New York has been estimated at one cubic yard, or two-fifths ton, to every inhabitant per annum, including street sweepings and ashes, but not the night soil. Of this amount the proportion of putrescible matter, varying somewhat with the season, averages about twenty per cent. Applying such estimate to San Francisco, with a population of three hundred and twenty thousand, we should have sixty-four thousand cubic yards, or twenty five thousand six hundred tons, of putrescible matter annually to be disposed of—very nearly seventy tons daily.

From the diversity of plans used in different cities and the great variation in the cost of plant and expense of operation, it is obvious that the problem of disposing of garbage and refuse is distant from precise solution. According to prices of labor, materials and fuel, each city must estimate from its own standpoint. Unless transportation companies abate considerably from their accustomed tariff, the refuse of our large cities has no margin of profit for fertilizing; and the cost of fuel probably forbids the saving of fats and production of gases. The cheapest method of cremation, therefore, is apparently the proper plan, by some apparatus like the London Furnace, first drying and then consuming the stuff, and requiring little or no fuel when once well under way.

The running expenses would represent chiefly a fair interest on cost of plant, the labor of two men for each day and night shift, and the cost of gathering the refuse from house to house. Reference to the second table indicates that twenty-five cents per capita annually would cover cost of carriage to two or three crematories located in the suburbs of San Francisco—say eighty thousand dollars; while under the present system each of the sixty thousand families, paying twenty-five cents a month for removal to the dumps, or three dollars a year, the amount is one hundred and eighty thousand dollars. The difference (one hundred thousand dollars) would pay for the whole plant in one year, besides the

operating expenses, and leave a large surplus, even if nothing were utilized. It is certain, however, that a large quantity of stuff might be saved, such as bottles, rags and fragments of metals, worth much more than the cost of sorting over the mass.

A company organized to carry out an imperfectly outlined plan like the foregoing would not require a very large capital, and would relieve the city of the worst features of the present barbarous method. Once under way, there would be time to devise improvements, for the purpose of saving useful products. Besides, it is evident that the cost to householders for removing garbage is unnecessarily high. No franchise should be granted without providing for regulation of charges for service rendered.

There is no time now to dwell upon the sanitary aspect of the case. It is known that the refuse of a city abounds in disease germs, and in the neighborhood of the dumps the dried stuff furnishes a large quota of the atmospheric dust which people must breathe. Moreover, recent experiments of a New York physician ("Med. Rec." Jan. 23, '93,) show that air exposed to moist exhalations from a sewer is liable to contain such microbes, for out of forty careful observations with suitable apparatus, they were found in one-half. My own investigations, recently made, show clearly an unduly large prevalence of diphtheria and scarlatina within half a mile of the San Francisco dumps for the last five years. Want of data restricted the study to these two diseases.

TABLE I—DISPOSAL OF WASTE IN VARIOUS AMERICAN CITIES.

| City.                | Population. | Ashes and Street Scrapings.                                  | Kitchen and Market Offal.        | Gathered at Public or Private Expense. | Useful Products.         | Annual Expense    | Complaint |
|----------------------|-------------|--|----------------------------------|--|--------------------------|-------------------|-----------|
| Portland, Maine...   | 35,500      | Vacant lots  | To swine                         | Mostly pub.                            | None                     | \$4,200           | Yes       |
| Cambridge, Mass...   | 70,000      | Vacant lots  | To swine                         | Public                                 | None                     | 16,000            | .....     |
| Lawrence, Mass...    | 45,000      | Vacant lots  | To swine                         | Public                                 | Swill sold               | 25,000            | Yes       |
| Hartford, Conn...    | 53,000      | Vacant lots  | Fertilizers                      | Public                                 | .....                    | *7,000            | No        |
| Albany, N. Y.....    | 95,000      | Vacant lots  | Special dumps                    | Mostly priv.                           | None                     | .....             | Yes       |
| Binghampton, N. Y.   | 35,000      | Vacant lots  | Taken by farm's                  | Mostly priv.                           | None                     | .....             | No        |
| New York City...     | 1,500,000   | Vaca't lots and sea  | The sea                          | Public                                 | None                     | .....             | .....     |
| Elizabeth, N. J. . . | 38,000      | Vaca't lots outside  | Vac. lots outsi'e                | Public                                 | None                     | 4,600             | No        |
| Springfield, Mass..  | 45,000      | { Ashes to vacant<br>lots, st. scrap-<br>ings for fertiliz's | Fertilizing                      | Public                                 | Manure                   | *7,000            | Odors     |
| Pittsburg, Pa.....   | 240,000     | Vaca't lots and sts.   | { Some to swine<br>some cremat'd | Private                                | .....                    | Crema'y<br>12,000 | † Yes     |
| Findlay, Ohio.....   | 18,500      | .....  | Cremated                         | Private                                | None sold                | 1,400             | No        |
| Toledo, Ohio.....    | 81,500      | Buried outside   | Buried outside                   | Public                                 | None                     | *10,000           | No        |
| Detroit, Mich.....   | 206,000     | Vacant lots  | Merz system                      | Public                                 | { Grease &<br>fertiliz'r | 36,000            | Odors     |
| Kalamazoo, Mich..    | 18,000      | Vacant lots  | To swine                         | Private                                | None                     | .....             | Yes       |
| Chicago, Ill.....    | 1,000,000   | Ashes for fill'g lots  | Buried outside                   | Public                                 | None                     | 253,140           | No        |
| Milwaukee, Wis...    | 205,000     | Vacant lots  | Merz system                      | Public                                 | .....                    | 15,000            | Yes       |
| Burlington, Iowa..   | 22,500      | Vacant lots  | To farm's & riv'r                | Private                                | None                     | .....             | No        |
| Dubuque, Iowa...     | 30,000      | Vacant lots  | To farm's & riv'r                | Public                                 | None                     | .....             | Yes       |
| St. Paul, Minn....   | 133,000     | Filling lots   | Merz system                      | Public                                 | { Grease &<br>fertiliz'r | 15,000            | No        |
| Wilmington, Del..    | 61,500      | Ashes filling sts.   | To swine                         | Public                                 | None                     | .....             | Yes       |
| Charleston, S. C..   | 55,000      | Filling lots   | To swine                         | Public                                 | None                     | .....             | No        |
| New Orleans, La..    | 242,000     | To river   | To river                         | Public                                 | None                     | .....             | No        |
| Los Angeles, Cal.    | 50,000      | Filling lots   | ½ cremated                       | Pub. contr't                           | None                     | 11,000            | .....     |
| San Francisco, Cal.  | 300,000     | Filling low lots   | Filling low lots                 | Private                                | None                     | .....             | Yes       |
| Sacramento, Cal..    | 27,000      | Filling lots   | To swine                         | Private                                | None                     | .....             | Odors     |

\*For offal. †Aside from crematory.

TABLE II—COST OF COLLECTING REFUSE ANNUALLY PER CAPITA IN VARIOUS CITIES.

|                      |          |                     |          |                         |          |
|----------------------|----------|---------------------|----------|-------------------------|----------|
| Boston, Mass.....    | 17 cents | Toledo, Ohio.....   | 13 cents | Charleston, S. C.....   | 18 cents |
| Haverhill, Mass..... | 54 cents | Chicago, Ill.....   | 24 cents | Washington, D. C.....   | 17 cents |
| Lynn, Mass.....      | 12 cents | Milwaukee, Wis..... | 17 cents | San Antonio, Texas..... | 30 cents |
| Newport, R. I.....   | 20 cents | Keokuk, Iowa.....   | 25 cents | Montreal, Canada.....   | 11 cents |
| New Haven, Conn..... | 8½ cents | Memphis, Tenn.....  | 31 cents | San Francisco, Cal..... | 60 cents |

The Chair: If it is the wish of the Convention, these papers will be referred to the Committee on Publication, and the discussion of them and all other papers will be deferred until the evening session. It is to be expected that we will have a still larger attendance this evening, and that the discussion of these respective papers will have more weight then, and the State Board of Health hopes that the discussion will be very interesting, and that every gentleman present will take five minutes so that we will have the whole evening for discussion. Besides, there are seven more papers to come before the convention, and if you are not tired, I would like to hear another one. I see Dr. P. G. Cotter here from Yuma, Arizona. He has come all the way from Arizona, and is in a cool climate now, and we would like to hear from Dr. P. G. Cotter.

Dr. P. G. Cotter then came forward and read the following paper, which was also referred to the Committee on Publication.

---

#### Medical Inspection of Passengers and Land Quarantine of Cholera Suspects near Yuma, A. T.

Mr. President: In response to an invitation from the President and Secretary of the State Board of Health, I am here to-day to consider with you how the people of this State can be best protected from Asiatic cholera by careful medical inspection of west bound passengers, and effective land quarantine of cholera suspects at some point on the Southern Pacific railroad, near Yuma.

It is not my intent, in the limited time at my command, to give a general dissertation on Asiatic cholera and its history, but rather to confine myself to a few suggestions relative to the necessity of effective quarantine service at the most important gateway into the State from the east and the south.

I shall present the points which seem to me most important, and hope from the discussion of them, to gain much from the experience of many of you who have spent long years of active service in the profession.

The Southern Pacific railroad crosses the Colorado River into California, at Yuma, a progressive village of about thirteen hundred inhabitants, situated near the confluence of the Gila and Colorado. At this point nearly all passengers from the Atlantic and Gulf ports, from the Eastern and Southern States and from Mexico, enter California.

Should cholera become prevalent in Mexico, the inspecting stations at El Paso and Nogales, however efficient, could not reach those who might cross the boundary into the United States at other points along the line or even those who might ascend the Gulf and Colorado River from Guaymas; hence the necessity for stringent precautionary measures at Yuma. Last year an immigrant from Mexico successfully evaded inspection at El Paso, and the inspecting officer telegraphed me to be on the watch for him as he passed through Yuma.

Absolute quarantine is impracticable and will not be considered, but we should see that nothing is left undone that would make our relative quarantine as effective as possible.

The system followed last year in the inspection and detention of suspects is as follows: Boarding the train as it left Yuma, and in company with the conductor, each passenger was seen, and while the conductor took up and examined each ticket, I made inquiry as to where the passenger came from, what route he had taken, and his destination. In case he was an immigrant coming through any of the Atlantic seaports, or from Mexico, he had his certificate from the Inspecting Officer of the United States Marine Hospital service, setting forth the facts of his previous inspection and detention, also that his personal effects had been subjected to sufficient disinfection. If such persons had, since the previous inspection, remained perfectly well and had developed no suspicious symptoms, they were passed, as also were those who had come from places not reported as having cases of cholera. In like manner each passenger was inspected and questioned going



through the entire train. The porters were depended on to give information as to anyone suffering from suspicious vomiting or bowel trouble. If no suspects were found, we were ready when the train stopped at the first station to get off and permit all on board to continue their journey.

If, on the other hand, passengers were found who had come from a reported cholera district (and let me say right here that whenever I saw in the press dispatches that cholera had broken out in any part of the United States or Mexico, I at once telegraphed the health officer of that place, asking to be advised as to the truth of such reports), and if there was such evidences of danger, to demand detention and disinfection of such passengers and their personal effects, then they were informed of our fears as to the danger of permitting them to proceed into the State without disinfection, and the conductor was instructed to have the car or cars which carried such passengers, together with all those riding in the same, to be set out at the quarantine station. The baggage belonging to all detained passengers was also put off and the remainder of the train, if any, was allowed to continue on its way. The railroad company had generously placed a number of box and tourist cars at our disposal at Ogilby, and one of them was fitted up with bath-tub, hot and cold water, carbolic soap, and a supply of clean towels.

The ladies detained first took from their trunks a change of clean clothes and went to the bath car, took their disinfecting bath and complete change, after which they went into the clean tourist car, leaving the clothes worn during exposure to infection to be hung on their respective seats for fumigation. Then came the men, who were each in their turn likewise treated to a disinfecting bath and change of clothes. When all had changed, the clothes worn were taken to the side-tracked cars and were arranged for fumigation. The doors, windows and ventilators were closed and the steam kettles started to saturate the atmosphere in the cars with moisture. When this was accomplished, the fumigating process was begun by placing six to eight pounds of sulphur moistened with alcohol in an iron pan, which was set on a couple of bricks in a tub containing a couple of inches of water. This tub was placed in plain view from the window in the door at one end of the car and the sulphur ignited. The fumigation was continued for twelve hours. Then the windows, doors and ventilators were thrown open and the car thoroughly ventilated before any one was permitted to enter it.

Each passenger packed up their fumigated effects and the car was dusted out and made ready again for use.

In case that passengers actually suffering with cholera should be found, then every portion of bedding, carpet or clothing soiled in the car by the discharges, should be either burned or boiled till there is no longer any danger of active cholera germs present, and the closets should be subjected to the most rigid cleanliness and disinfection.

The proper care of the sick is the one duty requiring most of us in the way of suitable quarters, nurses and medical attendance, hence the great necessity wherever a refuge station is established of equipping it thoroughly with all necessary means of caring for the sick and giving them the benefit of the most approved line of treatment. Every means necessary should be at hand for collecting, disinfecting and destroying all dejecta, as well as for the safest disposition possible to be made of the dead.

In the treatment of cholera we should bear in mind that nature in her struggle with the malignant disease germs has reversed the function of the gastro-intestinal canal, changing it from an absorbing to an excreting organ.

I believe that the experience of Dr. Elmer Lee, in Russia, last year, and his line of treatment, is worthy of a trial. He claims that early irrigation of the large intestine, passing the tube well up into the colon, stimulates the activity of the small intestine and thus relieves the patient of much putrid matter. Follow the irrigation of the bowel by a warm bath and clean bed, and when the patient is cleaner outside and inside, give hydrogen di-oxide diluted with distilled water in cupful doses every three hours. Introvenient injection of a saline solution composed of sodic chloride six parts, sodic carbonate one part and distilled water one thousand parts will help nature to stand the depletion of the fluids of the system.

Owing to the well known germicidal properties of quinine it should be given by the mouth in five-grain doses every few hours.

□ It may be given hypodermically as well, as also can be caffeine, brandy and ether as indicated.

The cramps are best controlled by rubbing, or by application of cloths saturated with the chloroform.

Mild stimulating treatment with champagne and ice will aid in establishing the reaction, and then mild symptomatic treatment is all that will be required.

A suitable site for the refuge station is necessary, that the sick may be isolated from the well, and due attention be given to the needs of both. The site should be selected near the line of the railroad, yet a safe distance from the contact of others, and within a reasonable distance from the basis of supplies.

The railroad runs for the first six miles west of Yuma through the Yuma Indian Reserve, and for the next few miles the land is too uneven for a proper location. East of Yuma the road is on a beautiful mesa, near its border, and overlooks the green bottom lands of the Gila River. There, six or eight miles east of Yuma, would be the most suitable and economical location for the refuge station. But that is outside of the jurisdiction of California, and the co-operation of the Governor of Arizona would be necessary. This I believe can be obtained, because in passing through Yuma the railroad is laid the entire length of the village, through one of the principal streets. If Arizona will not co-operate, then the protection of this State at that point had better be entrusted to the United States Marine Hospital Service,

(Here the Convention took a recess till 7:30 P. M.)

---

### EVENING SESSION, 7:30 P. M.

---

The Convention reconvened with Vice-President, Dr. William H. Mays, in the chair.

Dr. William F. McNutt, of San Francisco, was introduced and spoke as follows:

Mr. President and gentlemen of the Convention: I see by the printed programme that I am down for an address on this occasion. My young friend, Dr. Winslow Anderson, asked me to come here and make a few remarks, and I consented, but it was not my intention to advance anything rising to the dignity of an address. I am very glad that he gave me an opportunity of expressing my sympathy with this work, with the development of the science of hygiene, and to express my sympathy with this Association.

It has always appeared strange to me, almost unaccountable, that while so many thousands, even millions of dollars, and so many lives have been spent in the investigation of other subjects and other sciences, so little has been done, and is being done, with the science of hygiene. People will spend their lives perhaps in studying the fauna and flora of countries or trying to unravel the mysteries of prehistoric races, or in perhaps spying the heavens for new stars, while they give no thought, and take no interest apparently, and no trouble to protect themselves against the diseases and epidemics that are carrying human beings off by the thousands, that leave desolation, misery, crime and poverty in their track. It is only about fifteen or twenty years ago when there was not a medical college in the whole land that had a chair of hygiene, that gave any systematic instruction in hygiene, and to-day there are but few of them, and outside of the medical colleges there is hardly a college that pretends to teach the science of hygiene, or preventive medicine, or the causes of disease. However,

hygiene is pressing for recognition. The importance of the subject is every day becoming more and more apparent, and I am sure the time will not be long until it will occupy an important part in the physical and social history of the world. How long that time will be, will depend very much upon the enthusiasm and the intelligence of these sanitary associations.

It will not do for these associations to have a convention now and then, and read a paper or two on sanitation; that will not accomplish a great deal. This Society should, for instance, use its influence in establishing the teaching of hygiene, of sanitation in every school, in every college, and in every university in the State. The school boys of to-day will be the supervisors, school directors, state legislators of to-morrow. The young men in our universities this year will be our congressmen, our senators and our cabinet officers next year. Only a few months ago we saw in the papers that the question of a national quarantine law was discussed in our national assembly, and perhaps you all remember that the knowledge that the most part of our learned lawmakers possessed of the science of hygiene was about equal to the understanding of our Digger Indians about flowers; just about. And there they are to make laws, national laws. One gentleman, I remember, I think he was from Kentucky, said he would content himself with seeing that no national quarantine law should interfere with the sovereign rights of his State. That was his idea of a national quarantine law. So long as the dogma of State's rights was not interfered with, he was satisfied.

We have in this city a gentleman who has given a goodly portion of his life to sanitation. He understands perhaps as well as any one, and probably better than most men, the laws of hygiene. A few weeks ago I gave him some letters to some of our school directors with a view that he might establish a course of lectures in our high school, on sanitation. The school directors thought it might be a good plan, but there were no rules of the school department for the teaching of sanitation. I suggested to him that he might then, perhaps, give the school directors a few lessons or a few lectures in hygiene. Now, perhaps, this society could assist our school boards in establishing rules for the teaching of hygiene in our public schools. That might influence the legislators to pass a law regarding the teaching of hygiene, and enable them in that way to provide for this highly necessary instruction.

I did not purpose to give an address, I simply wanted to express to you my sympathy in this work, and my appreciation of it, and I thank you for your attention. [Applause.]

In the absence of Dr. Kober, his paper on "Etiology, Distribution and Prevention of Land and Ship Cholera," was read by Dr. C. W. Nutting, and referred to the Committee on Publication.

---

### The Etiology, Distribution and Prevention of Land and Ship Cholera.

BY GEORGE M. KOBER, M.D., FORT BIDWELL, CALIFORNIA.

The home of cholera is in the delta of the Ganges, and in other parts of India and the Orient. Epidemic extensions from there take place, by sea or overland,

by means of persons suffering or recovering from the disease, or by infected articles.

Cholera is generally introduced into Europe by way of Arabia, Egypt or the coast of Asia Minor; sometimes it follows well beaten routes of travel from Persia into Russia and the Continent. In this way, epidemics have visited Europe in 1830, 1831, 1837, 1848, 1852, 1866, 1867, 1871, 1873, 1884, 1885, 1886 and 1892, and from there the disease generally invades our own country in the same or following year.

**ETIOLOGY.** Some physicians, among them Guerin and Cunningham, believe Asiatic cholera to be of autochthonous origin; that epidemics are not the result of an infectious substance excreted by the patient, and rely for their argument upon the fact that outbreaks have been observed, which could not be connected with a pre-existing case; but we all know how difficult it is to exclude every possibility of infection. Pettenkoffer looks upon the cholera germ as ectogenous, similar to that of malaria; and holds that it can only develop and mature into a pathogenic factor *in the soil*, when suitable conditions of heat and moisture are present. According to his doctrine, contact with the disease offers no danger, epidemic extensions on ships, through the mediums of the water supply, dejecta and soiled linen are impossible, restrictions in travel, disinfection of the patients, excreta and effects are perfectly superfluous, but that attention to the soil which furnishes the local and seasonal predisposition is of the utmost importance.

In the recent cholera epidemic in Germany (1892), Munich escaped; and as commerce and travel between that city and those in which the epidemic raged was unrestricted, Pettenkoffer refuses to believe the escape of Munich to have been due to the non-transport of the comma-bacillus to that city, and attributes it to the absence of certain atmospheric and local conditions, necessary to the development of the disease.

On the other hand, Prof. Koch, and by far the majority of sanitarians, maintain that the "comma-bacillus" is the specific etiological factor of the disease, because this micro-organism is constantly found in the excreta of cholera patients when examined in the fresh state, and in the early stages of the disease, and has never been found in other diseases; moreover, inoculations of pure cultures of this bacillus into susceptible animals have produced the disease in question, and several accidental infections by experimenting physicians have been reported from Berlin. Pettenkoffer and Emmerich in October last, to prove their theory and show contempt for the cholera bacillus, actually swallowed a bouillon culture, and the former developed a choleraic diarrhœa, and Emmerich a mild attack of cholera. In both cases the watery stools contained cholera bacilli in large numbers; in Emmerich's case on the seventh day of the attack, the rice water discharges contained pure cultures of the "comma-bacillus." Whilst not denying the observation of Bauer and Von Ziemssen, that the clinical picture of these cases differed materially from Asiatic cholera, we cannot ignore the possibilities, that neither subject afforded the necessary individual predisposition; that the bacilli having been cultivated on agar and in bouillon had lost a measure of the original virulence, and lastly we certainly must admit the occurrence of very mild cases of cholera. The unbiased observer, in reading the experiments referred to, will conclude, that if the train of symptoms, accompanied by reproduced cholera bacilli in the stools, are not characteristic of cholera, it will be difficult to account for them in any other way. Indeed, the majority will find in them an example of Koch's "conditions, upon the proof of which alone can it be definitely stated, that a particular microbe is the cause of a certain disease." They are as follows:

*First*—"The micro-organism must be found in the blood, lymph or diseased tissues of man, or animal suffering from, or dead in consequence of the disease."

*Second*—"The micro-organisms must be isolated from the blood, lymph or tissues, and cultivated in suitable media outside the animal body, and these pure cultivations must be carried out through successive generations of the organism."

*Third*—"A pure cultivation thus obtained, must, when introduced into the body of a healthy animal, produce the disease in question."

*Fourth*—"In the inoculated animal the same micro-organism must again be found."

Neither Koch nor his adherents have ever claimed that the cholera-bacillus is the *only etiological factor* in the production of an epidemic; but we do aver, that it is the *one* factor, without which no case of cholera can occur.

The testimony of all the observers in the recent epidemic in Germany shows, that the disease can occur in such a mild form, that no suspicion as to its nature would be aroused were it not for the biological examination; and Dr. Biggs ("Am. Jour. Med. Sciences," Jan'y, 1893,) is quite certain, that such examinations, made by Dr. Prudden and himself, were alone the cause of the exclusion of epidemic cholera from New York in 1887, and of the greatest importance in assisting the health department in the outbreak of 1892.

**CHARACTERISTICS AND BIOLOGY OF THE CHOLERA-BACILLUS.** For the purpose of microscopical examination, we should make a cover glass preparation of the intestinal mucus; dry the specimen in the air, heat it over the flame, stain with gentian, violet or fuchsine, and examine for the characteristic comma bacilli. Sometimes they are sparsely present, or other micro-organisms may preponderate; in such an event, mix one part of the suspected dejecta with two of alkaline bouillon, and keep in an open glass vessel for about twelve hours at a temperature of between 65°, 104° F. The comma-bacilli will develop colonies near the surface, and small samples prepared on slides as directed above will reveal their character. Plate cultures should also be made; for this purpose mix a little of the flocculent mucus in a test tube with ten per cent slightly alkaline nutrient gelatine, which after thorough shaking pour upon the plates; the colonies develop within twenty-four or forty-eight hours, at a temperature of 60°, 65° F. and are circular, with irregular edges, coarsely granular and pale. Around the colony there is a zone, in which the gelatine is softened and its surface depressed. The contour and general characteristics of these plate cultures vary somewhat, depending upon the temperature under which they were developed, the size of the diaphragm and whether examined after twenty-four or forty-eight hours' growth, and every physician should make himself familiar with the details of a bacteriological diagnosis, so clearly described by Prof. Dunham in the "Am. Jour. of Med. Sciences" for January, 1893.

As an additional safeguard Dunham advises, that as soon as the colonies upon the plate cultures have grown enough to develop their characteristic appearance, material from them should be used to make gelatine tube cultures. The culture medium is prepared from a cold, aqueous extract of lean beef, to which one per cent of peptone, one-half per cent of salt and ten per cent of gelatine is added; the tube is inoculated and exposed at a temperature of about 70° F. After three or four days, a funnel-shaped colony or hanging drop preparation will be observed with the base towards the surface of the tube. By means of a sterilized platinum wire a portion of this colony is transferred into two cubic centimetres of a sterile solution of one per cent peptone, one-half per cent of salt in distilled water, placed in the incubator at about 96.8° F. for six hours, or if kept at a temperature of 70° F., then at the expiration of twenty-four hours, examine the form, arrangement and motility of the individual bacteria of these "hanging drops." Afterwards pour a few drops of concentrated strictly pure sulphuric acid down the inner surface of the tube, so that a layer of the acid is formed below the culture. Watch for the "Bujwid-Dunham's reaction," marked by a distinct rose tint, sometimes tending towards lilac. By this method it is possible to diagnose Asiatic cholera from cholera nostras, cases of arsenical poisoning, etc.

It is quite true, that micro-organisms similar in appearance to the comma-bacillus have been found by Finkler, Prior, Lewis and Miller, but they are never identical and can be readily distinguished by the plate and tube cultures.

Whilst the comma-bacillus develops best in contact with oxygen, it does not cease to multiply by exclusion of the air, indeed they may multiply in suitable soil, at a depth of ten feet, when heat and moisture are present. The germs develop best at a temperature between 86°, 104° F.; a temperature of +60° F. arrests their growth, but even a temperature of -14° F. does not destroy their vitality; they are effectually destroyed by drying (an argument against aerial transport in a dry climate), also by a temperature of 190°, 212° F.; exposure to a five per cent solution of carbolic acid, or 1:500 solution of corrosive sublimate, also the normal gastric fluid will kill the germs. The bacillus does not develop spores.

Uffelmann ("Berl. Klin. Wochensh.," 1892, No. 48) has shown, that the bacilli remained viable in water, for from five to six days; in milk for about three days; on the surface of bread exposed to the air for about a day; between slices of bread, kept more or less moist, for eight days; in butter for three days; on cooked meat, kept moist, for eight days; on apple and cauliflower, for four days; on paper, for about one and one-half days; on copper and silver coins, for only ten minutes

after thorough drying; on dry clothing, for four days, but on moist linen, for twelve days, or even longer; in decomposing fæces, one to two days; in exceptional cases, three to fifteen days. (Gruber.) It was also shown by Uffelmann, that for two hours after walking through cholera dejecta, house flies were capable of infecting nutrient media, and that the dry skin of the hand preserved the germs alive for somewhat more than an hour after contamination.

**PATHOGENIC ACTION.** There is every reason to believe, that the pathogenic effects of the cholera bacilli consist in the production, in the digestive tract, of ptomaines (cadaverin and putrescin) which cause the primary lesions and also after absorption, other toxic effects.

The germs most likely gain admission into the digestive tract and proliferate there as evinced by the intestinal lesions, the presence of the bacilli in almost pure cultures in the dejecta, their absence in other parts of the system, and the improbability of transmission through the air.

**MODE OF INFECTION.** Water and food are doubtless the most common media for the transmission of the germs. The histories of cholera epidemics afford abundant evidence on this point. Of course there are instances, where the evidence is far from conclusive, but nevertheless suggestive, that the water supply was the principal source of disseminating the disease. To-day, evidence is still wanting as to the source of the first case of the disease in the recent Hamburg epidemic; it is believed, however, that the germs were brought from Baku on the Black Sea, and found their way into the city water supply. This can be readily accounted for, when it is understood, that the water supply is derived from the river Elbe, that the sewage of the city is poured into this stream, and that the ebb and flow of the North Sea are perceptible at the source of the supply, virtually permitting diluted sewage to be pumped into otherwise defective reservoirs. The epidemic was limited to Hamburg, almost sparing the neighboring cities of Waldeck and Altona exposed to the same climatic conditions and probably also of soil, but having their own separate water supplies. (Reiche, "Am. Journal Med. Sciences," February, 1893.) But what is more, Posner ("Berliner Klin. Wochenschrift," 1892, No 48) informs us, that the cases of cholera which occurred at Altona, developed in those houses in a certain street which were supplied with water from Hamburg, but passed over those houses receiving water from the Altona water supply. Plate cultures of the Hamburg water supply failed to demonstrate the presence of cholera bacilli, but the general facts, as well as Krapelin's studies of the fauna of the Hamburg reservoirs, showing that they furnish conditions most favorable for the existence of vegetable and animal life, indicate that the water supply was the principal factor in disseminating the germs. Mild attacks of summer diarrhoea were of frequent occurrence, according to Reiche, in the weeks preceding the outbreak, and these whether due to the impure water supply or meteorological conditions naturally favored individual predisposition. Mitra in describing the cholera epidemic in Kashmir in 1892, says:

"The population is crowded into twenty-five thousand low, dirty houses built irregularly on narrow lanes and alleys, which are used as latrines. There is no drainage, and the storm water washes the filth and ordure into the Nulla Mur and into the river from which the drinking water is obtained."

There are striking instances on record (Simpson, "Ind. Med. Gaz." May, 1887,) that the germs have been transmitted through the milk supply, which had been diluted with water from infected sources. Articles of food, as shown by Uffelmann, may be the carriers of the germs, the result of having been handled with infected fingers, washed with infected water or touched by infected insects. Nurses and laundresses frequently infect themselves by means of their fingers carelessly introduced into the mouth. The possibility of transmission of the germs by means of soiled clothing, linen, effects and merchandise should not be underrated.

The importation of the disease by means of infected persons plays of course the most important role in the distribution of the germs.

The epidemic of 1884-85 in Spain was brought to Alicante by the Buena-ventura which landed passengers, among them a child sick with cholera. The pilgrims to Mecca have been known for years to be carriers of the disease; the first cases of the epidemic at Havre in 1892, came from the suburbs of Paris. (Gibert.)

**INFLUENCE OF THE SOIL, LOCAL AND SEASONAL PREDISPOSITION.** It is certainly true, that a peculiar constitution of the soil in many localities favors the develop-

ment of the germs, and there are localities which appear to prevent epidemic extensions, and this is even true of some parts in India. Pettenkoffer claims, that a porous soil, more or less polluted with organic matter and possessing a certain degree of moisture, is absolutely essential for the development and maturity of the cholera germ. If the soil is *too* wet, as at Lyons, it cannot mature; if *too dry*, as at Multan, the same result may be expected. He also points out, that houses erected on ridges enjoy greater immunity than those situated in depressions; that low-lying districts are visited in preference to higher elevations, and that proper drainage has exerted a most beneficial influence in the prevention of the disease. These facts cannot be denied and certainly show, that in addition to the specific germ, we have to deal with local predisposing factors. It does not follow, however, that this influence depends *solely upon the soil*, for it is equally possible, that the *water* may favor or prevent the development of the germs; the locality may not be supplied with wells, or if so, the arrangement of privies and drainage may prevent access of the germs into the water supply; nevertheless it is fair to assume, that the constitution of the soil, just as in typhoid fever, may favor or retard the development and final percolation of the germs into wells. In addition to the influence of the soil and water supply, the seasonal or climatic disposition cannot be ignored.

In Europe, and in this country, most of the epidemics present the greatest intensity during the late summer and fall, and subside with the approach of cold weather; possibly to return the following summer. It has also been observed that after the first showers of rain, succeeding a warm dry season, the extension of the disease was greatest, whilst prolonged rains diminished their intensity. It is evident, therefore, that the specific germs attain their greatest virulence when the temperature of the air and consequently of the soil is just suitable, and that a combination of a certain degree of heat and moisture constitute suitable environments for the cholera virus. The rise and fall of the ground water, which fluctuates with the rainfall, not only influences the proliferation of the germs, but also their transport into the well water, and the degree of impurities contained therein.

The rise and fall of the ground water naturally influences the ground air, and whilst the germs may be borne by "ascending currents;" in the light of their biological character such a mode of infection seems doubtful.

**INDIVIDUAL PREDISPOSITION.** What constitutes this mysterious factor in the production of the disease? Is it a weakness of the organism, a diminished power of resistance? Or is it a peculiarity of the tissues, cells or fluids which places them at a disadvantage in their struggle against the invasion and effects of these germs? Is it the addition or subtraction of a certain something in the blood or fluids, which furnishes a suitable pabulum for their growth? These questions cannot be ignored in the consideration of the contagiousness of certain bacteria, like those of cholera, typhoid fever, diphtheria, dysentery, etc.

All we know is, that infectious diseases differ more or less, like other diseases in degree; that there are mild and malignant cases, and it is not improbable that immunity in certain cases is due to the inaptitude of the organism to feel the effects of the ptomaines evolved by the microbes; that germs of infectious diseases may exist within the body, and the disorder they give rise to may be very slight, or entirely absent. In brief, infectious disease does not exist merely because some noxious micro-organisms have taken their abode in the system; they exist because functional or structural changes are brought about, through the agency of ptomaines. Klemperer ("Berl. Klin. Wochensh." 1892, No. 39), with subcutaneous inoculations of cultures of cholera-bacilli, claims to have succeeded in conferring upon man immunity from cholera, as indicated by the protective influence of the blood serum of the immune individual upon guinea pigs in a degree proportionate to the virulence of the protective inoculation. He was also able to demonstrate that some persons possess a *natural* immunity from cholera, much less in degree, however, than the immunity artificially conferred. Dr. E. O. Shakespeare, of Philadelphia, has announced a paper on this subject, to be read before the Association of American Physicians in May next.

Clinical experience teaches that faulty nutrition, debility, digestive derangements (particularly gastric and intestinal catarrhs), alteration of the gastric juice from an acid to an alkaline or neutral reaction, debauches, improper food, especially raw, unripe or decayed fruits and vegetables, and excesses of all kinds favor the development of the disease. Mental anxiety and fear also help to depress the *physical* and mental elasticity, and correspondingly the power of resistance.

One attack of cholera affords, for a time at least, immunity; no age is exempt, although it attacks most frequently persons between the age of fifteen and thirty years.

**SHIP CHOLERA.** One of the strongest arguments against Pettenkoffer's theory, that it requires a *suitable soil* for the development and maturity of cholera germs, is the occurrence of outbreaks on sailing vessels and steamers.

Koch, in 1872, reported eight instances; in 1873, the same number, and in 1874, twenty outbreaks of this kind. In 1884, cholera broke out on the steamer *Matteo Bruzzo*, from Genoa to Montevideo, and attacked forty persons. This steamer returned to Genoa without having been permitted to touch land. The steamer *Moravia*, which sailed from Hamburg August 16, 1892, reported twenty-two deaths during the voyage from "gastro-intestinal disorders." Cholera was first recognized at Hamburg on August 11th. The *Normania* and *Rugia* reached New York from the same port September 3d. Each of these reported a number of deaths at sea from "cholera," and arrived with four cases on the *Normania* and five on the *Rugia*. Later the *Scandia*, *Heligoland* and *Bohemia*, all from Hamburg, arrived and reported deaths at sea from "gastro-intestinal diseases."

The incubation period of cholera is usually from one to two days, the maximum period scarcely exceeds seven days, and whilst we can readily admit that all cases attacked within seven or eight days after leaving the port imbibed the germs on the land, it is equally reasonable to assume that those attacked at a later interval imbibed the germs on board, and that they must have attained their virulent character without the *intervention of the soil*.

**THE PROPHYLAXIS OF CHOLERA.** Conflicting theories as to the etiology of the disease have, unfortunately, resulted in different views regarding preventive measures. Pettenkoffer and his adherents, as before stated, do not believe that the dejecta of cholera patients contain a matured pathogenic germ, and that they can be conveyed in the drinking water, and therefore regard it as wholly unnecessary to restrict intercourse or to disinfect the dejecta, clothing, and effects of patients, or to boil the drinking water. They insist, however, upon proper drainage of the locality, prevention of soil-pollution, and the removal of the individual predisposition by improving the general nutrition, avoidance of catching cold allaying fear and proper attention to the cutaneous function.

Koch and his followers, whilst fully appreciating the importance of other predisposing causes, believe the comma bacillus to be the one factor without which no case of cholera can occur; they hold that this germ is found sufficiently virulent in the dejecta of patients and is capable, when introduced into the digestive tract of a susceptible individual, of producing the disease in question. This school looks upon the first cholera patient as the chief source of danger in spreading the disease, and with a view of preventing at the outset the introduction of the poison, they insist upon prompt recognition and proper isolation, and that no suspicious case should be permitted to enter our ports or cross our borders.

Under these circumstances, the safety of our own people demands the careful inspection and disinfection of all passengers and effects prior to sailing from foreign ports, and this should be done by competent physicians representing the Pan-American Governments. The vessels carrying passengers should be perfect in their sanitary appointments, and provided with pure drinking water. Dr. Wilcox, in describing the cholera of 1892, in New York ("Am. Jour. Med. Sciences," January, 1893), remarks: "On August 19th, on information that the disease was suspiciously near the German frontier, the Department of State was requested to make inquiries through consuls to ascertain if cholera existed in Germany. On the 23d, having received reports from Bremen, Hamburg and Stettin, the two latter being unsatisfactory, the Hamburg-American Steamship Company was notified by the health officer to use great caution, to disinfect baggage and clothing, and to detain passengers at Hamburg for five days. How far these orders were carried out was ascertained on the arrival of the *Moravia* on the 30th, when it was learned that the immigrants had embarked immediately upon the arrival of the train, and that there had been twenty-two deaths among twenty-four patients, the first case occurring on the first day after leaving Hamburg. It is evident that the cholera gained its entrance into New York harbor solely by the negligence of the steamship company. The disease can be stamped out on shipboard in five days by competent medical officers, and should be done at sea. Under the direction of the health officer it was done in every case after the steamships came under his jurisdiction in New York harbor. The sick and dead were removed, the immigrants received baths, having been previously rubbed with a bountiful



supply of green soap. A sail suspended by the four corners, the water being constantly renewed, was an excellent though an improvised bath-tub. The crew's quarters and the steerage were scrubbed and washed out with a 1:500 solution of corrosive sublimate. The fumigation with sulphur was carried out. The baggage and clothing were disinfected by sulphur, superheated steam, and when injury would not be done, by corrosive sublimate solution. Soiled bedding and clothing were wrapped in sheets wetted in corrosive sublimate solution and burned in the furnaces. Lastly fresh water was supplied, and only used after boiling. Proper regard for the lives of passengers demands that this work shall be done at sea."

With proper quarantine regulations and the hearty co-operation of state and national authorities, it would seem possible to prevent the entrance of the germs by the coast. If for any reason the disease should gain a foothold, the difficulties of establishing a land "*cordon sanitaire*" would of course be great, as they are often broken through. The disease, however, shows a predilection for well beaten routes of travel, and the State of California, upon approach of danger, apart from the marine quarantine, should not fail to establish inspectors at our border railway and overland stations, with a view of detaining and caring for all suspicious cases. This, of course, requires suitable equipments, but let it be remembered that the recognition of the first case of cholera is of vital importance in preventive medicine. Every suspicious case should be treated with precautionary measures, until the diagnosis has been confirmed or rejected. The patient, wherever found, should be isolated and the nurse instructed how to disinfect the dejecta and soiled effects, and to protect himself. Muriatic acid one part, to five parts of water, or 1:500 solution of corrosive sublimate, allowed to remain in contact with the dejecta for one hour, will prove most efficient in destroying the germs. A three per cent solution of carbolic acid, superheated steam, dry heat 212° F., are proper disinfectants for clothing, linen, bedding and effects. The floors should be scrubbed and washed with the sublimate solution. Nurses should be warned of the danger of carrying the germs by means of the fingers to the mouth. In case of death the body should be washed, if at all, with the sublimate solution, but preferably wrapped in sheets wetted with the same. Soiled bedding and clothing should be wrapped in sublimated sheets and burned. No articles of food or effects of any kind should be removed from a quarantined house or station, except by permission of the health officer.

Upon the approach of cholera, the public should be instructed how to guard against the disease, by proper food, avoidance of fear, indiscretions in diet, debauches and excesses of every description.

None but the most wholesome food, properly cooked, should be consumed. The water and milk should be boiled before drinking; the addition of 1% of citric acid, or 1:1000 of muriatic acid to the water, to be kept in porcelain receptacles, has been recommended. The hands should be frequently scrubbed with soap and brush, especially before meals, and the system should be placed in the best possible condition to resist the disease. For my own part, I believe that immunization by inoculations of cultures of cholera bacilli will constitute, sooner or later, a most important individual prophylactic measure.

Apart from all this, proper drainage and sewerage, prevention of soil pollution, a good water supply, cleanliness within and without the premises, disinfection of water closets, urinals, privy vaults, gutters and court-yards, in fine, suitable sanitary environments, cannot fail to have a most beneficial effect in the prevention of cholera, as well as in all other infectious diseases, and the efficacy of these measures is often evident within a very few days.

Dr. Henry S. Orme, of Los Angeles, read a paper entitled "A Few Sanitary Suggestions in Regard to Cholera," etc., which was also referred to the Committee on Publication.

#### A Few Thoughts About Cholera, Sanitary and Otherwise.

BY H. S. ORME, M.D., OF LOS ANGELES, CAL., EX-PRESIDENT CALIFORNIA STATE BOARD OF HEALTH AND STATE MEDICAL SOCIETY, ETC.

The reappearance of cholera at several points in Europe since the relaxation of the winter's frosts, admonishes us of the necessity to prepare for its coming again

during the early part of the present season. It must not be forgotten that the disease actually made a landing in New York last year, and that for the first time it was stamped out on the threshold. We must not presume that such success can be achieved every time. The chances are that the next time the result may be quite different. One thing we may well apprehend, this is: In case cholera again effects a landing, that it will be necessary to resist its advance at every point. New York is only five days by rail from California. It is therefore possible for the infection to be carried in personal effects of passengers across the continent, and to light up a new focus of action in a little more than a week.

But our greatest danger is not through the port of New York. It is now reported in the daily press that the health authorities at Halifax and Montreal are lax in their dealing with the personal effects of steerage passengers, who are landing by thousands from ports of Northern Europe, France and the British Islands, although it is known that cholera reappeared weeks ago at Hamburg and L'Orient. It is probable that some of these immigrants are destined for the Pacific Coast, and they can travel altogether through Canadian territory at a cheaper rate than through the States of our Union. As witness, to-day's dispatches inform us that cholera has appeared at Winnipeg among two hundred and fifty-six immigrants from Southern Russia, who were landed at Montreal and shipped by the Canadian Pacific Railway, en route to North Dakota and other States.

It is important that any such destined for California should be intercepted at our borders, and not be allowed to bring infected personal effects among our people by land or sea.

It has been proposed to suspend the admission of steerage passengers through ports of the United States during the present season, but it seems to me that inasmuch as we cannot prevent their landing at Canadian ports, it will be easier to deal with them at our own sea ports than at the one hundred or more points of land communication along a border of three thousand miles. Besides, we have the advantage of inspection by consular officers of health in foreign ports of passengers destined for our own country, which cannot be made too strict.

These points are generally understood by intelligent persons. Those individuals and our population at large look to our State Board of Health for protection.

Fortunately, the Legislature has made more liberal provision than ever before to meet such emergencies, and the people have a right to expect something to be done by way of preparation, and proper action to be taken whenever danger is at hand.

It is especially important to guard against all risk of panic; for aside from the menace to the public health which results from distrust and fear, the damage done to the business interests of the people by interruption or serious derangement of traffic on public lines of transportation, soon runs into millions, without counting the inconvenience of deprivation of accustomed supplies. It must be remembered that alarmed people have repeatedly, and not very long ago, taken the regulation of public traffic into their own hands, and that they are rather sure to act again in like manner whenever they distrust the constituted authorities. It is only fifteen years since "shotgun quarantines" dominated transportation lines and regulated the movements of individuals through extensive districts in several of the States of the lower Mississippi Valley, and several times since they have been seriously threatened. Human nature has not changed much in the intervening period.

The discovery that the outbreak of cholera at Hamburg was due to the contamination of the water supply from the River Elbe, is an admonition that the various sources of water supply in California should be guarded from pollution by cholera germs.

The "Abstract of Sanitary Reports" of March 31, 1893, (published by the United States Marine Hospital Service), shows that the authorities of Hamburg are hurrying to completion their improvements for a pure supply of water. It would have cost less as a public work if performed years ago, and besides have saved the recent loss of life and damage to business from the cholera visitation. Can California profit by the example without paying like penalties?

Avoidance of pollution is especially important and difficult when water is taken from streams, and navigable streams are the most dangerous of all because they must receive the dejecta of travelers. Some provision should be made to prevent the spread of cholera contagion through the medium of discharges upon land and water by passengers upon railways and steamboats, for although we hope to

keep the disease beyond our borders, we should be prepared to act when it has gained entrance.

Such a condition as the actual presence of cholera on our soil should not occasion despair. We have seen that it was stamped out a few months ago at New York. It has been stamped out in the delta of the Nile since the prohibition of casting those dead from cholera into the river. It is even thought practicable to prevent like defiling of the Ganges, by compelling the Hindoos to cremate cholera corpses, after which they might be allowed to cast the ashes into the sacred stream.

Surely what can be accomplished along the Nile should not be regarded as impossible along the Sacramento and San Joaquin.

Dr. Winslow Anderson, of San Francisco, followed with a paper entitled "Milk; its Adulteration and Relation to Infectious Diseases, with Remarks on Food Adulteration in General," which was also referred to the Committee on Publication.

**Milk, its Adulteration and Relation to Infectious Diseases, with Remarks on Food Adulteration in General.**

BY WINSLOW ANDERSON, A.M., M.D., M.R.C.P. LOND., ETC.

*Mr. President and Members of the Sanitary Convention:*

The remarkable progress in science that has marked this century, now rapidly drawing to its close, has been fully participated in by all branches of the healing art, and especially so by hygiene and demography. The substantial unanimity with which prophylaxis has maintained its supremacy as the main agency for diminishing the ravages of disease, was never in a more satisfactory condition.

The microscope and the chemical laboratory have made it possible for us to pry into nature's secrets, and to wrest from her a knowledge of the origin, as well as the means of successfully combating many of the contagious and infectious diseases.

We know now that cholera is contracted through our food and our drink, and that the disease is a preventable one. Last year I spent many weeks in India with cholera raging all around us. The only precautions we took were about eating and drinking. We looked well to the "boiling of our ice" before using it. We had our utensils cleansed with boiling water, and took the utmost care to swallow nothing that had not been thoroughly cooked. Dr. Simpson, the efficient Health Officer of Calcutta, assured me that there was not the slightest danger of contracting cholera if the food and drink were thoroughly boiled. He had treated hundreds of cases of cholera and never knew of its spreading or being contracted in any other way than by taking it into the stomach with water or undercooked food.

Specific inoculation methods of preventing disease also promise well, even for cholera and tuberculosis. By its means the mortality of smallpox has been reduced from fifty deaths in one hundred to five deaths in one hundred. Hydrophobia has been reduced in about the same proportion. Typhoid fever need never spread if thorough disinfection of the excreta be observed. The spreading of scarlet fever, diphtheria, measles, whooping cough, etc., can be controlled by isolation and disinfection. We also know from practical experiments carried on in Michigan upon thousands of acres of land, that subsoil drainage will eradicate the malarial miasmata; and I thoroughly believe that a perfect system of sewerage in San Francisco, and a careful inspection of our food, water and milk supply, will reduce our present rate of mortality one-half, that is, instead of having an annual death rate of nineteen or twenty in one thousand, it will be eight or ten in one thousand.

That cholera, typhoid fever, diphtheria, scarlet fever, etc., are contracted and disseminated by contaminated water, no one will deny; hence, I believe that our water supply should be under scientific sanitary surveillance. In connection with the contamination of our water supply, I desire to call your attention to the danger of our so-called filters. These, as you know, are constructed on different plans, but the principle is the same. Water passes through porous plaster of

Paris cylinders, or through charcoal, sand, etc., for the purpose of absorbing and retaining all inorganic impurities held in suspension in the water. The statement that all soluble impurities, such as the nitrates and nitrites, the albuminates and salts, are filtered out, or that disease breeding germs *could be filtered* out, is of course ridiculous, as nothing short of distillation and chemical precipitation will remove these soluble organic poisons from any water, no matter how many filters it passes through. It is the *insoluble* organic and inorganic impurities held in suspension that are caught in the porous filters, and here is just where the danger arises. These cylinders or carbon—sand, charcoal—arrangements, filled with organic impurities, remain in the filters for *weeks* and *months*. It is safe to say that no filter is thoroughly cleansed within one week, and most of them are not cleansed for a month at the time. Now, what is the result? Why the organic debris undergoes fermentation and decomposition in twenty-four hours, and as the water used for drinking purposes passes over this ever increasing mass of decomposing organic matter, it must of necessity become polluted and poisonous. I had a practical experience of this in a family of seven, living on Pacific Avenue. A filter, the latest improved, had been put into the house to supply *absolutely* pure water to the inmates. It had been in working order for two or three weeks, when one or two warm days came, and with them more rapid decomposition in the filter. The result was that the entire family was stricken down with gastritis—vomiting and purging—with great depression. I examined carefully into the probable cause. The milk, meat, vegetables, etc., were analyzed without finding a cause for such severe symptoms. In looking about closets, traps and sinks, my attention was drawn to a bad odor which came from the region of the filter. On closer inspection it was found that the plaster of Paris cylinder or charcoal filtering material were foul with decomposing matter. A watery solution of this material was given to a cat, which developed all the symptoms of an irritating alkaloidal poisoning, with such great prostration that it was unable to walk. I may say that all the patients as well as the cat recovered after several days. A similar case of foul water from filters occurred in the Bohemian Club of this city.

The remedy is to renew your filtering material *daily*, or better still, boil your water and your *ice* in case of an epidemic.

Most of our sewers and house-drains in San Francisco are in a deplorable condition. The sewers are choked up and form unwholesome cesspools. The drains in most of the private houses built ten or twenty years ago, are even in a worse condition. The systems are old and imperfect, and one rarely sees the *sine qua non* of good drainage—the external ventilating pipes. One great danger in these houses is the fact that the inside of the drainage pipes becomes foul with refuse adhering to them after constant use for a number of years with no external ventilation. The result is decomposition and sewer gas emanations of the most dangerous character. This, I believe, with faulty traps and drains, is the real cause of sewer gas poisoning so frequently seen. The remedy is new pipes, better systems of drainage, and external ventilation connected with every trap or drain in the house.

Although we have made immense strides in preventive medicine during the last fifty years, and the duration of life has been greatly prolonged, yet statistics show that fully one-fourth of all the deaths in our country is from preventable diseases.\* That means, to bring it home to California, that four thousand lives could be saved each year in our State if our wise law makers, if the *people themselves* would appreciate what the medical profession can do in the matter of hygiene and sanitation if they would give us the means of carrying out our knowledge for the public welfare.

Before entering upon the consideration of the question announced as the subject of my address, I will invite your attention for a few minutes to a brief allusion to what seems to me to be a matter of considerable importance to the welfare of our commonwealth.

As members of the Sanitary Convention of the State of California, it becomes our duty to suggest ways and means of guarding the public health, not only against the invasion of our deadly foreign foes, such as cholera, yellow fever, smallpox, etc., but also against the more insidious spies, equally dangerous and equally deadly in their intent, that are found constantly in our very midst—I refer to the adulteration of our food supply. Since working in this field of experimental inquiry, I have become convinced that we do not pay enough attention to

\* Address delivered before the Mississippi Medical Association by C. G. Comegys, M.D., October 12, 1892.

what we eat and what we drink. On looking into the subject carefully, one is astounded at the enormity of the fraud that is being perpetrated on the unsuspecting citizens of this and many other States where adulteration and sophistication have full sway.

I shall quote only a few examples to call your attention to the latest developments of the chemical laboratory, in the matter of deliberate, fraudulent and criminal adulteration.

According to the latest estimates of the highest authorities we have in America, the United States experts, one-seventh (1-7) of the whole food supply of this country is adulterated. This seems like a very large estimate, and one difficult to believe without further proofs, yet the authority is undoubted, and if you will go to the expense and trouble of investigating the subject for yourselves, by making the chemical analyses, I can assure you that you will find it underrated rather than overestimated.

This gigantic fraud against the lives and property of sixty-four million people is estimated by the same authorities to reach seven hundred million of dollars annually.\*

It is not my intention to refer to the adulteration of drugs and patent medicines, I will leave that for abler hands than mine, but I just want to quote the mortality of one patent remedy, viz: "Mrs. Winslow's Soothing Syrup." The New York authorities estimate that in one year the "soothing" effect of the morphine, to which the so-called "syrup" owes its wonderful (?) effects, caused the death of seventeen thousand children in New York City. Is it not high time that we urge the adoption of such laws as shall control the sale of adulterated foods and poisonous patent medicines?

I will briefly mention the adulterants found in a few of our staple commodities. We will take for example the "Staff of Life," FLOUR and BREAD.

The last person one would suspect of sophisticating his wares is the innocent looking miller, or the affable baker, and in justice it must be said that California flour is, as a rule, the purest and best found anywhere in the world; nevertheless, both flour and bread are at times found to be adulterated. The unscrupulous have found that damaged flour, and flour of inferior quality, will make a white, good looking bread on the addition of bluestone (sulphate of copper), a poison. Flour is occasionally found adulterated with rice flour, potato meal, bean flour, pea flour and even plaster of Paris (sulphate of lime), and bread frequently contains alum, ammonia, borax, sulphate of copper, sulphate of zinc, chalk, carbonate of magnesia, plaster of Paris, bone dust, bone ash and white clay. Such adulteration deserves prompt attention from the authorities.

YEAST POWDER is a substance that requires universal scrutiny. Many brands that I have examined contain ammonia, alum, plaster of Paris, cream of tartar (which is itself adulterated with alum, chalk and terra alba). Is it any wonder that people suffer with indigestion and dyspepsia when their stomachs become coated with plaster of Paris?

COFFEE, now one of the most universally used of all beverages, excepting, perhaps, tea and beer, is usually abominably adulterated. When prepared according to the oriental custom, as observed in Turkey and Arabia, the decoction is as thick as chocolate, all the grounds being mixed with sugar in the boiling process and masticated and swallowed when taken. In Sumatra the leaves of the coffee tree are used in preference to the berries. The Mormons proscribe coffee and tea; their use is considered sinful because the good Lord does not grow it in "Zion." Now it would seem difficult to sophisticate coffee, but it is not. A very fair cup of coffee is made from black walnut sawdust, caramel and roasted and browned horse-liver! This mixture has been ascertained by chemical analysis to be in extensive use. Ground coffee and hotel decoctions often contain roasted and ground peas, beans, potatoes, carrots, corn, rye, and oak bark, whilst chicory is seldom absent. This chicory, by the way, is itself adulterated with roasted wheat, rye, beans, acorns, carrots, parsnips, beet root, baked livers, venetian red, colored earths, oak bark tan and sawdust. Coffee grounds from large hotels have been known to be gathered up, carefully dried and re-mixed with adulterates and chicory, and sold again as pure coffee. So much for ground coffee. Many of you will say that you do not use ground coffee at all, you buy coffee in the bean, raw or roasted, and you are sure the coffee is pure. So it may be and so it may not be. The most inferior and unripe coffee, raw or roasted, is colored and polished with lead to give it an expensive lustre; unripe and half grown berries are colored and

\* "National Medical Review" for 1892, p. 135.

Sold for expensive mocha. Worse than this: acorns, roasted and ground, burnt sugar, and adulterated chicory are mixed and compressed by special machinery, into tablets of the exact size, shape and color of the coffee bean, and sold extensively as such. An easy, practical test for adulterated coffee, is as follows: Pure coffee, roasted and ground, floats on the surface of water for some considerable time, whilst many of the adulterants sold for coffee dissolve or sink in water in a few seconds.

Tea, grown so cheaply in India, Ceylon, China and Japan, one should think it would be found pure and unadulterated in California. Some of it is, but much of it is extensively adulterated. Tea is more easily adulterated than coffee on account of the many brands dealers impose upon the unsuspecting. In reality there are five kinds of tea in each of the countries named besides the natural leaf, which remains grayish green when dried, and the variety known as black tea which turns dark after the leaf is dried. These fine varieties are depending upon whether it is the bud or the first, second, third or fourth leaf of the same twig that is used. The most expensive is the "flowering" bud or tip, next comes the first leaf tea and so on.

In China I was often assured by tea planters and merchants that poor, unripe tea leaves, and many foreign leaves were copper colored—not for the Chinaman's use, for the beggars in the streets would not touch it, but for the Americans. This slight sophistication would seem to be an insignificant matter when I tell you that tea is enormously adulterated with the leaves of the sycamore, the horse-chestnut, the plum, the beach, the palm, the elm, the poplar, the willow and the oak. These, as you may suppose, "improve" the bulk to the extent of making five or ten cases of tea out of one. All these leaves are "faced" with plumbago, carbonate of lead, carbonate of copper, chromate of lead, carbonate and sulphate of iron, and catechu to "improve" the taste, whilst sand, impregnated with iron, is added to "improve" the weight. Thus you will find many samples of tea adulterated, and we never question their composition nor the legality of selling the infamous mixtures for pure tea.

On close inquiry you will also find quite a lucrative tea trade going on at the back doors of hotels. Tea leaves, once used and carefully dried, are again mixed and adulterated and sold for the pure article. Tea, by the way, is seldom properly made outside of China and Japan. Ordinarily we put tea in any kind of tin, copper or silver teapot, pour hot, boiling or boiled water on the leaves and let them "steep" from five minutes to half an hour. Then we wonder why our tea is not good. With the adulteration of lead, copper, tannin and iron we usually succeed in tanning the inside of our metal teapots and the process is extended to the inside of our stomachs, or we succeed in making fair ink from the iron and tannin. Now, tea should never be placed in anything but an earthen-ware vessel. The best tea is the pure natural leaf—the flowering bud or tip, or the first leaf. All tea should be sun-dried if possible. Use one teaspoonful for each cup and one for the blessed pot. The tea should be placed in a small perforated earthen-ware receptacle within the warmed teapot. Water has much to do with the making of good tea. Our Spring Valley water—not the best in the world—requires boiling for just five minutes by the clock for Ceylonese, Chinese and Japanese tea, whilst for Indian tea three minutes boiling will do. The boiling water is then poured upon the tea leaves and the "steeping" process should vary from three to five minutes according to the tea and taste. If you steep it longer than five minutes all the tannic acid and bitter extractions spoil your tea. After five minutes, remove the cup containing the tea from the teapot and your cup of tea is not spoiled by standing a few minutes if not used. Made in this wise a cup of tea is truly delicious. In Oriental countries sugar and milk in tea are looked upon as adulterations and only used by people of depraved tastes.

With your permission, I will just cite a few more examples to show you how universally adulterated are articles of food that in any way permit of it. Take for example—

**CHEESE.** The Government report says: "That no article of ordinary consumption is more generally adulterated than cheese." This is truly deplorable. Is life not worth living? Is health not worth having? If so, why do we permit such gross frauds to be perpetrated on us every day of our lives; why do we permit most of our articles of diet to be poisoned by the very people from whom we buy them? We have a State analyst—a competent, hard working professor in the State University, but our legislators in their usual wisdom would rather expend four hundred thousand dollars on coyote farming

at \$5.00 per head than they would allow one-hundredth part of that for our State Analyst to protect us from poisons in our daily food. Cheese, on account of the large amount of proteine and fats which it contains, is a valuable article of food. The rich varieties, such as the English full cream "Cheddar," and the French Roquefort from ewes milk, and some of our first-class full cream American cheese, contain as much as thirty to forty per cent of fats and twenty to thirty per cent of proteine, whereas our average cheap, skim milk and adulterated cheese contains only eight per cent of fat.

The usual adulterants found in cheese are: oleomargerine, lard, cotton seed oil, skimmed milk and water to "improve" the weight; the juice of carrots, sage and parsley, to improve the flavor; and saffron, red and yellow ochre and ferruginous earths to "improve" the color! Is it any wonder that cheese decomposes and that people are poisoned by eating such unwholesome mixtures?

I could give you details of scores of articles of daily consumption that are abominably adulterated, such as sugar, butter, lard, oat meal and most meals and flours, cocoa, chocolate, syrups, marmalade, honey, licorice, hops mustard, spices, vinegar, pickles, and preserved fruits and vegetables, potted-meats which often contain horse-flesh and other less frequently used flesh. Fruit essences, many of which are now made on a large scale out of rancid butter, bad-cheese and alcohol.

One of the worst adulterated articles in general use as a beverage—and we must admit that it is in very general use—is beer. Instead of being a nutritious brew of malt and hops costing one-tenth of a cent per glass and selling for ten cents per glass, thus making ten-thousand per cent.—quite a reasonable profit—beer is often found adulterated with cocculus indicus, capsicum, ginger, quassia, wormwood, calamus root, caraway and coriander seeds, copperas, sulphuric acid, cream of tartar, alum, carbonate of potash, ground oyster shells, nux vomica, picrotoxin and *strychnine*. These articles, presumably, do away with malt and hops, make a stronger beverage when mixed with water and two to eight per cent. of alcohol, thus making the profit one-million per cent. instead of ten-thousand per cent. I have seen several people "crazy drunk" on beer, and when one considers the picrotoxin, cocculus indicus, and *strychnine* it is no wonder they lose their reason.

WINES AND SPIRITS are often sophisticated or "improved" as it is called. Gin, we find is often nearly a mixture of water, sugar, cinnamon, alum, cream of tartar, cayenne pepper and alcohol. Champagne is frequently made entirely from gooseberries. The purest wines in this or any other market to-day are our home made California wines—before they are shipped to France for improvement and returned to us as French wines. I was in Bordeaux in 1891, and during our stay there several cargoes of California wines were lauded for transformation into the pure French article. One bottle of California wine makes three of French; we sell it for fifty cents to one dollar per gallon, and buy it back again at five dollars to eight dollars per gallon. I will mention two more articles of universal use—both of which could be dispensed with—but probably never will be. One is mostly for ladies and children, and the other largely for men and boys—I refer to confectionery and tobacco. Next to the patent medicine vendors, quack doctors and charlatans, who are, no doubt, responsible for thousands of deaths annually. I am almost tempted to put down sweets and tobacco. It is estimated that forty million pounds of sweets are sold in California yearly. It would perhaps be wrong to say that *none* of these delicious wine candies and bon-bons, those beautifully colored sugar plums, caramels and chocolate creams, etc., are pure and wholesome; be that as it may, I will venture the assertion that if any one of you will buy a pound of these fine mixed French or other candies and submit them to the test of an analysis, you will find many of the following substances: the harmless ones of which are arrowroot, wheat and potato meal, etc., etc.; but what shall be said of such things as potter's clay, pipe clay, chalk, plaster of Paris, and sand, for our fair ones and our little tots. What would you say if you knew that most of these delicious sweets, these rainbow colored sugar plums have been found to contain some of the most poisonous substances known? Would you willingly feed your children upon sulphide of arsenic, arseniate of copper, gamboge, chromate of lead, ultramarine and fuchsine dyes, indigo, ferruginous earths, saffron, Brunswick green, Antwerp and Prussian blue, cobalt and zinc? If not, avoid the many colored sweets, in fact most of them, for indigestion and intestinal diseases, eczema, urticaria and prurigo are almost sure to follow.

What shall we say about the weed. Perhaps the less said the better. Hum-

boldt claims that tobacco has been cultivated in Orinoco from time immemorial. Its general introduction, however, into Europe, like that of the potato and Indian corn, dates from 1492 when Columbus found the Cubans smoking cigars. Tobacco, although not a food, is an article eaten by some, snuffed by others, smoked by many, and is of great commercial value. The weed is used all over the world by men, women and children to a slavish extent. In Spain it is the custom in many provinces to smoke a cigarette at table between courses. It is claimed that it cleans the mouth and makes the next dish taste more daintily. The hostess usually set the example, we tried it whilst in Spain but did not like it.

Tobacco is bad enough in itself, but when you add hay, apple parings, corn husks, paper, cabbage and rhubarb leaves, potato leaves, endive, elm leaves, licorice, coltsfoot, beet-root, dock, sea weed, sawdust, bran, chicory, copperas, alum, sand and *coal-dust* to it, it is perhaps worse. All these various "improvements" are soaked in saline and saccharine infusions and finished off with ammonia and tobacco decoctions and then ready for chewing and snuffing and smoking. The most injurious of all these preparations is, no doubt, the cigarette as made in this country, without restriction as to what it contains. We often find opium or a meconate in cigarettes, and when a boy consumes fifty to one hundred of these daily it becomes a matter of grave concern. He is a slave to both tobacco and opium and death frequently occurs. I saw one tender youth die from cigarette smoking in a London hospital, and the medical journals frequently report deaths from the same cause. As sanitarians and members of the various Boards of Health, it seems to me that we cannot serve the State better than to make public all these vile adulterations and frauds, and ask the public to aid us in their suppression.

MILK. I will now crave your indulgence for a few minutes longer whilst I give you the results of my laboratory investigation on milk, its adulteration and relation to infectious diseases.

Milk is undoubtedly the most universal food in existence, and as such it is perhaps responsible for more epidemics of disease and for more deaths from its adulteration and contamination than any and all foods combined.

The milk of cows is chiefly employed, although goats milk is also quite extensively used. Sheeps milk is consumed in the north of Europe, and is the basis of the celebrated French Roquefort cheese. The Laplanders use reindeers milk, and the Tartars consume milk from the mare, which by fermenting they make into their whiskey or koumiss, a strong alcoholic milk drink. In Arabia and Egypt the camels milk is extensively employed.

Last year the able report of Prof. A. L. Metz, chemist to the Board of Health of New Orleans, set that city in a serious frame of mind. The chemist proved from his investigations that New Orleans had been paying the milkmen of that city about three hundred thousand dollars annually for the water they had served in the milk, and as the water was not of the best quality, the announcement created quite a sensation.\* That aspect of the question, although it amounts to millions of dollars yearly throughout this "Land of the Free," dwindles into almost invisible insignificance when compared with the mortality among children due to impure milk. It is estimated that under the system of milk inspection now pursued by the New Orleans Board of Health, from five hundred to one thousand infant lives will be saved yearly in the city alone.

New York, Philadelphia, Baltimore, New Jersey, Chicago and other cities are now organizing strict milk inspection. Dr. Chancellor in his report to the Maryland Board of Health, says that in one year the infant mortality in New York City was reduced three thousand six hundred and seventy-three through milk inspection; that is, in 1883, with the inauguration of milk inspection, the infant mortality was three thousand six hundred and seventy-three less than in 1882 when there was no inspection.

In Philadelphia during 1891 there occurred five thousand four hundred and eighty-eight deaths among children under one year of age. Of this number one thousand died from cholera infantum during the three summer months; fourteen hundred died from inanition and marasmus, and seven hundred more from convulsions.† Cholera infantum is vastly more prevalent in hand-fed infants.

Dr. Arnstein shows by a careful study of the subject that the disease is directly due to the fermentation and decomposition of milk.

Dr. Booker has found the *bacillus lactis aerogenes* and *bacillus coli commune*

\*\* New Orleans Medical and Surgical Journal " for 1892, p. 237.

† " Medical News," March 18, 1893, pp. 301, et seq.



present in the stools of cases of cholera infantum, but not in the dejecta of healthy infants. Many of the deaths attributed to convulsions and inanition, are no doubt due to the toxic influences of impurities ingested with the milk.

The "Br. Medical Journal" for September, 1892, gives a description of a scarlet fever epidemic in Glasgow directly traceable to the milk supply. Between August 4th and 12th of 1892, two hundred and twenty-four persons were attacked by the disease, and all cases were traced by the milk inspectors to diseased cows. Their teats were found to be studded with vesicula-papula eruptions. A case of scarlet fever had also occurred among the dairymen.

Dr. Klein, the great bacteriologist in London, is satisfied that cows suffer from scarlet fever, and that they may communicate the disease to consumers of milk.

Vol. I, p. 474, in the "Br. Medical Journal" for 1890, contains a description of a diphtheria epidemic in Eton College, England, traced also to infected milk.

The "Pharm. Journal Trans," Vol. XIX, p. 541, of 1892, contains proof of the transmissibility of typhoid fever by contaminated milk.

I could give you many other instances of contamination and disease dissemination through milk, but want of space forbids.

As my analyses and investigations of San Francisco's milk supply are not completed, I shall withhold my report until some future occasion.

**PURE MILK.** Pure unskimmed cows milk is a whitish, opaque, homogeneous fluid, of sweet and bland taste, slightly acid in reaction: does not become viscid on the addition of ammonia hydrate and hosa sp. gr. of one thousand and thirty. The cream yields from ten to fourteen val. per cent, and never less than three per cent by weight, according to modern methods of analysis. Subjected to microscopic examination, pure milk should contain myriads of beautifully formed globules of fatty matter of various size, strongly reflecting the light, readily and entirely soluble in potassium hydrate. The amount of water should be about eighty-seven per cent in cows milk and a little more in human milk. The total solids in cows milk varies from twelve to fifteen per cent, according to the age of the cow, period after calving, quality and quantity of food, etc. Human milk contains from one to three per cent less of solids. It is important to note that cows milk must contain at least three per cent of fat by weight, otherwise it is adulterated and not pure milk. The fat should be from three and one-half to six per cent by weight. It is a little less in human milk.

In cows milk there is about four per cent of caseine, including one-half to one per cent of *serum albumen*. This serum albumen is usually overlooked in this country, although it is of a great deal of importance in infant feeding as we shall see presently. Human milk contains much less caseine. Cows milk contains one to two per cent less of lactose, milk sugar, than human milk, and the salts of potassium, sodium and calcium, chloride and phosphate are about the same for both, with the exception that cows milk contains less lime salts.

*Chemical Composition of Milk.*—One hundred parts of milk contain :

|                                | Water. | Butter. | Caseine. | Sugar. | Salts. |
|--------------------------------|--------|---------|----------|--------|--------|
| Woman .....                    | 87.71  | 4.37    | 1.54     | 5.75   | 0.53   |
| Cow .....                      | 87.00  | 4.60    | 4.00     | 3.80   | 0.60   |
| Goat .....                     | 86.80  | 3.32    | 4.08     | 5.20   | 0.58   |
| Sheep .....                    | 85.20  | 4.20    | 4.50     | 5.00   | 0.68   |
| Mare .....                     | 88.00  | 1.00    | 1.60     | 8.90   | 0.50   |
| Ass .....                      | 90.00  | 1.40    | 1.70     | 6.40   | 0.50   |
| Sow .....                      | 82.60  | 5.70    | 6.20     | 5.00   | 0.50   |
| Milk of cow without cream..... | 90.00  | 0.80    | 3.90     | 4.70   | 0.60   |
| Buttermilk .....               | 90.00  | 1.00    | 3.00     | 5.40   | 0.60   |
| Colostrum.....                 | 75.10  | 3.50    | 16.18    | 4.60   | 0.60   |
| Thick cream.....               | 55.00  | 34.50   | 8.50     | 2.00   | 0.60   |
| Butter .....                   | 10.00  | 87.80   | 1.00     | 1.20   | 0.60   |
| Rich cheese.....               | 40.00  | 30.00   | 25.00    | 5.00   | 0.60   |

—*Annali di chimica e di farm.*

The *practical points* to be observed from our chemical analyses of milk in relation to infant feeding are these: That as cows milk contains less water *when pure* than human milk, water should be added for infant feeding. Do not let your milkman do this for you, for that is how infection and epidemics so often occur. As the salts of lime are less in the cows milk, I have found it an excellent practice to add from five to ten per cent of freshly prepared lime water (calcium hydrate) containing, as it does, about one grain of lime to the ounce of distilled water, and

twenty-five per cent of boiled water, more or less, according to the age of the child. Lime water has also the advantage of rendering the acid milk alkaline or neutral, as is the human lacteal secretion. My invariable rule is to *boil* the milk as soon as it enters the house, because (a), though the cow be healthy, its transportation endangers its purity; (b), bacilli from the cow, or those germs absorbed, can be destroyed by boiling, and (c), a very important consideration, the skin or scum formed upon the top of boiled cows milk, Prof. Austin Flint's observations to the contrary, notwithstanding, is *serum albumen*, and the most indigestible part of the whole milk, and should be removed.

Cows milk also contains less sugar than human milk, hence this must be added, but do not use cane sugar, for that is a foreign substance to milk; use one-half a teaspoonful or thirty grains of lactose to the ounce of milk. By these simple means you have sterilized the milk, rendered it free from serum albumen, and almost transformed cows milk into human, and made it just as digestible.

To recapitulate :

*First*—Boil your milk as soon as it enters the house.

*Second*—Skim off the film of indigestible serum albumen.

*Third*—Place the milk in earthen-ware vessels in a cool place, and cover it so as to exclude dust and germs.

*Fourth*—For infant feeding. Add five to ten per cent. of freshly prepared lime water and twenty-five per cent of boiled water. This reduces the relative amount of caseine and adds the needed lime salts and water.

*Fifth*—Add thirty grains of *lactose*, or sugar of milk, to each ounce, and you will have a wholesome, neutral or alkaline, sterilized food for infants, easily digestible, and one which does not allow the bacterium lactis, present in all milk, to turn it sour by fermentation, converting the milk sugar into lactic acid.

Supplying pure milk, of necessity means that it must be obtained from healthy animals. More than this, to produce good milk, a dairyman must not fail to supply his cows with proper and sufficient food. Too many cows are being fed on the slops and swills of breweries and distilleries, with the result that "swill milk" is unfit for human consumption. In order that cows may furnish, pure, rich milk, they should be kept under the best hygienic conditions; they should have pure water to drink, a pasture to exercise in, good grass in the summer, and good, clean, bright hay in the winter with a small quantity of meal—salted—every day. They should have a good, clean, well ventilated barn to remain in at night. Cows should not be too old nor should they be allowed to be "swilled" for two or three years without having a calf. The cows teats should be washed with warm water before milking, and not, as I have seen it done, wash them in the milk that is used for sale. Every precaution should be taken to keep them free from pimples and sores. All this means scrupulous and intelligent care and cleanliness in all the details that enter into the process to which the milk is subjected from the moment it is obtained from the cow until it is delivered to the consumer. It requires more care and cleanliness, it is feared, than can be obtained from the spontaneous volition of dairymen, but it is of vital importance to have pure milk, and the milk inspector should co-operate in this matter by insisting upon cleanliness in every detail. If the price of milk is not sufficient, then have it raised. We do not want any one to work for nothing. Physicians and sanitarians have learned from experience that such work becomes rather irksome. Milk should be kept in a dark, cool place and in *earthenware* vessels. Tin pans affect the milk unpleasantly, they increase its fermentative changes, the salts acting on the tin. All milk should be delivered to the consumer as rapidly as possible after it is taken from the cow.

Recent bacteriological investigations by the New York Board of Health have demonstrated that tuberculous cows may spread the disease through the medium of milk. Experiments were made on guinea-pigs, with some of the "gilt-edge" milk from Adams' farm at Scarsdale. The animals rapidly developed tuberculosis and died. Twelve of the suspected cows were killed and every one of them was found to be tuberculous.

It has further been shown that about three per cent to five per cent of cows are tuberculous.\* When a patient gets ill, his resisting powers are below normal. One of the first things he is given is milk. Now it appears to me that with consumptives flocking to our balmy shores, and with five per cent of our cows tuberculous, we can easily understand why tuberculosis spreads so rapidly and why the disease is on the increase. M. Miguel gives a very interesting resume of his ob-

\* Sternberg.

servations on the number of microbes present in milk. He found that one cubic centimetre of milk—about sixteen drops—on arriving at his laboratory only two hours after it had been taken from the cow, contained nine thousand bacteria. In one hour more the number had increased to thirty-one thousand seven hundred and fifty, whilst in twenty-five hours time the number had reached five million in each cubic centimetre.\*

Prof. Bang, of Copenhagen, in his experiments on bacilli of tuberculosis, reports that the bacilli found in milk, cream and butter, are not destroyed by "scalding" at a temperature of 150° F., nor even at 176° F.

I therefore strongly recommend boiling of all the milk as soon as it enters the consumer's house. The idea that it becomes more indigestible from decomposition of its salts or from changes in its caseine, or changes in its cream, is fallacious; it is from the *serum albumen*, which if skimmed off, renders the milk just as digestible as before boiling, besides having the surety that all disease-breeding germs and accidental pollution have been rendered inert.

Aside from the grave diseases which result directly from the transmissibility of germs from the cow, milk is deplorably and dangerously adulterated. The bland universal food is not always what it appears to be to the unaided eye. The most frequent adulterant found in milk is water, and here lies a danger of considerable magnitude. Water in cow yards and about dairies is not always of the purest kind; it is often well water or pond water, and is frequently contaminated. Many epidemics of infectious diseases that I could name have been caused by water contaminating the milk, either by the washing of the cans in impure water, or by the wilful adulteration for the purpose of increasing the "stock in trade." As we all know, watered milk has a peculiar bluish color—in fact, it looks thin. The microscope shows a paucity of cream globules and the crucial test shows less than three per cent by weight of fat. To overcome the color and thinness, our friends, the milkmen, have been known to add such things as starch, gum tragacanth and gum arabic, turmeric, chalk, boiled decoctions of white carrots and annetto. This brings the color up to the standard—in fact, it makes the fluid look like rich cream milk. Sugar and glycerine are added to sweeten the water, and borax, boric acid and salicylic acid to keep the mixture from fermenting and souring. Skimmed milk has been known to be treated in this way and sold as "gilt edge" milk. Cream in San Francisco, doubtless owing to our climatic influences and hydroscopic atmospheric conditions, or some other occult agency, is exceedingly thin. I do not wonder that our friends from the interior, where they still have the good old-fashioned cream, remark upon our city's lacteal production, but it is the best we can do until we have an energetic milk inspector. Our cream, by the way, has been known to absorb arrow root and magnesia, to stiffen it up a bit.

The diseases from which cows suffer, that are communicable to man, are: Tuberculosis, splenic fever (anthrax), scarlet fever, foot and mouth disease (eczema epizootica), the "trembles," and cows fed upon poisonous weeds, wild onions or poison oak. This latter produces great gastro-intestinal irritation, swollen tongue and fauces, great prostration, and frequent deaths. All cows suspected of having any of these diseases should be isolated at once, and examined by a veterinary surgeon, and if found to be suffering from disease the cows should be instantly killed and their carcasses buried. Milk is so universal and so essential an article of food that no means should be spared to insure and maintain its purity. Next to water it is undoubtedly one of the most common carriers of contagium. Countless are the epidemics of disease that owe their origin to infection transmitted by milk; and who can estimate the thousands upon thousands of lives that have been sacrificed? If any further argument is needed than this wholesale destruction of human lives and the spreading of consumption, for I look upon the cow as the direct agent in increasing this dreadful disease, and milk as one of the most potent agencies in spreading most infectious diseases, but if any further proof is demanded why we should have milk inspectors then I would direct attention to the hundreds of thousands of dollars that are yearly spent for water and other abominable adulterants that are added to our milk supply.

In conclusion, I cannot urge too strongly upon our municipalities the necessity of having milk inspectors and chemists to examine the milk supply of our cities; nor can I do better than to appeal to this convention for support in the matter of making public my laboratory investigations, and asking you to assist me in devising measures for the prevention and suppression of milk and food adulteration.

\* Journal of the Royal Microscopical Society.

Dr. J. H. McLean, of Alameda, presented a paper on "Municipal Sanitation in California," which was read and referred to the Committee on Publication.

---

### Municipal Sanitation in California.

BY JNO. T. McLEAN, M.D., HEALTH OFFICER, ALAMEDA.

In the circular issued by the State Board of Health, through its Secretary, on February 15th, 1893, calling a State Sanitary Convention, it is stated that "the purpose of the Convention is to consider the best means of preventing the entrance into our State of Asiatic cholera during the coming season, and how best to combat it if it effects a lodgment within our borders, and such other matters as may properly be discussed in a sanitary convention." The Secretary further says in the circular: "I shall be pleased to have a paper from you (those invited to the Convention) on some question of local or general sanitation, having special reference to the probable invasion of our State by the Asiatic scourge."

In response to this invitation I propose to say a few words on "Municipal Sanitation in California."

It is possible that cholera may invade our State, coming to us by the great lines of travel, over the sea, from the Orient, or by the trans-continental railways from the great Atlantic or interior cities of our own country.

If it is met on our borders, and there isolated and cared for, it cannot spread in California; or if, passing a border quarantine, it should get into any of the cities of California, it will depend largely on the sanitary condition of those cities, so invaded, to what extent this dreaded scourge may spread in them.

And if cholera should thus find a lodgment in one or more of our cities, from the intimate and constant intercommunication between the principal cities of the State, it may be expected that it will spread to others of these cities; and its ravages and fatal effects, wherever it may get a lodgment, will depend on the sanitary condition of those cities invaded by it.

In this view of the prospective possible cholera visitation to California, the present sanitary condition of the cities of our State becomes a matter of very great importance; and not only the propriety, but the necessity of a discussion of our municipal sanitation is apparent.

The death rates of our cities are, as a rule, the best evidence of their sanitary condition. If the municipal and domestic sanitary conditions are good, the death rate will be small; and, on the contrary, if these conditions are poor, the death rate will be larger.

As an indication of the measure of attention given to municipal sanitation in the principal cities of California, I have compiled the following tabulated statement of the annual death rate, per thousand of population, for the fifteen months ending March 31st, 1893, of the nine cities of our State having a population of ten thousand and more, from the monthly reports of deaths in the cities and towns of our State issued by the State Board of Health.

It is as follows:

## DEATH RATE OF THE NINE PRINCIPAL CITIES IN CALIFORNIA.

| CITIES.        | POPULATION ..... | ANNUAL DEATH RATE FOR THE YEAR 1892. |               |            |            |           |            |           |              |                |               |               |                | Average annual death rate for 15 months ending Mar. 31, 1893. |       |
|----------------|------------------|--------------------------------------|---------------|------------|------------|-----------|------------|-----------|--------------|----------------|---------------|---------------|----------------|---|-------|
|                |                  | January .....                        | February..... | March..... | April..... | May ..... | June ..... | July..... | August ..... | September..... | October ..... | November..... | December ..... |   |       |
| San Diego .... | 16,153           | 21.48                                | 8.16          | 18.57      | 10.39      | 7.42      | 10.39      | 6.68      | 10.32        | 3.60           | 8.16          | 9.60          | 10.32          | 10.88   | 10.88 |
| Fresno .....   | 10,796           | 19.92                                | 13.83         | 16.56      | 15.54      | 6.66      | 4.99       | 12.99     | 15.          | 9.             | 12.           | 12.           | 6.96           | 11.92   | 11.92 |
| Alameda .....  | 12,300           | 9.75                                 | 12.60         | 8.76       | 10.68      | 16.56     | 17.52      | 11.8      | 11.8         | 9.75           | 18.48         | 18.48         | 17.52          | 13.40   | 13.40 |
| Oakland .....  | 50,000           | 18.72                                | 14.88         | 15.12      | 15.12      | 16.56     | 13.92      | 15.       | 12.36        | 10.8           | 15.32         | 9.96          | 13.2           | 14.45   | 14.45 |
| Stockton ..... | 14,376           | 24.12                                | 18.           | 10.08      | 11.67      | 12.48     | 7.44       | 19.92     | 14.16        | 10.88          | 9.96          | 19.92         | 15.            | 15.33   | 15.33 |
| Los Angeles... | 50,394           | 27.6                                 | 18.32         | 15.94      | 19.76      | 19.4      | 16.18      | 12.26     | 13.28        | 9.22           | 13.08         | 13.28         | 13.56          | 15.82   | 15.82 |
| Sacramento ... | 26,272           | 29.64                                | 16.44         | 18.25      | 15.07      | 18.24     | 15.        | 19.68     | 16.2         | 12.85          | 9.84          | 13.20         | 21.            | 16.78   | 16.78 |
| San Francisco. | 330,000          | 25.44                                | 20.04         | 21.4       | 17.66      | 19.02     | 18.75      | 21.       | 16.32        | 16.92          | 16.32         | 19.56         | 20.52          | 18.33   | 18.33 |
| San Jose.....  | 18,027           | 44.52                                | 34.56         | 36.66      | 25.28      | 23.96     | 17.30      | 19.29     | 11.88        | 16.56          | 12.60         | 23.28         | 22.56          | 23.03   | 23.03 |

Some remarks are proper concerning the figures in this table. It will be observed that the population of San Diego is stated, for the whole fifteen months, at sixteen thousand one hundred and fifty-three. This is the population as given by the national census of 1890.

The population of Fresno, as stated in the census, is ten thousand eight hundred and eighteen. In the first five months named in the table the State Board of Health Reports give the population as ten thousand seven hundred and ninety-six, and for the remaining ten months they place it at twelve thousand, and on these statements of population the death rate is calculated.

The census of 1890 gives Alameda's population as eleven thousand one hundred and sixty-five. It is stated at eleven thousand nine hundred in the first five monthly reports of the State Board of Health for 1892; at twelve thousand three hundred for the remaining seven months of '92, and at twelve thousand five hundred for the three months of 1893. The calculation for its death rate is made for the year 1892, on a population of twelve thousand three hundred, and for the three months of 1893 on a population of twelve thousand five hundred. This basis of population is made from the reports of the school census marshal, who, when taking the census of children of school age, also definitely ascertains the total population of the city.

The census gives the population of Oakland as forty-eight thousand six hundred and eighty-two. The State Board of Health Reports for the first six months of 1892 fix it at fifty thousand, and for the remaining nine months in the table at sixty thousand, and at these figures the death rates are calculated.

The census population of Stockton is fourteen thousand three hundred and seventy-six, and this is given as the population by the State Board's Reports during the fifteen months represented in the table, and the death rate is based on this population.

The population of Los Angeles, by the census, was fifty thousand three hundred and ninety-four, and the State Board's Reports for the first four months of 1892 give that as the population, and for the remaining eleven months they state it at sixty-five thousand, and the death rate is based on these figures for these respective months.

The census population of Sacramento is twenty-six thousand three hundred and eighty-six. The State Board's Reports place it at twenty-six thousand two hundred and seventy-two for the first four months in the table; at twenty-eight thousand for the next eight months, and at thirty thousand for the next three months, and on these figures the death rate is calculated.

The census population of San Francisco is two hundred and ninety-eight thousand nine hundred and ninety-seven. The State Board's Reports for the fifteen months place it at three hundred and thirty thousand, and the death rate is based on this last named population.

The census population of San Jose is eighteen thousand and sixty. The State Board's Reports for the fifteen months give it as eighteen thousand and twenty-seven, and on this last figure the death rate is based.

As to the reliability of these figures representing the population of these cities, it is reasonable to suppose that San Diego, Stockton and San Jose have each increased in population in the three years since June, 1890, when the census was taken. But the State Board's Reports give their population now as the census named it. Allowing each of these cities a fair additional population, as the increase since 1890, and their death rates, as stated in the table, would be diminished. By the State Board's Reports the population of Oakland has been increased by over ten thousand, and that of Los Angeles by nearly fifteen thousand since the census. The query as to whether there has been such a large increase of population in these two cities since June, 1890, is a reasonable one. The statement of increase of population since the census in each of the other nine cities seems to be fair.

Inasmuch as the population is the divisor, and the number of deaths the dividend, in ascertaining the death rate of a city, it follows that the larger the divisor the smaller will be the quotient, or death rate, of that city. Hence the necessity for exactness, as nearly as it can be reached, in these figures as to the population of our cities and towns, in order that their statement of death rates may be reliable. Without such exactness, both by those naming the population and by the State Board of Health in publishing it, the reports of death rates are misleading and unreliable, and really, as vital statistics, of little account.

In regard to the population of Alameda, as its health officer, I have been care-

ful that my reports should understate, rather than overstate, the population of our city. And this spirit of truthfulness should actuate all reporters of vital statistics to our State Board of Health. There is not only nothing to be gained, but, ultimately, disadvantage will result from careless or untruthful statements of these vital statistics of our cities and towns. The suspicion of unreliability will attach to them, and their value for correctness will be lost.

From these remarks as to the statistics of population, etc., found in the table, the conclusion is a reasonable one that if these statistics were stated for each city exactly as they exist, the average death rates might be somewhat modified; and possibly the relative positions of these cities as to healthfulness, as indicated by their death rates, might be somewhat changed. But the table is based on our official reports of these vital statistics and must be taken as the fairest and best statement that can be made as to these statistics for the cities named.

In order, if possible, to account for the difference in the death rate of these nine cities of our State, as shown by the foregoing table (amounting to about one hundred and ten per cent between the two extremes, San Diego and San Jose), I addressed the following queries to the health officer of each of these cities. The essential principles of good municipal sanitation were covered by the queries, and the replies should indicate to what extent these principles were maintained in these cities:

1. What is the source of the water supply of your city; and, in your opinion, is it free from all danger of contamination when used for drinking and domestic purposes?
2. Has your city a sewer system to carry off the constantly accumulating organic refuse of its inhabitants?
3. What provision, if any, is made for flushing your sewers?
4. Are privy vaults and cesspools in use, and if so, to what extent, in your city?
5. Does the storm water flow into your sewers, or is it carried off on the surface, by the gutters of graded streets?
6. Does this storm water accumulate to any extent in ponds, in low-lying portions of your city?
7. Do your city ordinances require that sanitary principles shall be observed in the plumbing and drainage of your dwellings, and are these ordinances enforced?
8. Is the accumulating garbage required to be gathered, and if so, how is it disposed of?
9. Are contagious and infectious diseases isolated? If so, which of these diseases? And is placarding among the means used to secure isolation? And for how long a time is isolation maintained?
10. Are the premises where these diseases have existed disinfected prior to the raising of the quarantine to which they have been subjected, and what is your method of disinfection?
11. To what extent is school sanitation observed?
12. Is there co-operation between your municipal authorities and your School and Health Boards in maintenance of the essential principles of municipal and school sanitation?

The following replies came to these queries:

From SAN DIEGO, by Thomas L. Magee, M.D., Health Officer:

1. The water supply comes from the Cuyamaca Mountains, about fifty miles from the city. Reservoir four thousand five hundred feet above sea level. Conveyed in an open flume to within eight miles of the city distributing system, thence to city in iron pipe. It is approximately free from sources of contamination.
- 2, 3 and 5. We have a sewer system known as the "Separate System," with seventy-six flush tanks (Field's).
4. Privy vaults and dry earth closets are in use in all parts of the city not on a sewer line, and a good many are still in use along the line of sewers.
6. No. The contour of the city is such that there are no such depressions.
7. Yes.
8. Yes. Taken to sea in a garbage scow.
9. Yes. Smallpox, yellow fever and typhus. All others are placarded. Scarlet fever, three to six weeks; measles, three weeks; diphtheria, three to five weeks.
10. Disinfection first, then removal of quarantine. We fumigate with sulphur.
11. Children from infected families are prohibited attendance.
12. Yes.

From FRESNO, by F. M. Sponogle, M.D., Health Officer:

1. The water supply is furnished from wells (artesian) from two hundred and fifty feet to six hundred feet deep, being pumped into tanks of one hundred thousand gallons capacity, which are cleaned every ninety days with white sand. I do not think there is any danger of disease.
2. Yes. Only about one-fifth of the city is at present under sewer system. It should be completely sewered.
3. Arrangement was made with canal company. In case water is shut off we have the large tanks.
4. About four-fifths of the city use privy vaults, and cesspools from the kitchens.
5. On surface, by graded streets. Does not connect with sewers.
6. No. Unless in certain localities where the ground is very low.
7. No. Not as they should do. The license for plumbers has not been enforced, and our sewer system is not carried out as it should be.
8. Hauled out of the city, or deposited on some low ground or vacant lot in the outskirts of the city.
10. Yes. Chloride of lime, carbolic acid, sol. bi-chlo. mercury one to one thousand.
11. The rooms have been crowded too closely for want of the new school building. Otherwise in good sanitary condition.

12. This has been neglected, though I have endeavored to correct it by requesting of the School Board a strict observance of sanitary conditions in the schools by not overcrowding the rooms and by cleanliness of buildings and grounds.

From ALAMEDA, by John T. McLean, M.D., Health Officer:

1. The water supply is from artesian wells located in the eastern portion of the city, and at Fitchburg, three miles east of the city. Gravel beds carrying artesian water underlie the peninsula on which Alameda is built, and, in addition to the city water system, many citizens have dug artesian wells on their own premises for their home supply of water. The wells are from eighty to two hundred and fifty feet deep, alternating strata of sand and clay lying between the surface and these artesian gravel beds. Numbers of analyses of the water have been made, and it is found to be first-class potable water and free from all sources of contamination. There are a few surface wells, mostly on premises in the older portions of the city. Typhoid fever and diphtheria have been traced by the health officer to the use of this surface well water, it being contaminated by seepage from surrounding privies, cesspools and other filthy and unsanitary conditions. The use of surface well water is discouraged by the health department of Alameda.

2. The "Waring Sewer System" has been adopted and built to the extent of the present needs of the city. There are six miles of large receiving sewers, extending east and west on the northern and southern borders of the city, into which sixty miles of lateral sewers empty, running through the avenues extending east and west, and the side streets running north and south. The receiving sewers were built by the city, at a cost of sixty thousand dollars, and the lateral sewers, with their manholes and flush tanks, were built by the owners of the property on which they front, under supervision of city engineer and street superintendent, at a cost of not less than one hundred and sixty thousand dollars.

3. The sewers are ventilated by manholes and are flushed by automatic flush tanks, about one hundred and seventy-five in number, each of fifty gallons capacity, emptying themselves from two to four times in twenty-four hours and sweeping all sewage out of the sewers. The flush tanks get their water from the city water system. The sewage is emptied by the north side receiving sewer into the Estuary, between Oakland and Alameda, and by the south side receiving sewer into San Leandro Bay. When the Oakland harbor, which will connect the Oakland Estuary with San Leandro Bay, now being constructed by the Government, is completed, and the gate shutting the outlet of San Leandro Bay into the bay of San Francisco, at each high tide, is built and put in place, this sewage will be carried, by the ebb tides, twice a day, out of the San Leandro Bay and through the Oakland harbor or tidal canal into the bay of San Francisco. New lateral sewers are constructed in the unimproved portions of the city whenever dwellings are built in these localities, the policy of the city being to supply a sewer for the earliest dwellers on hitherto unoccupied and unsewered streets. Automatic house drain flush tanks, varying in capacity from ten to fifteen gallons, have lately been introduced in Alameda, with a view to thoroughly and frequently flushing the drain between the house and the street sewer. It is set at the side of the house so as to receive the waste water from the kitchen, the laundry, the wash-



basins and bath tubs, and delivers the same, in a flood, into the house drain and carries all within it to the street sewer. The drain from the water closets empties into the house drain beyond the flush tank, so that the waste from the closets is also frequently flushed into the street sewer. This house drain flush tank makes it impossible for sewage to lodge in the house drain on its way to the street sewer, and assists also in flushing the street sewer.

4. City ordinances forbid the use of privy vaults and cesspools on premises fronting on sewered streets, and none are allowed on such streets. As all the residence streets are sewered, practically we are without privy vaults and cesspools, all waste being carried from the houses into the sewers.

5. About forty-five miles of the streets of the city have been graded and macadamized and bordered by stone gutters at a cost of about five hundred thousand dollars. Through these gutters the storm water in carried to the Estuary on the north, to San Leandro Bay on the east, and to the bay of San Francisco on the south and west. The sewers receive and carry away only the waste of the dwellings of the city.

6. I know of only one pond of water within the city limits, and this is a small one, say one hundred feet by three hundred feet in size, in the extreme western part of the city. The owners have been notified, and will be required to fill this lot to the official grade.

7. Plumbing and drainage, in accordance with the most approved sanitary principles, of all dwellings constructed since the organization of the Board of Health, in 1887, are required by our ordinances, and these ordinances are enforced.

8. The garbage is regularly gathered by carts and dumped on the marshes lying at the eastern and western extremities of the city. It should be cremated.

9. Smallpox, diphtheria, scarlet fever, measles, mumps and whooping cough are isolated, and the first three diseases in this list are placarded. All children in families having the first four diseases are not allowed to attend school; nor are these families allowed to take books from the public library. Children affected with mumps and whooping cough are kept from school, but other children in families having these last named diseases are allowed to attend school. Children who have had diphtheria are kept from school forty days; scarlet fever, until after desquamation has ceased; measles, for thirty days, or until after complete recovery; mumps and whooping cough, until after recovery. Physicians are required by ordinance to notify the health officer of the existence of all contagious diseases occurring in their practice; and families having these diseases and not employing a physician must give a like notice.

10. Premises occupied by those who have been sick with smallpox, diphtheria and scarlet fever are disinfected without cost, by the city, with the fumes of sulphur before quarantine is raised. The disinfection of other contagious diseases is left to the families where these diseases have occurred.

11. Unless care is taken to prevent it, the schools of a community are largely instrumental in spreading contagious diseases; particularly those to which children are subject. A rule of the School Department of Alameda requires that the question be asked daily of the members of each class of every school in the city, whether there is sickness in the family at home, and if there is, the nature of that sickness is ascertained, and if it be found to be contagious, the children in attendance from that family are sent home, and are not allowed to return until they bring a permit from the health officer stating that the danger from contagion in that family has passed.

12. All the authorities of Alameda co-operate in the endeavor to maintain the best possible municipal and domestic sanitary conditions.

From OAKLAND, by J. P. H. Dunn, M.D., Health Officer:

1. Catchment and spring water, and, in my opinion, it is free from all danger of contamination when used for drinking and domestic purposes.

2. Yes.

3. Two men and a cart.

4. Very few.

5. The storm water flows into the sewer.

6. No.

7. Yes, yes.

8. It is gathered by private parties and dumped on the marsh in West Oakland.

9. (a) Only smallpox; (b) only in smallpox. The Oakland Board of Health has issued and distributes a circular on the characteristics of contagious diseases and their hygienic management, including the fumigation of infected premises. The

characteristics of diphtheria, scarlet fever, typhoid fever and smallpox, as the more prevalent contagious diseases, are mentioned. Several city ordinances of Oakland requiring sickness and death from typhus, typhoid, malarial and yellow fever, Asiatic cholera, smallpox, diphtheria and scarlet fever to be reported to the health officer; requiring the burial of persons dying of smallpox, diphtheria, scarlet fever and Asiatic cholera within twenty-four hours after death, and forbidding public funerals of such deceased persons, and requiring the reporting to the health officer of all births, form a part of the circular.

10. See circular, above mentioned, which accompanies the reply of Dr. Dunn.

11. Sanitary condition of schools good.

12. Yes.

From STOCKTON, by C. A. Ruggles, M.D., Health Officer:

1. The City Water Works pipes through the city water supplied from bored wells, which Dr. R. believes to be good, and free from contamination. The greater part of the city is supplied by bored wells, ninety feet and more deep, cased by galvanized iron. This water is not free from possible contamination, by reason of seepage from contiguous cesspools and privy vaults into these wells through the well casings, which, in time, corrode and admit this seepage.

2. Stockton is now constructing, at great cost, a sewer system approved by Waring, of Newport, and Marsden, of San Francisco.

3. No reply.

4. Privy vaults and cesspools are in use, and will be tolerated until the sewer system is completed, when connection of all premises with sewers will be required, and privy vaults and cesspools abolished.

5. Storm water is carried off by sewers constructed for that purpose.

6. If it accumulates in lower portions of the city, it is pumped off or ditched out.

7. Plumbing is not now regulated by city ordinance or by order of the Board of Health. It is proposed that only qualified plumbers shall be licensed by the Board of Health, and that all plumbing shall be done in accordance with rules to be established by said Board.

8. Garbage is gathered daily and carried out of the city and destroyed.

9. By ordinance, all cases of cholera, smallpox, diphtheria and scarlet fever are required to be reported by the physicians in attendance, and by the families infected, to the health officer, who placards the premises and places a guard to enforce isolation, which is maintained for twelve days after recovery in smallpox, and for eight days after recovery in diphtheria.

10. When attending physician reports recovery, the patient and premises are disinfected. All worthless articles in infected rooms are burned; clothing, bed linen, etc., are soaked for twenty-four hours in sol. bi<sup>2</sup>chl. merc., one ounce to five buckets water, and then washed as dirty clothes; the apartments, with their contents, are fumigated for eight hours with sulphur fumes, with steam added; the walls, if papered, are stripped of old paper and repapered, and the wood work is newly painted.

11. No reply.

12. Co-operation of all branches of city government with the Board of Health in maintaining proper sanitation.

From LOS ANGELES, by Granville MacGowan, M.D., member of Board of Health and ex-Health Officer:

1. The water supply comes principally from a system (City Water Co.'s) of subsoil filtration from the Los Angeles River, near its source. A portion of the supply (Citizens' Water Co.'s) comes from an old irrigating ditch which empties into an old reservoir five miles from the city, and is piped thence to distributing reservoirs in the city. A third source of supply is from subsoil filtration from the Arroyo Seco Creek, which supplies Pasadena with water. A fourth source comes from wells, of which there are a few, in the built-up portions of the city. The first supply is pronounced almost absolutely free from contamination, and could be made perfectly so in a few days. The water from the second source of supply is pronounced very impure, and has been condemned. Its use will be discontinued as soon as changes inaugurated by the City Water Company, which has absorbed this supply, are completed. The water from the third source of supply Dr. MacGowan is doubtful about, and says its use would probably be forbidden during the prevalence of an epidemic of cholera. The well water is open to the suspicion of contamination from seepage from cesspools, and it has been and is the policy of the Health Department to suppress the use of water from these wells, and have them, in all possible cases, closed.

2. Los Angeles contains about one hundred and five miles of graded streets; about thirty-four miles of these contain sewers in actual use, their sewage being discharged upon market gardens about five miles below the town. An outfall sewer to the sea, seventeen miles away, is in process of construction and will be finished in September, 1893. As the internal main sewers are already in place, though many are not in use, only lateral street connections will remain to be made after that date. It is expected before April 1, 1894, says Dr. MacGowan, that Los Angeles will be the best sewered city on the continent.

3. The sewers in use are flushed by automatic flush tanks, some constructed after Waring's pattern and others after the Miller model, as made by Mr. Meyer, C.E., of Pasadena. In situations where this is not practicable, by reason of faulty construction of old sewers, they are flushed twice weekly by fire hose.

4. All that portion of the city not connected with the sewers in actual use has cesspools and vaults. Probably the dwellings of five-eighths of the population are constructed with these appurtenances.

5. Storm water is all carried off on the surface.

6. Not at present, as most of such places have been filled during the past five years.

7. Yes.

8. Yes, by cremation.

9. Yes; scarlet fever, diphtheria, smallpox, typhoid fever and cholera. Houses are placarded, thirty days at least, for scarlet fever and diphtheria.

10. Yes; sulphurous acid gas, moist; chlorine; hot water and soap; kalsomine; solution chloride of lime four per cent.

11. Only so far as endeavor to keep the buildings in reasonable sanitary condition. The Schools Boards have not always co-operated kindly with the Health Department. Children from infected houses are not admitted to the public schools except after quarantine and by permission of the health officer.

12. Not always, by any means. The average Council and School Boards act only intelligently, in matters concerning public health, when they are compelled to do so by the threat of, or actual presence of, an epidemic.

From SACRAMENTO, by H. L. Nichols, M.D., Health Officer:

1. Sacramento River; not entirely free from contamination; but with boiling or filtering perfectly safe.

2. Our sewers receive in part the overflow from cesspools, but try to have no solid matter enter.

3. Flushed by water from hydrants.

4. Yes, to a considerable extent.

5. Much flows off in gutters, but a large quantity flows from the gutters into the sewers.

6. To some extent.

7. Yes.

8. Yes, and required to be carried outside the city limits.

9. Yes; smallpox, scarlet fever and diphtheria. Placarded until danger of infection is passed.

10. Yes; by cleaning, cremating some articles of clothing and bedding, and fumigation.

11. Vaccination. Pupils with infectious diseases, or members of families so infected, are excluded from school.

12. Yes.

From SAN FRANCISCO, by J. W. Keeney, M.D., Health Officer:

1. The supply of water is from catchment in San Mateo County hills and from a constant flowing spring in Lake Merced. It is considered, generally, by our residents as pure and wholesome. There is no danger of contamination when used for drinking and domestic purposes.

2. We have a good sewer system to carry off the accumulating organic refuse of the dwellings within our city limits.

3. The sewers are frequently flushed from the fire hydrants.

4. Privy vaults and cesspools are only tolerated where there is no main sewer in the street to connect with. When necessary, the vaults are emptied by odorless excavators.

5. Storm water flows into the sewers through conduits located at the four corners of the streets that are graded.

6. Storm water is not allowed to accumulate to any extent in ponds in low-lying portions of the city. Ordinances compel owners of such lands to fill them in with earth.

7. All applicants for plumbers' licenses have to undergo a rigid examination as to their qualifications to act as such by the Plumber-in-Chief, who holds his appointment from the city authorities. All new plumbing and plumbing repairs are thoroughly inspected before acceptance by the Chief Plumber. He requires all work to be done in the most approved and latest sanitary styles.

8. The accumulating garbage is gathered by district scavengers and spread upon designated dumping grounds and covered by ashes, etc.

9. All contagious and infectious diseases are isolated. The premises are placarded for thirty days.

10. When the doctors report the result of such cases as come under their care to the health officer, the quarantine is released and the rooms are thoroughly fumigated with the latest appliances for disinfection.

11. The schools are notified from the Health Office of all children sick in their districts from contagious diseases, and the children cannot return until they receive a card from the health officer certifying that there is no longer any danger from contagion. The school houses are often thoroughly fumigated by designated city health inspectors.

12. There is co-operation between the different city authorities and the Board of Health, and they use all efforts to aid the Board of Health in sanitary precautions against contagious diseases.

From SAN JOSE, by J. R. Curnow, M.D., Health Officer.

1. The source of our water supply is from clear mountain water, brought in pipes from the Santa Cruz Mountains. There is no danger whatever from contamination of any kind.

2. Our city has a perfect sewer system connected with the San Francisco Bay, near Alviso. The system was built at an expense of one hundred and fifty thousand dollars four or five years ago.

3. The sewers are flushed with clear water; how often, I cannot say.

4. There are very few cesspools and privy vaults in use in our city.

5. The storm water flows in our sewers in most instances, although some of it is carried to the gutters before going to the sewers.

6. We have no swamps or low lands in San Jose, and no water accumulates.

7. The city has a plumbing inspector whose duty it is to inspect all plumbing, drainage, and all buildings.

8. All our garbage is carried off every morning; most of it burned.

9. Contagious and infectious diseases are strictly quarantined for as long as our judgment dictates.

10. All premises are duly fumigated where there is any suspicion of any lurking germ of any nature whatsoever.

11. The sanitary condition of our school buildings is as perfect as we can make it.

12. There is co-operation between our municipal authorities, School and Health Boards with regard to the principles of sanitation and good health.

A study of the foregoing table of death rates and of the replies of the respective health officers to the queries propounded does not satisfactorily account for the difference in the death rates of the nine cities named in the table.

It is not a matter of chance or accident that the average annual death rate for fifteen months of one of the nine principal cities of California should be more than double that of another of these cities; or that the average annual death rate of these nine cities, for these fifteen months, should gradually increase from 10.80 deaths per thousand of population, the lowest, to 23.08 deaths, the highest. There is some cause for this increase of these death rates which is not satisfactorily explained or developed by the answers to the queries, and the real cause for this increase, in my judgment, will be found in the fact that those cities having the lower death rates have also the better sanitary conditions. I know that the death rates of Alameda (and possibly this may be true of others of these nine cities), is increased by the coming to it of people with wasted health who are ready to die, they being attracted here by the salubrious climate and generally healthy condition of our city. They abide with us for some days, perhaps for some weeks, but sooner or later they succumb and die from disease originating and having its development in some other locality; but their deaths are charged to Alameda because these invalids spent the closing hours or days of a fast-failing life in our city. But the death of such invalids who have sought a last temporary refuge in some of our cities will not account for the large increase in the death rates of others of these nine cities. So that while it is a conceded fact that certain climatic condi-

tions which prevail on the sea coast, such as the cool and equable temperature and pure atmosphere, give the residents of our coast cities—San Diego, San Francisco, Alameda and Oakland—an advantage, in their lesser liability to disease and death, over the residents of our hotter and less salubrious interior cities—Fresno, San Jose, Stockton, Sacramento and Los Angeles. It is, nevertheless, true that in our coast cities and towns, as well as in those in the interior, the health and lives of their residents, as well as the material prosperity of their respective communities, will depend largely on the attention they give to municipal and domestic sanitation; and by this last named fact not only their death rates, but also their material prosperity will be measured.

The population of the State of California, by the last census, was one million two hundred and eight thousand one hundred and thirty. In the three years since the census we may reasonably suppose this population has increased to one million three hundred and thirty thousand. The census gave the seventy-six cities and towns of our State having one thousand and more population a total population of six hundred and fifty-seven thousand two hundred and thirty-two. In the three years since the census we may suppose the population of these seventy-six communities has increased to seven hundred and twenty-five thousand. On this basis of our present total State population, and our present total urban and town population, it will be seen that these seventy-six cities and towns have considerably more than one half of the present total population of our State. It is in these aggregations of our population, represented by our cities and towns, and not on our farms or in our country districts, that sickness and death principally prevail. The monthly reports of deaths of our State Board of Health are mostly from these cities and towns with a population of one thousand and over, and these reports indicate that a large percentage, an average of fifteen per cent or more, of the total deaths in the State occur in these cities and towns from preventable diseases.

This is a startling fact, that nearly, and probably fully, one-fifth of all the deaths in our State are from diseases which, under changed and better sanitary conditions, should not occur. Incredulous persons may doubt this statement, but our official reports of deaths make this dreadful record. From month to month, and from year to year, these reports have told us of the taking off, by the destroyer, Death, of large numbers of our people, of all ages and conditions and in all the walks of life, by diarrhoea, dysentery and cholera infantum; by diphtheria and croup; by smallpox, scarlet fever and measles; by malarial and typhoid fevers; by erysipelas and alcoholism, and by other preventable diseases; and these reports of deaths by these diseases will continue until a wise and careful attention to municipal and personal hygiene and sanitation shall prevent their recurrence.

It is all right, in view of a possible visitation from Asiatic cholera, for this State Sanitary Convention to advise the people of California to put their respective communities and their individual homes in order against the coming of this dreadful scourge, and thus to be prepared to avert its fatal ravages if it does come, but it is also a present and pressing and most important duty for this Convention to impress the people of our State with the serious fact that we have constantly abiding with us these other above named dangerous and often fatal preventable diseases; and that it becomes all of us, State and Municipal Boards of Health, all State and municipal officers, and all physicians and laymen, to use all the means which sanitary science teaches us are at our command to prevent the constantly recurring development and fatal results of these preventable diseases with all their accompanying cost of money and pain and sorrow.

There are evidences, as well in our larger cities as in our smaller towns, of an awakening on this matter of municipal sanitation.

The good results accruing to such of our cities and towns as have devoted intelligent thought and study, and the necessary money, to secure good sanitation, as evidenced by the greater freedom of these communities from sickness and their lower death rates, as well as by their increasing growth and material prosperity, have been noticed; and these sanitary object-lessons are stimulating other and hitherto less progressive communities to secure like good sanitary conditions with their accompanying good results.

A commission of civil engineers is studying the present and prospective needs of San Francisco, with a view to the construction of a complete sewer system to replace the imperfect one now in use there.

The authorities of Oakland, several years ago, employed Sanitary Engineer *Hering* to make a study of the needs of that city as to sewers, and to recommend

a plan upon which a complete sewer system should be constructed. This work was done and the report made, but it remains on file in the city's archives unacted on. Mayor Pardee, in his inaugural message, called the attention of the present City Council to this report, "to the end that the city may be protected in this most important matter."

Mayor Pardee, in his message, also says of Oakland's present water supply, that "the water has at times been a menace to health, and has never been, and never can be first class in quality;" and he recommends that a new water supply be procured for the city from artesian wells at Alvarado.

The authorities at Sacramento are discussing the expediency and necessity of abandoning the Sacramento River as an unsatisfactory water supply, by reason of its impurity, and securing pure water for the city from artesian wells in the vicinity.

Stockton, at large cost, is now constructing a complete sewer system, which has the approval of Sanitary Engineer Waring.

Los Angeles is constructing a sewer system, with an outlet to the ocean, which will be completed in a year.

Others of our smaller cities and towns are providing themselves with sewer systems and supplies of pure water.

This disposition to improve present imperfect sanitary conditions, and to provide the best possible sanitation where little or no attention has heretofore been given to this important matter, should spread to every city and town in the State. Wherever a thousand or more are gathered, and in all larger communities, provision should be made for their necessary essential sanitary wants.

The most important want, in a sanitary sense, of any community, whatever its size, is pure drinking water. If it is without sewers, and of necessity uses cesspools and privy vaults, and also uses surface well water, the water should be boiled before it is drunk. But if it is possible to tap a stratum of artesian water, as is the case in many of our valleys, or to pipe water from a mountain lake or stream, as is possible in our foothill and lower mountain towns, that would be better than to depend on the use of surface well water, which is liable to contamination from noxious surroundings.

The next most important want is a provision, by sewers or otherwise, for the disposal of the organic refuse of the community.

In the plumbing and drainage of a town sanitary principles must be observed.

Privy vaults and cesspools and other unsanitary house surroundings should be abolished.

Garbage must be gathered and effectually destroyed.

The best methods of school sanitation should be put in practice.

Persons suffering from contagious diseases must be isolated, and the premises occupied by them, after recovery or death, must be disinfected.

To secure the general adoption of these essential sanitary conditions, which are necessary to the good health and material prosperity of every community, small or large, in our State, there should be the heartiest and most helpful co-operation of our State, County, City and Town Boards of Health; of our State, county and municipal legislators; of the officers and teachers of our public schools; of our police departments; of the public press, and of the people generally in all our towns and cities.

The State Board of Health is to be congratulated for its timely and wise action in inaugurating a movement, which can but result in better general sanitation, and consequent better public health, by the calling of this First State Sanitary Convention. Such a Convention should have been held years ago, and the primal gathering should have had annually interesting and useful successors; as a consequence, our State would have made more and better progress in sanitation.

The laches of the past, in this regard, can be, and, it is to be hoped, will be corrected in the future, so that this Convention will be the precursor of many succeeding ones, with constantly decreasing sickness and death, and a corresponding increase of happiness and prosperity throughout all our borders, as an inevitable sanitary result.

Dr. J. R. Laine, of Sacramento: May I ask Dr. McLean, for the benefit of those who are making reports to the State Board of Health, how he has ascertained the increase of his population from the date on which it was taken by the United States census?

The President: I will state to the society that there is another paper to be read before the discussion opens, and if Dr. McLean will answer the question we will then pass on to the next paper.

Dr. McLean: The school census is taken in our city, as well as in all the other cities of the State, once a year, and the report comes in. It is being taken now in Alameda. The census takers are instructed both by the School Board and by the Board of Health of our city, and, by the way, there is the best possible co-operation between the Board of Health and the School Board and our Municipal Board in regard to sanitation in the city of Alameda. That matter I will talk about in another portion of my report. These school census takers are instructed by the Board of Health, as well as by the Board of Education of our town, carefully to take, not only the census of the children of school age, because ten or twelve dollars comes for every one of these children that are reported and goes into our City School Fund. The census takers are also instructed to take the total population of the city once a year, and to take it carefully and correctly, and then from this as a basis our increase of population is ascertained.

Dr. Woolsey: I desire to make a motion in regard to this matter, inasmuch as this paper deals with questions of statistics pertaining to Oakland, San Jose and other cities, and has been based upon monthly returns instead of annual returns, and sometimes one part of the year, and sometimes another, and inasmuch as the State Board of Health is more competent to deal with statistics, I would suggest in reference to this paper that instead of referring it to the Committee on Publication, it be referred to the State Board of Health for the purpose of revising the statistics and deductions therefrom.

Dr. J. R. Curnow, of San Jose: I would say, with due deference to Dr. McLean, that his statistics are not true. I have been in San Jose most all my life, and we have the reports fully and correctly in that city. The annual death rate of San Jose is about thirteen per one thousand. The difference between thirteen and thirty is considerable.

Dr. ———: I want to ask whether the object of this Convention is to discuss the question of the census, to resolve ourselves into a census bureau or to discuss the question of sanitation. Sanitation is one thing and a census bureau is another thing. What difference does it make whether there are eighteen thousand people or thirty-three thousand people in San Jose?

Dr. McLean: I want to say that I have, right here, the reports of the State Board of Health for the whole of last year, and for the three months of this year that have been filed, and that I have truthfully made up this statement from these reports, both of population and death as reported from those cities. I suppose the respective cities and towns to which the blanks of the State Board of Health are sent for this purpose have furnished the figures which are the basis of these reports of their population. The State Board of Health reports on the deaths, and these returns state the population each month, and state the number of deaths for each month. There is no getting around that statement of the State Board of Health. If it is not correct, I am not responsible for it, and the gentleman from San Jose must not blame me. He must blame himself or the health officer down there for not reporting a reasonable estimate of the population of his city. And so with

the rest of the cities of California. San Jose is undoubtedly at a disadvantage by reason of the fact that the State Board of Health's report starting from January, 1892, and ending March, 1893, states its population as given by the United States census of 1890. I am not responsible for that. I found that statement in the report, and I made it up in the paper.

Dr. Curnow: Dr. McLean assumes that Alameda has increased in population every year, which is true, but he does not concede the same to us. He assumes that we are standing still in San Jose. Now we are not.

The motion to refer the paper to the State Board of Health instead of the Committee on Publication was lost.

Dr. McLean: I want to say one word, and then I will leave the stand, and that is, that I have no motive except what would commend itself to a person acting conscientiously and on his honor. I have nothing to do in any way in the matter relating to any difference between San Jose and Sacramento, or any other place.

Dr. F. A. Nief, of San Francisco, D. V. S., B. Sc., then read a paper on "Sanitary, Veterinary, Police and Hygiene and its Relation to Public Health," which was also referred to the Committee on Publication.

---

#### Veterinary Sanitary Medicine and its Relation to the Public Health.

Mr. President and Gentlemen: No city can be considered to have a perfect sanitary system unless it possesses a method of inspection relating to one of the primary factors of health and welfare of populations, viz., foods. History teaches us that from the remotest times sanitary measures were taken to protect the people from diseases caused by unhealthy and diseased foods emanating from sick animals; and when we come to consider the steady march of progress and the wonderful revelations made by the modern microscopists and sanitarians as to the etiology of numerous diseases, it would appear as a negligence, nay a crime, to neglect the modern sanitary precautions against this evil. But, luckily, with a few exceptions, all civilized countries have systems of protection. These systems are, of course, more or less perfect in different countries and we are sorry to state that this portion of the United States is one of the most unfavored among the number; not that the body of medical men appointed for the purpose of caring for the health of its people are not competent to have the sanitary measures applied, but on account of the want of necessary appropriations, and, in many instances, by the incompetency of its subordinates whose duty it is to examine the different foods to be brought to the market for consumption and to report on contagious and infectious diseases in domesticated animals in a proper manner. This deplorable condition should, we believe, be remedied, and this as soon as possible, for when we take into consideration the evil results of the present modes of inspection it is nothing but right that a demand for protection should be made by the people.

Of what does the system consist? In answering this question we will take the subject step by step, leaving out that which we realize we are not as yet able to do in California, although it is also of great importance; but we have not, like some large Eastern and continental cities, the necessary accommodations and appropriations.

In the examinations of meat products we should have the following:

*First*—Ante-mortem inspection of all animals on their arrival at the slaughter-houses.

*Second*—Post-mortem examination of all slaughtered animals before their removal for the purpose of consumption.

*Third*—An official stamp to be applied to all meats considered fit for food.

*Fourth*—A law making a misdemeanor, punishable by heavy fine and imprisonment, the violation of the above rules or refusal to comply.



All of the above applies to animals alone, but when we come to look upon the products of these, such as milk, for instance, we will find that there also do we require skilled experts, possessing a knowledge of both chemistry and bacteriology. Let us now inquire into the qualifications of the persons selected to fill the important positions of inspectors in cities where even a moderate system of inspection is carried out. None are tailors, grocers or shoemakers, but men who by their studies, certified to by a diploma granted by a recognized veterinary college of good scientific standing, are fit to fulfil in a creditable manner the duties of their trust. We will now, and very briefly, enter into the consideration of a few of the diseases which are often met in slaughter-house inspection:

Among the diseases of the ox which should be particularly looked to and which are commonly met, we will, as we have stated, mention but a few, for should we attempt to describe each individual disease, its pathology, and modes of detection, it would carry us too far beyond the line which we have traced for work. Therefore we will only discuss those which we are most liable to meet in the abattoir.

Tuberculosis is too well known by our practitioners to require a description of its prominent symptoms. But some of these are often deceptive and obscure, thereby rendering a diagnosis very difficult, and in some cases impossible, by manual and ocular examination. For instance, an animal may present, as to general condition, all the signs of health and be, nevertheless, infected with the disease. In such cases, which are far too common, how is a sanitarian to make a diagnosis on the live subject? This question, a few years ago, would have remained unanswered, but at the present date the problem has been solved, thanks to Prof. Koch's tuberculine.

Tuberculosis cultures contain a soluble product, discovered and isolated by the above named German scientist, and possessing a remarkable property. In fact, this substance, properly prepared, has no action whatever on healthy subjects, while it becomes toxic when inoculated to tuberculous animals.

Tuberculine is the name which has been given to glycerinized extract of the cultures and containing the reactive agent, and since his first discovery Prof. Koch has much simplified his method of obtaining the substance, which substance presents but little difficulty in its mode of preparation by the bacteriologist. Tuberculine provokes on the inoculated tuberculous subject the following phenomena:

1. A febrile reaction, more or less intense, and which occurs between the tenth and twentieth hours after the administration.

2. An inflammatory reaction, *absolutely* remarkable, around the tuberculous deposits. This substance, therefore, is pyretogenic on an infected animal, but has little or no action on a subject free from tubercular lesion.

In concluding this subject of tuberculosis, let us say, that should we have the least suspicion of the presence of tuberculosis in a herd, nothing is easier than to satisfy ourselves of the condition suspected by the use of tuberculine, and by this means prevent the introduction into families of the germ-bearing milk and meat.

Of anthrax we will say little, as those who are listening to me are too well acquainted with it to require the discussion of its different forms and manifestations. We will, therefore, touch only on the most striking points of the malady. There are two well known forms of anthrax, each being caused by a different germ, and these, to-day, we are able to differentiate, isolate and cultivate; thereby showing their difference and at the same time their relationship. In fact, we can, under the microscope, distinguish bacterial or essential from symptomatic anthrax, and, although the last named is by no means a benign disease, we only treat of the first, as it is by far the most dangerous.

The bacteria of anthrax was first discovered by Davaine, but its true features were ascertained by Koch, Pasteur, Chamberlan and Roux. The rod-shaped element attacks both man and lower animals with equal readiness, although among our domesticated species we find that some are not readily diseased except by experimental inoculation. To be brief, let us say that the most receptive subjects are man, ox tribe, horses, sheep, and in the second category we find the dog, cat, swine and birds, but even these last, under certain circumstances, will contract the disease.

The introduction into the system of the bacillus anthracis is effected in three principal modes:

1. Accidental cutaneous inoculation, causing in man the initial malignant pustule, and often general anthrax.

2. By the digestive tract, causing intestinal anthrax by the ingestion of anthracoid meat containing either bacillus or its spores, or both.

3. By the respiratory passages, pulmonary anthrax. It is the rarest form met. In man, it has often been observed among the ragpickers of Vienna, Austria, and the wool sorters of Bradford, England. It is, without doubt, caused by the dust containing desiccated bacteria and spores.

In man, as well as in animals, the post-mortem lesions are, as a whole, identical. The blood is black, tarry-like, sticky to the feel and uncoagulable. The veins are gorged with this blood, the spleen is enormous, bosselated and black; the mucous membrane of the small and large intestines, and often that of the stomach, is covered with black ecchymotic spots, bulging outwards and having a furunculous appearance, these varying in hue from green to black, and many are ulcerated and partly gangrenous. The lungs present inflammatory patches, and the decomposition of the cadaver is most rapid. The blood, organic pulps, especially that of the spleen, ganglions and bone marrow, are virulent. To resume, the microbiological features of the bacillus anthracis are as follows: It is aerobic, immobile in organic and culture fluids. In the system, it is present under its bacillary form only, while in the culture mediæ it assumes a filamentous appearance, and readily sporulates. In artificial mediæ its culture is most favorable at temperatures varying from 30° to 35° C. It fluidities gelatine, and is easily stained by the methods of Gram and Weigert. Animals having died from this disease should be buried in deep trenches and their carcasses covered with lime.

Actinomycosis is a disease often found in the bovine tribe, and is communicable to man and many animals. No later than a few weeks ago we have read in our journals of several cases in man caused by the use of actinomycotic meat. This disease has been known for many years under the various names of "wooden tongue," "lumpy jaw," "osteosarcoma of the ox," etc., but until recently its true nature and etiology was unknown.

The actinomycis or ray fungus was discovered, if we remember rightly, by Israel, and almost simultaneously by Bollinger, Rivolta and Pononcito. It is a cryptogamic production of a characteristic microscopic appearance found in the pus and tissues of the lymphosarcomatous tumors to which this fungus gives rise. These tumors are most commonly met on and around the inferior maxillary bone, larynx and pharynx, but at times it is concealed from view as we have found them in the mediastinal region when no outward symptoms could be observed. Its mode of introduction into the healthy subject is by penetrating into an abrasion, such as an excoriation of the gums. It goes without saying that the use of the meat of infected animals should not be used for food. It is true that some have advised the removal of the diseased portions and the market use of that which was healthy. This, in our opinion, is a dangerous practice, as we possess no means to assure us that all of the parasites have been removed. We have stated that its presence can be easily detected when external manifestations are present; it is so, for stained or not the microscope will readily show the actenic form of its mycelium and its conidia.

Glanders and Farcy, a contagious and infectious disease, and fatal in nearly every instance, is one of the most dreaded among the long list of maladies communicable from animals to man. It has been our lot to observe several cases in man, and I assure you, Mr. President and gentlemen, that such a sight and the impression of horror thereby caused can never be forgotten. This horrible disease has not, so far, been found in the ox, and all attempts at experimental inoculation have failed in this tribe of animals. It is of equine origin, and is caused by the presence in the system of a bacillus, the "Malleomyces Equestris." The microscopical appearance of this micro-organism is not unlike that of the bacillus tuberculosis which it resembles in many respects. But on potato culture, for instance, it has a specific chromatic reaction which no germ, so far discovered, possesses. Glanders may present itself under two forms, viz: Acute and chronic or latent, not to mention farcy, which is a cutaneous manifestation of acute glanders. Acute glanders can easily be recognized by the veterinarian on account of its variety of specific symptoms; but when we are called to pass an opinion on a case of chronic equinia it becomes a most difficult matter, for this disease, unlike others, always begins in the chronic form. This, when the glauderous tubercles are residents of the lungs and bronchial and other hidden gangliæ. Animals suffering from this form of glanders have been known to spread the disease for months, and even a few years, without being themselves suspected in the least by the inspectors. Here, again, shall we call your attention to the wonderful stride taken by our profession.

At the present date we need not allow an animal, apparently sound but having a suspicious history, to travel around spreading the contagion and death wherever it goes, for within the last few years a product somewhat similar to tuberculine has been found, or rather prepared, by Roux and Nocard. This substance, when subcutaneously injected into the areolar tissue of glandered horses will cause a specific hyperthermic condition absolutely reliable; and to-day the French, German, Russian and many other governments have adopted its use in the armies to recognize and stamp out the disease, thereby saving life and property. Indeed in the States of New York, Illinois, Ohio and others malleine has been successfully used by their State veterinarians.

We will now briefly say a few words about that most important fluid daily used by every one and constituting the essential article of food of young children—milk.

In most cities this product is the object of the most strict inspection, not only as to its nutritive value but as to its quality as a disease-producing agent under certain circumstances. This inspection is, in our mind, of the utmost importance, as it is a well established fact that milk being *per se* an excellent germ-cultivating medium, is the direct cause of innumerable cases of tuberculosis in the infant, and, in many instances, in the grown subject, and we need only here mention this disease in connection with our remarks on milk.

By rights the nutritive quality of healthy milk should be ascertained by a quantitative analysis. Many so-called inspectors confine their examination to the lactometer test, and when the instrument registers the proper degree of gravity (1.027-1.034) it is passed as a nutritious and pure article. This is by no means a test, for we may easily prepare a fluid of the same degree of gravity without its containing the necessary per cent of casein, albumen, fat, lactose and mineral salts as is the practice of many unscrupulous dealers in large cities. Therefore we may consider the lactometer as a little better than useless. Milk contains, on an average 88 per cent of water, but it is hardly necessary to remark that should water be added it would not render it unhealthy, but, as a matter of protection, especially for young children, a quantitative analysis should be resorted to in the inspection, especially when it assumes the bluish hue so characteristic of the use of the pump. We will now touch on the point alluded to above, tuberculosis. It is a well established fact that this disease is often communicated to the human being by milk (insufficiently cooked), containing the bacillus of Koch, and we have, a very short time since, examined in our laboratory specimens of diseased milk. This milk, it is true, was obtained from very unhealthy cows kept and milked in filthy barns and under the most unfavorable circumstances, and the result of our bacteriological examination was as follows: In six of the specimens we found the bacillus of tuberculosis, and in the remaining five, which were free from this germ, we observed an enormous amount of leucocytes and broken-down and crenated red blood corpuscles, not to mention the foreign material. Therefore a microscopic examination should be made of all suspicious milks as a means of detecting the dreaded bacillus and thereby in many instances save life.

We are aware that that which we have said is nothing new to the scientific public, and we did not think for a moment to teach a new theory as to the measures which should be taken to prevent a population from being poisoned by unhealthy market product, but our sole aim is to bring before you the painful fact that these measures are here somewhat neglected and that a new order of things should soon be inaugurated, and for this purpose the veterinary profession of the Pacific Coast, represented by the "California State Veterinary Medical Association," has not hesitated in selecting your humble servant to voice its professional sentiments in regard to the relation of veterinary sanitary police and hygiene to the public health. Veterinarians have been long overlooked in this connection in California, and this, we believe, on account of the presence of the numerous empirical "horse doctors" who have been the cause of casting a shadow of ridicule and contempt on a profession which abroad, and in many of our Eastern States, is looked upon as a scientific means of preventing a large number of diseases in its field. Hoping, Mr. President and gentlemen, that this paper will, in its humble way, bring this most important subject to the point of recognition which it deserves, I thank you for your kind attention.

The President: Ladies and gentlemen, in the discussion of the large range of subjects touched upon by the doctors in the papers we have

heard, as the hour is late, we had better remember the rule that was adopted this afternoon limiting remarks to five minutes for each speaker. I would like to call upon some of the leading sanitarians to make some addresses. Perhaps Dr. Norris would favor the society with some remarks.

In response Dr. Norris said that an unexpected honor was done him in thus being called upon, an honor which he appreciated, and that in response he would simply read some remarks that were made at a meeting of medical men of the army on this subject at the Presidio several years ago. The question was, "Of What Value is Inoculation as Practiced by Dr. ———."

Dr. Cluness, of Sacramento: I desire to say just a word, and I shall not take three minutes. The first item I find upon my paper is the quarantine of diarrhœa, as referred to by the Secretary of the State Board of Health. In my judgment, it is not only necessary to quarantine those who may be afflicted with diarrhœa while so afflicted, but even for a considerable length of time afterwards, for the reason that during the prevalence of the epidemic in Hamburg the "British Medical Journal," edited by Mr. Hart, sent a representative to the city of Hamburg, and during his investigation he found that persons who had been afflicted with cholera, and who had entirely recovered from the diarrhœa, and who were to all intents and purposes quite well, yet who were detained by him for the purpose of investigation were still loaded with the germs of cholera. Therefore such persons should be required to be quarantined for a considerable length of time after the evidence of cholera has disappeared.

Another point is with reference to the site for detention, as referred to by the gentleman from Yuma, Dr. Cotter. The site for the detention of persons afflicted with cholera should be entirely away from all water communication. I am somewhat familiar with the point indicated by the doctor as a suitable one for quarantine purposes, but notwithstanding the fact that he has told me that it is some distance from a running stream, it is not, in my judgment, far enough, because of the nature of the soil surrounding it. It is a very porous soil, filled with gravel, and one which would convey the germs of cholera very readily into the stream from the point indicated by the doctor.

Another point made by my friend, Dr. Ruggles, with reference to the germ in privies. I do not believe that the cholera dejections when thrown into privies, especially after they have been disinfected in the manner indicated by him, are half as dangerous as he imagines, because of the fact that the germs of decomposition so soon destroy those of cholera. The cholera germ is a delicate one and easily destroyed.

Another point that I wish to mention is, the fact that a quarantine should always commence at the point of departure and never end until the point of entry. The five days quarantine, as intimated by some persons, is, in my judgment, entirely too short a time, if you quarantine at all, for the reason indicated in my first remark. Even when a person has apparently recovered from cholera he may be loaded with the germs of the disease, and he may be transported from New York to California with those germs in his system.

Dr. Cotter, of Yuma: In answer I would say that my idea of treating the dejecta—I think I referred to it in my paper—would be that

all dejecta and vomited matter ought to be caught in vessels containing a strong solution of some disinfectant, and after that they should be thrown into a barrel that had been sunk in the ground so that the top of the barrel should be at least four feet below the surface of the ground and more than half full of some disinfectant solution. When the barrel becomes full with the matter thrown out, it has been my custom to have that barrel covered up with the surface of the ground and another sink made and another barrel placed in it.

Now, another point that I would like to inquire about is the length of time that germs have been known to exist in the personal effects of passengers, and in an active state, and also the necessary means by which they are positively killed, whether by fumigation, with sulphur spraying, with carbolic acid solution, or any other powerful disinfectant.

Another thing is the length of time for which it is necessary to quarantine persons who have simply been exposed to infection, as well as those who have recovered from the disease. These points all ought to be settled, it seems to me, in order to be better able to protect the State.

Another thing is, how long will cholera germs live after having entered a stream? how long are they dangerous.

Dr. J. R. Laine, of Sacramento: Mr. President and gentlemen of the Convention, what I have to say is so brief that perhaps it would be unnecessary for me to step upon the rostrum. Dr. Cluness, in reading his paper, touched upon the fact two Governors of the State had neglected to sign a bill creating the office of State Sanitary Inspector, and I believe he mentioned the reasons that he thought influenced the Governors not to sign the bill. Concerning that I do not wish to express any opinion at all. But he also said something concerning the legislators, rather intimating that it was parsimony on their part in not providing the State Board of Health with sufficient means. I wish to state for the purpose of correcting that impression, which he probably understands at this time is somewhat erroneous, that the last Legislature appropriated fifty thousand dollars for the prevention of the introduction of contagious diseases in this State, to be used at the discretion of the State Board of Health. Previous to that time the only appropriation that had ever been made outside of the appropriation of four thousand dollars per annum, which is the amount limited for the use of the State Board of Health, was ten thousand dollars, which, I think, was some six or eight years ago appropriated for that purpose. That amount has done duty up to the present time, and at least one third or one quarter is unexpended at this time. So that it places at the present time the sum of fifty-three thousand dollars for use for this purpose. Now, I wish to say that this is the largest amount that has ever been appropriated by this State for any such purpose. So far as I know, it is the largest amount that has ever been appropriated by any State. And when, in attempting to get a bill passed to create the office in question before the last Legislature, I was met with this statement: "Why, we are about to appropriate an amount of money which will enable you to employ any assistance of that character, should it become necessary to do so, without creating an office that would continue when there was really no necessity for it." Against that I could advance no argument, and dropped the matter, and no

such office was created, and no such bill passed during this session. I merely make this statement to correct the impression that there has been parsimony on the part of the last Legislature. I do not know that it is necessary for me to defend this Legislature, or any other, but I wish to state that as a mere matter of justice. [Applause.]

Dr. Magee, of San Diego: Mr. President and gentlemen of the Convention, papers have been so numerous and lengthy, and the hour is so far spent, that I can say but a word. With regard to our location in San Diego, there are some things that are peculiar, and one thing which we have there which is much better than any other part of the State, is the fact that we have no surface water, and that the water level in that vicinity is about one hundred feet below the surface of the ground. We have no such thing as waterlogged land there, no moist land, no swamps, no ponds, nor anything of that kind. You know it has been generally talked over the State, at any rate as far up as my friend, Dr. Orme, the President, lives, that there wasn't any water down there at all, but we do succeed in getting enough to flush our sewers. Our water supply is very good indeed. It comes from the Cuyamaca Mountains, fifty miles back in the country, and four thousand five hundred feet above the city level it is impounded, and from that point it comes down about three thousand feet in a very few miles, the descent is very great, coming down a creek of a bouldery character, where the water is thoroughly aerated, and the organic matter it contains is thoroughly oxidized.

The thing that bothers me more than anything else is the proper gathering and disposition of garbage. I have been urging it upon our authorities that there is but one way to make a success of it, and that is for the garbage to be gathered at the expense of the city instead of the individual. Our garbage, after being gathered, is taken out to sea. We have a garbage scow, which is sailed out beyond the bar, and it is dumped in the ocean at a spot sufficiently distant so that it never drifts back into the bay at all. But the great difficulty consists in getting it all together. Poor people, with lots of children, have plenty of garbage and plenty of time, and it is much more convenient for them to dump it on vacant lots after night-fall, or dump it into the ground and pollute the soil than it is to cart it away. And the facts of the case are, that we cannot attain the highest sanitary condition in our city, unless we could have the garbage gathered and disposed of by the city and relieve the poor of all expense and trouble in the matter, except to put it in a barrel so that the scavenger can take it away from the door.

We have never had any sporadic cases of cholera or cholera morbus in San Diego that have not been traced directly to the consumption of diseased or decaying meats or vegetables. Last year there was just one case in the city, and that was the outgrowth of a man eating over-ripe grapes. There was one death from cholera morbus in San Diego some years ago, and that was traced directly to the man's eating diseased meat. We intend and expect, if there is any cholera appears in the State whatever, to have the vegetables, meats and other articles of food that are exposed for sale thoroughly inspected and everything that is unfit for use removed and promptly taken to the garbage scow and taken out to the ocean.

I fully concur in a great many of the recommendations that have been made here to-day, and while I think that we will not probably have any very severe epidemic of cholera in California, I confidently expect that we will have it in the United States. I certainly believe myself that the germs of cholera are now disseminated throughout the United States from last year.

Dr. C. A. Ruggles, of Stockton: Mr. President, I did not intend to say anything at this time, but after consultation with our Secretary, it seems as if the occasion may possibly arise when an explanation of certain points might be of benefit. It is in relation to the situation of the quarantine inspection district, at Yuma. I will state, that last November the State Board of Health empowered Dr. Cochran, who was President of the Board, and myself to visit Yuma, and make a quarantine inspection station somewhere there as was best, in our judgment. We fancied that we were very successful in it. We located a quarantine station at a place called El Rio, and we had everything that we thought was necessary to make it a successful quarantine station. We had regular water and telegraphic communication, and a railroad switch with an abundance of buildings that we might use for hospital purposes. We came away from there feeling that we had done a good thing. We knew nothing about any feeling amongst the people of Yuma at that time. Subsequently I found out that there was a big irrigation scheme going through there, and they objected to a quarantine station. As though that were not enough, they influenced the officers in charge of the Indian Reservation to say that we should not come within six miles of them. The poor unfortunate Yuma Indians were of more importance than the people of California. Therefore, all these objections being brought before the State Board, Dr. Laine and myself deemed it proper to go down and see if we could not come to some definite conclusion in regard to locating a quarantine station there, or in that immediate vicinity. I say it now advisedly, that I think they treated us very unkindly. Dr. Cotter was present, he knows the facts as I state them. They would not even allow us water; they wouldn't allow us to purchase water, and there we were with no quarantine station, and no prospect of getting one there. The only way we could get out of the difficulty was to reach a conclusion something of this nature: That the Territorial Government of Arizona must protect itself, and therefore California at the same time, and if the Territory of Arizona will not do it, and we haven't much hope that it will, we have got to appeal to the general government, and if the general government don't listen to us we will put a guard there, if we have to take the whole National Guard of the State of California to do it. And the quarantine station will be brought inland towards Banning, or some such place as that, where it will not be deemed inhuman to stop a train of passengers. There isn't a place between Yuma and Banning that I would put a dog on, and compel him to stay there any length of time, because there isn't a place for shelter, there isn't a place for water, and there isn't a place fit to put a human being on, between Yuma or El Rio and Banning. I make this explanation now, so that if the Board has to act you may know why it is done in the manner that we shall do it. [Applause.]

Dr. E. H. Woolsey, of Oakland: Mr. President and Gentlemen: I

have heard some of the papers read before this Convention this afternoon and those this evening, and I regret very much that I could not have been here all the time and that some of the papers were read before I arrived. I congratulate the Board of Health and those concerned in the calling of this Convention, because I believe it to be a move in the right direction. It goes to the end of educating the people in regard to the dangers of cholera, and other diseases that are contagious, and in regard to the means for their prevention.

The remarks of Dr. McNutt reached deeper than perhaps those of any other, because they go to the groundwork and basis of an education that would yield the grandest results, and that is, the education of our children in our schools in hygiene. It is now generally agreed by all the authorities that bacteriology has brought the knowledge of the question of cholera to its present comprehensive state. It is not many years ago that the profession was at sea in regard to the causes of cholera, and the means for its prevention were as various and as divers as possible, because it was thought that it might be wafted in the air, or communicated in some other way than by contact. And the paper of the Doctor who just spoke, Dr. Ruggles I believe, which referred to the analogy of the cause and mode of contagion and infection between cholera and typhoid fever, and also the mode of treatment of that disease was specially valuable and suggestive.

We understand that the dejections of typhoid fever are the principal cause for the communication of typhoid fever, and if the public understood that fact which was stated by Dr. Ruggles and which has been also alluded to, I believe, by others in the discussion, there would be no such thing as fright or fear, but they would give personal attention to the means for preventing disease, and there would be no such fear as will probably prevail in the case of a cholera epidemic, that people will go on the other side of the street, because there happens to be a hospital for cholera, or a case of cholera there, because every one can understand, with such analogies drawn, that there could be no possible danger in going by a case of cholera in a house, or even being in the next room from a case of cholera, provided none of the clothing of the cholera patient was carried in there.

I want to state something which may be interesting to you. I have been conducting a private hospital for some seven or eight years, and incidentally, in my absence, patients were admitted with typhoid fever and put in the beds in wards, and when I discovered the fact, it was sometimes inexpedient to remove them. Now I don't care whether they have a typhoid fever patient there or not. I would just as soon have a typhoid fever patient in a surgical ward, or a medical ward as any other patient. I have had typhoid fever patients for five or six years, incidentally at first, and in fact within three feet of other patients, and we have never had any instance of the contagion of typhoid fever, because I keep typhoid fever patients clean. And I believe that there is no more danger with typhoid fever three feet away from another patient, if you will look out and see that there is perfect disinfection and perfect hygiene, than with any other disease. Now if the public understood that once—and it is the business of the Convention to educate them, and the business of these physicians to carry that idea home—there should be no such thing as fear of cholera;



there should be such a thing as personal attention to personal cleanliness, and personal hygiene.

Now bacteriology has brought the knowledge of cholera to its present position; it is to bacteriology alone that we owe the present comprehensive state of our knowledge on this question. Now some distinction was drawn here that it was not the germs that caused disease, but it was the ptomaine; that idea is erroneous. We would not have any toxine if we did not have any germs; so if you prevent the increase of germs you prevent the toxine.

I want to state one thing which may be of use to the members of this Convention, and perhaps may be even to some who have pursued the same idea of treatment, and that is, in reference to irrigation. Lee and others have claimed very great results in the treatment of cholera by rectal irrigation by the means of tubes. Now it has been my course, for some years, in typhoid fever and in cholera morbus and so on, to treat those cases with gradual flushing of the colon at first experimentally, and lastly by a certain method. Now I regard it as one of the most esteemed elements of treatment for all such cases, and I believe when cholera comes it will be considered one of the readiest and most effective means of treating the disease. Now then, the first indication in the treatment of cholera is to get rid of your bacteria. Now in the introduction of the tube you can't carry it very far up the colon without some risk, and you may have some people that will prevent your carrying it at all, and it is not always possible to carry the tube up to the sigmoid flexure and into the colon. It is impracticable and we don't pretend to do it. Now my system is gravity flushing, and a part of this system is recommended by all means as to the use of enemata. I prefer to have a patient in a small bed, practically a ward bed, a little iron bed. When I have a typhoid fever patient in his house, I have him lifted out on a lounge if I haven't any small bed. I prefer it. Then by raising the foot of the bed with the patient already there, raising it up, placing his head on the pillow and his shoulders on the mattress, you are able to fill that patient up with two or three quarts of hot water very easily. While the patient is loaded up, or as soon as he is loaded up with hot water, then he should be turned on his right side, with the foot of the bed still raised. That will enable the fluid to pass across the transverse colon. Now then, when the patient is on his right side, leaving him on his right side, the foot of the bed is to be lowered, which will cause this fluid to gravitate down into the large colon and the cæcum. I then raise the foot of the bed, the patient still lying on his right side. I turn the patient then to his left side while the bed is still lifted, turning him over on his back and then turning him on his left side, and dropping the bed down. In that way I have succeeded in dislodging matter, beans, apple peelings, and a lot of things that have been held in the colon sometimes for weeks. And I believe that in every case of typhoid resulting from such causes that there is no need for it to get into fevers at all, because you can simply sluice them out. You can see in typhoid patients, every time they are sluiced out, their temperature goes down, and after a period of three or four days the temperature will go up, and by this method, without any change of treatment the temperature will drop down, the patient feel himself

more comfortable. Now then, if we can do that, then the various methods of saline injection or antiseptic solution can be used. Then we are carrying the remedy to the furthest point. It has occurred to me that it would be a useful thing, and I don't know that it has been tried, to make small injections under the skin of a saline solution by the use of hypodermic needles, to inject into the peritoneum, so it corrects the loss of serum in the blood which occurs in all cases of cholera; it seems to me that it may be replaced in the vessels in that way readily and with great safety, more so than by the other injection.

Now there is one point that occurred to me while listening to some of these papers, and that is the question of quarantine. We should attempt to get to the root of the evil. Dr. Ruggles has said that quarantine should be established, and where the quarantine begins it should be continued to where the cholera ends. I propose a measure which will go behind all that. This country is afflicted with classes who are not desirable people for this country. It has been afflicted by the lowest class of Germans; it is now being afflicted through Winnipeg, according to the papers, by the lowest serf classes of Russia. These classes we do not want. They are costing this country thousands and thousands of dollars, and will cost it thousands and thousands of lives. And without saying anything about general quarantine, and quarantining every State, I think it is a proper thing that there should be some law passed, and that that law should be drawn, and it must be drawn sooner or later, and the sooner the better, to prevent the importation into this country of that class of people. [Applause.] I therefore have written the following resolution in the last ten minutes, and I now submit it to this Convention:

*Resolved*, That the sanitary protection of the people of the United States demands the passage of a law for the purpose of limiting the immigration to this country of the refuse of foreign population."

I would ask that such resolution, if passed, be presented by the Secretary of the State Board of Health, or of this Convention to the National Board of Health, or some authority there, whereby it shall reach Congress. This is a State Convention, these things probably would have occurred without it, and if we had no Convention thus to express our views upon public questions to Congress. I move the adoption of this resolution.

The motion was duly seconded, and the resolution adopted unanimously.

Dr. J. R. Laine, of Sacramento: I do not wish to discuss the resolution at all, but I wish to call attention to the fact that, as I understand it, there no longer exists a National Board of Health, to whom this can be referred; that all matters relating to quarantine have been delegated by the last Congress to the Hospital Marine Service under the auspices of the Treasury Department. Now this should be referred properly, if you intend it to reach the next Congress, perhaps to the President of the United States, instead of the Medical Board, unless it is sent to the Hospital Marine Service.

Dr. Woolsey: I would suggest that the President of the United States be asked to do something in the matter.

Dr. Ruggles: I do not quite agree with Dr. Laine in relation to that matter. The law now is, that if the President of the United States, at

any time, in his judgment, thinks that this country is in danger by immigration, he has the right to draw the line as the gentleman suggests. Now the only point is this, let the Marine Hospital Service of New York, Dr. Wyman, understand that we, in Sanitary Convention assembled, do believe that that time has now come, and he can communicate that to Grover Cleveland if he sees fit.

Dr. Laine: I am not objecting to it at all. It was simply that I did not wish to send it to the National Board of Health, which is now defunct. That is the point.

A motion to adjourn having been made, Dr. Ruggles said: Before we adjourn, I wish in the name of the State Board of Health of California, to state that one year from to-night, there will be another meeting of this character, where I cannot now say. That depends entirely upon the action of the State Medical Society to-morrow, in designating the place for the next meeting. This Convention will be held the Monday night previous to their assembling, and at the place of their assembling. We feel very much encouraged at the attendance at this Convention. We feel that it is the beginning of a good work, and the beginning of instruction to our people. That is all there is of it, all there is in it. When the people are thoroughly instructed to believe just as we believe, the thing is all done. I believe we have made a good beginning. I feel highly encouraged. I feel that we can go to Pennsylvania, Iowa, Kansas and all those States with our printed proceedings of this Convention, and that we can feel proud of them. [Applause.]

Dr. Orme: I wish to make the same remark that Dr. Ruggles has, that this Convention has proved highly profitable and successful, and I hope we will have double the attendance next year. But before we adjourn, how about the committees? Are the committees ready to report?

Dr. Ruggles: I think I am on the Committee on Constitution, By-Laws, Rules and Regulations, and if my judgment is correct, that committee will report one year from to-night.

The President: If there is no objection, it will be so ordered. There is a resolution that I think it is very important that we should pass in regard to disease among animals. In my county there have been at least six deaths from glanders, and I understand from competent veterinary surgeons that there have been at least a dozen in the State in the last two years, and as we have not, west of the Mississippi River, a branch of the Bureau of Animal Industry, I would favor this resolution:

*Resolved*, That the Secretary of this Convention be instructed to communicate with the Secretary of the Bureau of Animal Industry, in order to have a branch of that bureau on this coast, through the Secretary of Agriculture."

The resolution was adopted unanimously.

Dr. W. F. Wiard, of Sacramento, moved that a committee of three be appointed as a committee of instruction to have sent to every newspaper in the State of California intelligence of what is necessary for the prevention of cholera, and what to do in case it does come. In support of the motion, he said: I believe that will accomplish two things. I know it is a very difficult thing to educate the people at all. We see

the folly of this thing every day; we see people of intelligence among our patrons who take a solid comfort in covering up a case of contagious disease, and nearly every day they protect it from disclosure. That shows us the folly, to a certain extent, of attempting to instruct the people, but I believe if this is carried out it will result in instructing them. And another thing, it will show to the people of this State that we, as physicians and as sanitarians, are allied to the interests of the State. It will show to them that we have had a convention here, and that we have tried at least to accomplish something. Understand me, Mr. President, I don't want to be on this committee myself, and I cannot, but I sincerely hope that this motion will prevail.

Dr. H. Bert Ellis: I think the doctor's object is a worthy one, but I think it is one that can be safely left to the State Board of Health. I think it is something that they are in the habit of doing; they are in the habit of instructing the public and disseminating just such knowledge, and I think we can safely leave it to their discretion and wisdom. [Applause.]

Dr. Ruggles: I will state to the President and gentlemen, that in the Secretary's office in Sacramento, there is a very high pile of these documents, and they can be had upon application from any Board of Health in the State, anybody that will take the pains to ask for them. There are plenty of them there on smallpox and diphtheria, and everything else. The only trouble is that they are not asked for and not received. Last year we sent out any quantity of them, and the probabilities are that many of them were never looked at at all. The documents are there, in the office of the Secretary of the State Board of Health, and can be had upon application by anybody.

Dr. Hitchcock: I believe that the success of this Convention will depend, in the end, upon the education of the people. Without dissemination of sanitary addresses among the people, as has been proven time and again, it is impossible for them to know the law. We have not been able to enforce the law, no matter how important, in reference to sanitary measures when it has not received the approval of the public, and I believe that the most important part of this conference, or this sanitary convention, will be to enable the people to see the importance of prophylaxis, the prevention of contagious diseases.

Adjourned.

---

The following bills relating to sanitary matters were passed by the last Legislature and are now on the statutes:

## REPRINT OF STATUTES OF LEGISLATURE OF 1893.

### CHAPTER CLXIII.

*An Act to appropriate money to prevent the introduction of contagious diseases.*

[Approved March 23, 1893.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows:*

SECTION 1. The sum of fifty thousand dollars is hereby appropriated out of the General Fund in the State Treasury, to be expended by the State Board of Health, under the direction of the Governor, for the prevention of the introduction of Asiatic cholera and other contagious and infectious diseases into the State. The claims of such expenditures must be audited by the Board of Examiners: except that when a contingency arises, which, in the opinion of the Governor, demands the immediate use of money, the Controller may draw his warrant, upon the order of the Governor, in such sums not exceeding one thousand dollars as he may direct, in the name of the State Board of Health; *provided*, that an account must be thereafter filed with the Board of Examiners, and audited by it, and transmitted to the Controller, showing the manner of such expenditure.

SEC. 2. This Act to take effect from and after its passage.

### CHAPTER CXC.

*An Act providing for the removal of human remains from cemeteries in cities having a population of more than five thousand and not exceeding one hundred thousand.*

[Approved March 23, 1893.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows:*

SECTION 1. The City Council of any city of this State having a population of more than five thousand, and not exceeding one hundred thousand, may, by ordinance duly passed, and under such lawful rules and regulations which it may adopt, provide for the exhuming, taking up, and removal from cemeteries within the boundary lines of such city (and in which such cemeteries no interments of human remains have been made for a period of not less than five years), of all the human remains interred in such cemeteries.

## CHAPTER LXXVIII.

*An Act entitled an Act to amend section fifteen of an Act entitled "An Act to provide for the formation, government, operation, and dissolution of sanitary districts in any part of the State, for the construction of sewers and other sanitary purposes; the acquisition of property thereby; the calling and conducting of elections in such districts; the assessment, levy, collection, custody and disbursement of taxes therein; the issuance and disposal of the bonds thereof, and the determination of their validity, and making provision for the payment of such bonds and the disposal of their proceeds."*

[Approved March 9, 1893.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows:*

Section fifteen (15) of "An Act to provide for the formation, government, operation, and dissolution of sanitary districts in any part of the State, for the construction of sewers and other sanitary purposes; the acquisition of property thereby; the calling and conducting of elections in such districts; the assessment, levy, collection, custody, and disbursement of taxes therein; the issuance and disposal of the bonds thereof, and the determination of their validity, and making provision for the payment of such bonds, and the disposal of their proceeds," is amended to read as follows:

Section 15. At any time prior to the day fixed for the election, the Board shall select one, and may select two, polling places within the district, appoint officers of election, and make all necessary and proper arrangements for holding the election. The tickets shall contain the words, "For the issuance of bonds as proposed by the Sanitary Board," or "Against the issuance of bonds as proposed by the Sanitary Board." The election shall be conducted in accordance with the general election laws of the State, so far as the same shall be applicable, except as herein otherwise provided. Every qualified elector, resident within the district for the length of time necessary to enable him to vote at a general election, shall be entitled to vote at the election above provided for. After the votes shall have been announced, the ballots shall be sealed up and delivered to the Secretary or President of the Sanitary Board, which shall, as soon as practicable, proceed to canvass the same, and shall enter the result upon its minutes. Such entry shall be conclusive evidence of the fact and regularity of all prior proceedings of every kind and nature provided by this Act or by law, and of the facts stated in such entry. If, at such election, two-thirds of the votes cast be in favor of the issuance of bonds as proposed by the Sanitary Board, the said Board shall thenceforth have full power and authority to issue and dispose of bonds as proposed in the order calling the election.

SEC. 2. This Act shall take effect immediately.

## CHAPTER LIV.

*An Act to amend section three hundred and seventy-four of the Penal Code, relating to crimes against the public health.*

[Approved March 3, 1893.]

*The People of the State of California, represented in Senate and Assembly, do enact as follows:*

SECTION 1. Section three hundred and seventy-four of the Penal Code is hereby amended to read as follows :

374. Every person who puts the carcass of any dead animal, or the offal from any slaughter-pen, corral, or butcher shop, into any river, creek, pond, reservoir, stream, street, alley, public highway, or road in common use, or who attempts to destroy the same by fire within one fourth of a mile of any city, town, or village, except it be in a crematory, the construction and operation of which is satisfactory to the Board of Health in such city, town, or village; and every person who puts any water-closet or privy, or the carcass of any dead animal, or any offal of any kind, in or upon the borders of any stream, pond, lake, or reservoir from which water is drawn for the supply of the inhabitants of any city, city and county, or any town in this State, so that the drainage from such water-closet, privy, carcass, or offal may be taken up by or in such stream, pond, lake, or reservoir; or who allows any water-closet or privy, or carcass of any dead animal, or any offal of any kind, to remain in or upon the borders of any such stream, pond, lake, or reservoir within the boundaries of any land owned or occupied by him, so that the drainage from such water-closet, privy, carcass, or offal may be taken up by or in such stream, pond, lake, or reservoir; or who keeps any horses, mules, cattle, swine, sheep, or live stock of any kind, penned, corralled, or housed on, over, or on the borders of any such stream, pond, lake, or reservoir, so that the waters thereof shall become polluted by reason thereof; or who bathes in any such stream, pond, lake, or reservoir; or who by any other means fouls or pollutes the waters of any such stream, pond, lake, or reservoir, is guilty of a misdemeanor, and upon conviction thereof shall be punished as prescribed in section three hundred and seventy-seven of this Code.

SEC. 2. This Act shall take effect from and after its passage.

# INDEX.

---

|   | PAGE. |
|---|-------|
| A Few Thoughts about Cholera, Sanitary and Otherwise, by Dr. H. S. Orme.....  | 38    |
| Cholera; Its Cause and Prevention, by Dr. George C. McDonald.....   | 18    |
| Convening of the Convention.....  | 5     |
| Disposal of the Waste of Cities, by Dr. S. S. Herrick.....  | 25    |
| Evening Session.....  | 31    |
| Introductory Address, by Dr. H. S. Orme.....  | 6     |
| Medical Inspection of Passengers and Land Quarantine of Cholera Suspects near Yuma, A. T.,<br>by Dr. P. G. Cotter.....                      | 29    |
| Milk; Its Adulteration and Relation to Infectious Diseases, with Remarks on Food Adultera-<br>tion in General, by Dr. Winslow Anderson..... | 40    |
| Municipal Sanitation in California, by Dr. Jno. T. McLean.....  | 49    |
| Remarks by Dr. C. E. Ruggles, President of the State Board of Health.....   | 23    |
| Reprint of Statutes of Legislature of 1893.....   | 74    |
| The Etiology, Distribution and Prevention of Land and Ship Cholera, by Dr. George M.<br>Kober.....  | 32    |
| The Relative Merits of Land Quarantine and Cleanliness, by Dr. J. R. Laine.....   | 10    |
| Veterinary Sanitary Medicine and its Relation to the Public Health, by Dr. F. A. Nief.....  | 61    |
| Will the Cholera reach America this Season? by Dr. W. R. Cinness.....   | 15    |









