

the trades. In the light of this view it has seemed advisable to our president to devote a session of the present meeting to the illustration of this subject as it is presented in the program before you.

Two important subjects concerning the safeguarding of the public health, suggested for consideration, have been purposely omitted from the program for different reasons; in both of them the responsibility for the initiative rests especially with the medical profession. The first is the safeguarding from tuberculosis, which is omitted because it is already the subject of an individual campaign, vigorously prosecuted. The second is the subject of the, so-called, venereal diseases, especially propagable by relationship between the sexes but communicable also in other ways.

However much the medical profession may be at one in the recognition of the community injury effected by these latter diseases, it is by no means united as to the manner in, and the extent to, which the knowledge of which it is possessed should be brought before the public; and until such societies as that of Moral and Social Prophylaxis and the special committees appointed by various medical societies throughout the country have come to a definite conclusion of their own, the public consideration of this subject may, advisedly, be left in abeyance.

That it is a subject to be considered with as little sentimentality and upon as rational a business basis as that applied to other communicable diseases there is no matter of doubt, but the foundation for such consideration must be, first, the scientific ascertainment and tabulation of facts, and, second, a careful consideration and determination of the form of public education to be applied.

Since impairment of health and, correspondingly, of wage-earning capacity has an important bearing upon that which charitable organizations are called upon to consider, and because medical charities are open to large criticism on account of their pauperizing tendencies, it is well that the physician and the educated social worker should not only take counsel together, but have opportunity for the public, and educative, discussion of such problems as they have in common.

With such opportunities the outlook of the medical profession toward public service inevitably widens, the array of questions in which the physician may take elucidative part lengthens, and such subjects as the relation of hospitals to the community, the establishment of medical police work upon more definite and effective lines, the educational differentiation of defectives, the extension of compensatory education to the mentally sound but physically disabled, the betterment of transportation facilities for the sick and the insane by the establishment of a uniform ambulance system on railways, and other and newer problems, the outgrowth of community centralization, may advisedly be made subjects for conference in future meetings of this association.

To such gatherings as this the term conference is justly applicable; the bringing together of

earnest and purposeful workers along special but related lines of social service, the presentation of the objective from various standpoints, the comparison of results and the suggestion of additional activities, broaden information, stimulate effort and strengthen endeavor.

THE DECREASE OF INFECTIOUS DISEASES CONSEQUENT UPON THE APPLICATION OF PREVENTIVE MEASURES.*

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In this paper an attempt will be made to show what has been done in the past few years towards the diminution in the frequency of the three principal infectious diseases, namely: diphtheria, smallpox and scarlet fever. It is beyond the scope of this paper to say very much regarding tuberculosis, typhoid fever and cholera. Certain suggestions will be offered regarding more efficient means of isolation and the importance of special hospitals for the treatment of the diseases just mentioned. These subjects will be treated from two standpoints; that of the general practitioner and that of health officials.

The science of preventive medicine which has made marked advances in this country in the past few years is yet in its infancy, and although much has been done in the prevention of disease, much yet remains to be accomplished. There is always a certain amount of friction between the general practitioner, health officials and the public. All of them have certain duties and certain responsibilities which they cannot evade. They should work in unison, in order to accomplish the best results. The health officials should be specially trained in their duties, as is the case in England and on the Continent. On the other hand, the general practitioner should not be sensitive regarding the invasion of his rights as the family consultant. He has *his* duty to perform not only regarding the individual patient, but also regarding the general public.

The sanitary code varies considerably in different countries. The most complete and satisfactory one is that of England. Sanitary laws in many instances must be arbitrary, and they sometimes seem to attack individual liberty. In no country in the world has the idea of individual liberty taken such strong root as in England. The English originated the law of *habeas corpus*, and the common saying that an Englishman's house is his castle shows very clearly how jealous the Englishman is of his individual rights; notwithstanding this, he submits willingly to laws which deprive him of a certain amount of individual license.

After the ravages of cholera in 1832 and 1833, preventive medicine commenced to have an important influence in reducing the death-rate of infectious diseases.

* Read, by invitation, at the Fourth Massachusetts State Conference of Charities, Worcester, Thursday evening, Nov. 15, 1906.

The sanitary administration of England is, in accordance with the Public Health Act of 1875, in the hands of a central authority, the local government board and local authorities, the local boards of health.

In 1776, the first steps were taken in France for the establishment of a public sanitary service. Each district has a council of public health, which corresponds to our boards of health. The duties of the medical officer of health are practically the same as those of England.

In other continental countries the rules and regulations regarding infectious diseases and other sanitary matters are quite strict and rigidly enforced.

It is a fundamental principle that, in order to limit the spread of a disease, its cause should be discovered. It is in this direction that valuable work has been done the past few years, not only by foreign investigators, but also by our own State Board of Health. The establishment of local health boards is no new thing, but the methods incident to increased knowledge of disease, as well as the power and responsibility of health officers, have materially changed. In 1797, more than one hundred years ago, an act of the legislature was passed authorizing the establishment of local boards of health. This act was changed slightly in 1817, and again in 1878. The text of the Act of 1895, now in operation, is as follows:

"Every town in the Commonwealth may elect a board of health by ballot at the annual meeting of the town, or at a meeting legally warned for this purpose, consisting of three persons, to serve, one for the term of three years, one for the term of two years and one for the term of one year, beginning with the day following such town meeting or until their respective successors are chosen and qualified; and thereafter such town shall, at its annual town meeting, choose in the same manner one person who shall hold office for three years from the day following such town meeting or until another is chosen and qualified in his stead. If no such board is chosen the selectmen shall constitute such board of health."

It will be seen from this that there is no mention of a physician on the board, but later an act was passed in which it was expressly stated that in cities and towns of more than five thousand inhabitants one member of the board should be a physician. In the acts of the legislature of 1895, so much of Section 3 of Chapter 218 of the Acts of the year 1894 as provides that one member of the board of health shall be a physician shall not apply to towns in which the selectmen constitute the board of health.

The organization of a state board of health is of much more recent date than that of local or city and town boards of health. In 1849, the idea of the State Board of Health of Massachusetts was brought to public notice, but the board was not established until twenty years later. There had been during the year 1849 a great deal of infectious disease, and the death-rate had been

extremely high in Massachusetts. Dysentery, scarlet fever and typhoid fever had been extremely prevalent, and in addition Asiatic cholera had invaded the state causing the death of about 1,200 of the population. In that year a commission was appointed by the legislature to report upon the sanitary condition of the state. This commission advised the establishment of a general board of health, the duties of which were very clearly stated. When the board was finally established in 1869 under the title of the State Board of Health and Vital Statistics, it was organized very nearly in accord with the suggestions of the sanitary commission of 1849. The members of this commission were Lemuel Shattuck, Nathaniel P. Banks and Jehiel Abbott, men identified with the history of the state fifty years ago, one of whom was governor at a later period. No one of them was a physician, and, therefore, the medical profession must be relieved of the public suggestion of making an exaggerated claim for the importance of sanitary science. In the introduction of the report of the commission relative to the importance of public health regulations, the following passage appears:

"We believe that the conditions of perfect health, either public or personal, are seldom or never attained, though attainable; that the average length of human life may be very much extended, and its physical power greatly augmented; that in every year, within this Commonwealth, thousands of lives are lost which might have been saved; and that tens of thousands of cases of sickness occur which might have been prevented; that a vast amount of unnecessarily impaired health and physical debility exist among those not actually confined by sickness; that these preventable evils require an enormous expenditure and loss of money, and impose upon the people unnumbered and immeasurable calamities—pecuniary, social, physical, mental and moral—which might be avoided; that means exist, within our reach, for their mitigation or removal; and that measures for prevention will effect infinitely more than remedies for the cure of disease."

Admirable as this report of the sanitary commission was, it took twenty years for the public to appreciate the importance of a state board of health that should have cognizance of all diseases dangerous to the public health. Since 1869, when the board of health was organized, rapid advancements have been made in the prevention of contagious diseases, not only in man, but in the lower animals, and the power of a board of health to abate nuisances has been very much increased. The state board of health, as well as local boards of health, now, by statute law, have power to abate nuisances, sources of filth and causes of sickness, whether arising from contagious diseases or due to an infected water supply. In the early history of health boards very little is said regarding diphtheria and scarlet fever. The etiology of typhoid fever at that time was not known, and, therefore, very little attention was paid by local boards of health to the water

supply. The cause of cholera was not known, and, therefore, very little was done in preventing epidemics of this disease. Smallpox, however, as it was the most dreaded and fatal disease of the early part of the nineteenth century, did receive great attention at that time. In 1802, the Boston Board of Health instituted experiments remarkable for their accuracy to demonstrate the protective power of vaccination. These experiments were unique in their nature and are worthy the careful consideration of any one interested in this subject.

In the Acts of 1886, Chapter 104, Section 4, the powers and duties of the State Board of Health are thus defined:

"The State Board of Health shall take cognizance of the interests of health and life among the citizens of the Commonwealth. It shall make sanitary investigations and inquiries in respect to the causes of disease, and especially of epidemics and the sources of mortality and the effects of localities, employments, conditions and circumstances on the public health, and shall gather such information in respect to those matters as it may deem proper, for diffusion among the people. It shall advise the government in regard to the location and other sanitary conditions of any public institutions."

In the Acts of 1894, Chapter 218, Section 4, further duties of the board in case of contagious diseases are thus defined:

"If smallpox or any other contagious or infectious disease dangerous to the public health exists, or is likely to exist in any place within the state, the state board shall investigate the same, and the means of preventing the spread thereof, and shall consult thereon with the local authorities, and shall have co-ordinate powers as a board of health, in every place, with the board of health thereof or with the mayor and aldermen or the selectmen, if no such board or officer exists in such place."

One very important duty of a board of health is that regarding death certificates. It is by careful supervision of these that frequently the prevalence of any disease in a given locality can be determined.

A second important duty of the board is the supervision of the water supply. Typhoid fever and cholera are disseminated by a polluted water supply. The history of Boston before and since the introduction of Cochituate water abundantly proves this. In Boston, for instance, before there was a general supply of water from a non-infected locality, the ratio of deaths from typhoid fever was very large. For the four years from 1846 to 1849 the average rate of mortality from this disease was 17.4 per 10,000 of the population; after the introduction of Cochituate water in 1848 the rate commenced to decline, so that from 1850 to 1854, inclusive, the average was 8.2, less than one half as great as in the previous four years. Since 1854 the rate has, with one exception, that of the semi-decade from 1870 to 1874, inclusive, gradually diminished to 1.96 per 10,000, the rate for 1905.

In the cholera epidemics of 1832, 1849, 1854 and 1866 the dangers of an infected water supply are manifest. The history of the outbreaks of this disease in Hamburg in 1892, as compared with Altona, is an apt illustration of this fact. The water supply of Hamburg was taken immediately from the Elbe without proper filtration; the supply of Altona was from the same source, but before the water was used, it was subjected to very careful filtration. In Hamburg there was a frightful epidemic of cholera; in Altona, a short distance from Hamburg, there were only a few cases of the disease. Hamburg, unlike most cities, has learned wisdom from experience, and has now one of the most elaborate and perfect systems of water filtration in the world.

A third important duty of a board of health is a medical examination of dairies and of the men employed in these dairies; for it has been demonstrated time and time again that a man ill with walking typhoid may infect the milk so as to cause an outbreak of this disease. Some five epidemics of typhoid fever in Massachusetts, of more or less severity, have been traced to infected milk supplies. As bearing on this fact, it is of interest to note that in the foreign cities where the ratio of deaths from typhoid fever is much lower than in this country, there is a most rigid and careful supervision of the milk farms, both as to their sanitary condition and as to the health of the employees. In London, for instance, where typhoid fever is comparatively rare, large dairy companies have been formed whose supply of milk is based on most minute and rigorous regulations. To prevent the spread of infectious diseases by milk, the farmer is required by his contract to call a physician if any person employed in his dairy is taken ill. If the disease is infectious, the secretary of the company must be at once informed, who will indicate the measures to be taken. In the event of serious disease the delivery of milk from the farm is forbidden. Arrangements are made with local medical officers of health to obtain information as to each case of infectious disease arising in the neighborhood of a dairy. In Berlin, also, there are stringent regulations regarding persons who have come in contact with any infectious disease having anything to do with milk. Similar observations are true regarding Vienna and Glasgow. In Paris, a large proportion of the milk comes from dairies situated in the city. The employees of these dairies are subjected to a careful medical supervision, and it is very reasonable to suppose that this has a decided effect in reducing the death-rate from typhoid fever in that city. In Boston, the milk comes from so many different places and such long distances, and passes through so many hands, that it would be difficult to absolutely trace the source of infection in a given case. But there can be no doubt that in Boston, as well as in many other cities, infected milk may be and is, much more frequently than is generally supposed, a cause of an outbreak of typhoid fever. While this statement so far as Boston is concerned may not be capable of positive

demonstration, it is certainly worthy of careful consideration.

A fourth duty of a board of health is the establishment of compulsory notification of all contagious diseases dangerous to the public health. This was established in England quite a number of years ago and was known as the Compulsory Notification Act, and for a time was bitterly opposed not only by the laity but also by physicians. It was claimed that it interfered with private rights; that it was a source of annoyance to the individual; and that it interfered with his ability to earn a living. Some physicians opposed it on the ground that it violated professional etiquette. After much discussion the act was finally passed in England, and is now generally enforced. The degree of infectivity should also be an important factor in deciding the question of compulsory notification. Placarding the houses, in certain instances, where there is a case of infectious disease, should be the result of the compulsory notification. For over a hundred years a compulsory notification of smallpox has been required. In Boston it was not until 1877 that notification was required in cases of scarlet fever. In 1878, diphtheria and croup were placed on the list of compulsory notifications. In 1881, typhoid fever was also placed on this list. Within three years it has been required to report cases of consumption.

A fifth duty of a board of health, and perhaps the most important, is the establishment of isolation hospitals, or fever hospitals as they are called in England, for the care and treatment of patients ill with infectious diseases. A hundred years ago smallpox hospitals were established in nearly every large city, because the fear of smallpox was much greater than that of the other infectious diseases. Some thirty-five years ago Glasgow, which had suffered more than any other city from the inroads of diphtheria, scarlet fever and measles, established the first fever hospital for the treatment of these diseases. In 1862, an act was passed to provide a fever hospital in Glasgow. A beginning was made in the early winter of 1864, and a pavilion hospital of wood on brick foundations, erected, furnished and opened with 136 beds on the 25th of April, 1865; this was the first Municipal Fever Hospital. It must be borne in mind that at that time the population of Glasgow was about 428,231, and that previous to the erection of this hospital there were no accommodations for diphtheria, scarlet fever and measles. These diseases ran riot in the crowded tenement houses. Isolation was impossible; whole families would be swept away by either diphtheria or scarlet fever.

Boston at that time with a population of 192,318 had no provision for infectious diseases other than smallpox.

The effect of the first municipal hospital at Glasgow, which, as has just been stated, was opened on the 25th of April, 1865, was such in diminishing the death-rate from infectious diseases that a large estate was purchased for hospital purposes. On this estate was erected a

pavilion hospital capable of accommodating some four or five hundred patients. There was also a laundry and disinfecting plant where bed linen used by patients ill with infectious diseases treated at their homes could be sent to be disinfected and washed. The hospital itself was opened the latter part of 1870, and is known as the Belvidere Fever Hospital of the city of Glasgow.

The health authorities of Glasgow, not satisfied with the hospital accommodations at Belvidere because they were unable at certain times of the year to give each patient 2,000 cubic feet of air space, and because they were unable to vacate certain wards for six months for purposes of disinfection and renovation, decided to purchase land for a third fever hospital known as the Ruchill Hospital, which was opened by her Royal Highness Princess Christian on the thirteenth day of June, 1900. The entire cost of the Ruchill Hospital was about \$1,250,000, and it will accommodate about 440 patients, allowing upwards of 2,000 cubic feet to each bed.

It is, therefore, evident that Glasgow is more liberally supplied with hospital accommodations for infectious diseases than any city in this country; or, to state it in a different way, there are beds for patients ill with infectious diseases for 9.79 out of every 10,000 of the population. This is a magnificent work in sanitary science, and has been a very important factor in lowering the death-rate of Glasgow to an astonishing degree. It is well to remember that the population of Glasgow in 1900 was 755,730, only about 200,000 more than that of Boston.

In London, the first fever hospital or hospital for infectious diseases under the charge of the Asylums Board was opened the last of September, 1871, but patients ill with diphtheria were not admitted until the 23d of October, 1888. Since the opening of the first hospital and the others that have been opened from time to time, there have been treated, to Jan. 1, 1901, 244,206 patients, 161,646 of whom were ill with scarlet fever; 48,529 had diphtheria. Typhus fever, which is always present to a greater or less extent in England, was represented by 2,351 patients. Typhoid fever, or enteric fever, as it is termed in England, caused the admission of 15,632; and there were admitted patients ill with other diseases, 16,048. It is interesting to note the diminution in the death-rate of diphtheria. In 1888, the death-rate from this disease was 59.30%. In 1889, it was 40.74%, but there was no marked diminution in the percentage until 1894, when the death-rate was 22.85%, co-incident with the use of antitoxin. In 1896, when antitoxin was more generally used, the rate was 17.69%. In 1900, the percentage was 12.27. Nine of these fever hospitals in London and one large convalescent home are under the charge of the Asylums Board. They are situated in different sections of the city, many of them in the outlying portions. All of them are in the centers of large tracts of land, so that they have an abundant supply of fresh air. [The names are as follows: the Eastern Fever Hospital, the North Eastern, the North Western,

the South Western, the Fountain, the Grove, South Eastern, Park and Brook Fever Hospitals.] What immediately attracts a hospital man from this side of the water is the bountiful supply of air space: 2,000 cubic feet to each patient and fifteen feet of wall space. A second thing that also attracts his attention is the number of vacant wards, purposely kept vacant until an emergency arises for their use, or until the time has come to empty a ward for disinfection and renovation; a condition of things that has not been reached in this country. In London nine individuals out of every 10,000 of the population can be provided with good hospital accommodations, if ill with an infectious disease.

Previous to 1888 there was no special provision in Boston for the care of patients ill with diphtheria and scarlet fever, but as physicians viewed with dismay the constantly increasing prevalence of these diseases it was decided by the trustees of the Boston City Hospital in 1887 to erect two pavilions for this special purpose.

It is an interesting fact that the Board of Trustees of the Boston City Hospital established the first separate hospital for the treatment of infectious diseases in this country. This is known as the South Department of the Boston City Hospital, and was opened for the admission of patients Aug. 31, 1895.

In the twenty-fifth annual report for 1893 of the State Board of Health of Massachusetts, an article was published detailing the advantages of isolation hospitals, together with some of the measures which have been taken in other countries for their establishment and maintenance. When the report was written the provision for the separate treatment of infectious diseases in this state was very limited. The continued prevalence of this class of diseases, together with the rapid increase of population and of the consequent density in the cities and large towns, brought the importance of the subject more and more forcibly to the local sanitary authorities.

In 1894, an act was passed by the legislature bearing on this point. The text of the act is as follows:

ACTS OF 1894, CHAPTER 511.

"SECTION 1. In any city in which no suitable hospital accommodations have been provided for the care and treatment of persons suffering from contagious diseases dangerous to the public health, the board of health of such city may address a communication to the mayor thereof, stating that, in the opinion of said board, the safety of the inhabitants of the city demands that suitable accommodations should be provided for the reception and treatment of persons suffering from such diseases, other than smallpox and those of a venereal nature. The mayor shall forthwith transmit such communication to the city council and the city council shall forthwith order such hospital accommodations to be provided and shall make the necessary appropriations therefor.

"SECT. 2. Every city in which hospital

accommodations have been provided in accordance with the provisions of this act shall make an annual appropriation for the maintenance of such hospital accommodations, and said appropriation shall be expended under the direction of the board of health, unless otherwise ordered by the city government."

As a result of an investigation of the State Board of Health in 1899, regarding the existence of hospitals for infectious diseases in Massachusetts, it appeared that in ten cities of this state and in the town of Brookline there was at that time provision for the reception of persons ill with infectious diseases except smallpox. Nine of these hospitals are in cities having a population of over 30,000 each. Four of these are supported by public funds, four by private funds, and three by both. In only three or four of the cities, and the town of Brookline, are the hospitals under the management of the local boards of health. In other cities the hospitals are managed by independent boards of trustees.

In the state of Massachusetts, as a whole, there are accommodations for 1.58 persons ill with an infectious disease out of every 10,000 of the population; in Boston there are accommodations for four out of every 10,000 as compared with London with a ratio of nine out of every 10,000, or with Glasgow with practically the same ratio.

The diagnosis of a mild attack of an infectious disease is frequently a difficult matter, but it is the mild and atypical forms that cause epidemics and not the severe and typical cases.

A mild attack of smallpox is of greater danger to the community than a severe attack. The only reason that there are not more mistakes made in diagnosis in this disease is due to the fact that smallpox at the present time is an extremely rare disease.

It is unnecessary in this paper to advance any argument in favor of vaccination, its protective power being so thoroughly well established. It is well, however, to appreciate the fact that vaccination eight days after exposure to a case of smallpox does not mitigate the disease. The importance, therefore, of vaccinating immediately on exposure and then forty-eight hours later to repeat the operation, so that if the first attempt is not successful, the second may be, is evident. It has been demonstrated that, if the vaccine vesicle arrives at maturity before the onset of the variolous symptoms, the disease will be modified and in some instances prevented. Well-vaccinated communities never have epidemics of smallpox, as is evidenced by the history of the German Empire.

Diphtheria. — The importance of a bacteriological examination in all cases of suspicious sore throat and where there is a profuse nasal discharge cannot be overestimated. Much has been said about the inaccuracy of cultural diagnosis, and while mistakes may be made in the laboratory, the chances of error are very much less in cultural diagnosis than in the clinical. One great source of error is carelessness in taking

the culture. The swab is simply put into the mouth and does not come in contact with the membrane. The swab should be rubbed near the edge of the diphtheritic membrane and not over the center of the patch. Sometimes the swab is not rubbed sufficiently on the surface of the culture medium and consequently there is no growth. These may seem trivial matters, but as accuracy of diagnosis is all important, it is well before criticising the work of the laboratory to be sure that the critic himself is not at fault. The reaction of the culture medium is sometimes the cause of a mistake, as the serum may be acid or very strongly alkaline. The bacilli of diphtheria grow more abundantly and more characteristically on serum that is neutral or very slightly alkaline. Sometimes the serum is found to be perfectly dry, and when in this condition the growth is disappointing, as a certain amount of moisture is necessary for the growth of the organism. To sum up the whole matter in a few words: It can be said that in a given case, if the culture medium is of the proper reaction, if there is a sufficient amount of moisture; if the culture is taken with care, and the tube is placed in the thermostat within a short time after it has been inoculated and allowed to remain there for at least eighteen hours, the results will be satisfactory.

Some years few ago the writer made an examination of 500 throats in which the clinical diagnosis was doubtful, but there was a suspicion of diphtheria. In this investigation it was found that about 40% of the cultures contained the bacilli of diphtheria. It must be borne in mind that the diagnosis of diphtheria in these cases would not have been tenable without the aid of cultures. It was also noticed that in many instances a positive culture was obtained twenty-four or forty-eight hours before any membrane appeared. The importance of taking cultures in nasal diphtheria of a mild type cannot be too strongly emphasized, for this type of the disease in which a diagnosis is impossible without the aid of the microscope is responsible for the prevalence of diphtheria in the community. If these mild cases of diphtheria in the schools could be detected, there would be a marked diminution in the ratio of morbidity of this disease. In laryngeal diphtheria, however, cultures are frequently of no avail because the membrane is situated so far down that it is impossible to reach it with the swab, and, therefore, the diagnosis must be made from the clinical symptoms.

The statement has been made that the bacillus of diphtheria is frequently found in cultures from the throats of healthy individuals who have not been exposed to diphtheria. Loeffler found this organism 4 times in the examination of cultures from 160 well children. Park and Beebe found it in 8 out of 330. Kober found this bacillus 5 times in cultures from 600 individuals. Denny,¹ of Brookline, Mass., found the organism of diphtheria only once out of 235 cultures from normal throats. The writer examined 130 throats

with this point in view, and in no instance was an organism found that gave the same staining reaction as the bacillus of diphtheria. In a few instances, however, bacilli were found having morphologically a marked resemblance to the organism of diphtheria, but the differentiation was easily made by the staining and cultural peculiarities. In these 1,455 examinations by different observers in only 18 instances were the bacilli of diphtheria found, giving a percentage of only 1.23.

The statement has been made that the bacillus of diphtheria is very frequently found in the throats of perfectly well persons who have the care of patients ill with diphtheria. My experience is the opposite of this. In order to show that the organism is not found, as a rule, in the throats of attendants of patients ill with diphtheria cultures were taken from the throats of 120 nurses on duty in the diphtheria wards of the South Department of the Boston City Hospital, and in no instance was the bacillus of diphtheria found.

Previous to the discovery of Klebs and Loeffler the question of the release from isolation in a case of diphtheria was a very difficult one to decide. By means of cultural examination the physician is now able with a certainty to say that the patient is free from infection. Two negative cultures from the throat and from the nose should always be required. In certain rare instances the bacillus may remain in the throat

A.

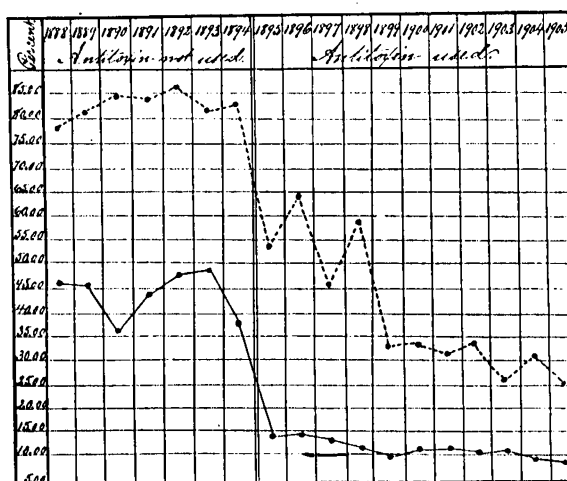
Per cent of mortality of diphtheria at the Boston City Hospital, proper, and at the South Department, from 1888 to 1905, inclusive.

Per cent of mortality of intubations for the same time:

From 1888 to 1894, antitoxin not used.

From 1895 to 1905, antitoxin used.

Diphtheria = ——— Intubation = ———



for a very long time; but in these cases the organism, as a rule, is non-virulent and the inoculation of guinea pigs will definitely settle the question of virulence. As a matter of fact, a cultural examination shortens rather than lengthens the period of isolation.

So far as alleged "return cases" of diphtheria are concerned, it may be said that they are of

¹ Bacteriology and the Public Health. George Newman, M.D.

such rare occurrence at the South Department of the Boston City Hospital as to prove the very great importance of cultures for discharge, as in no other way can it be definitely shown that the individual is free from infection. Cultures for the release of patients from isolation should be commenced ten days or a fortnight after the disappearance of the membrane and the cessation of the discharge from the nose. It is a waste of time and labor to commence taking cultures any earlier, and if the condition of the patient is satisfactory, it is unnecessary to wait any longer.

In 1894, antitoxin commenced to be used to a somewhat limited extent. Like everything new in medicine it required some little time for medical men in this country to become convinced of its value in the treatment of diphtheria. Without going into a lengthy account of the advantages to be derived from the serum, a glance at Chart A, which gives the percentage of mortality of diphtheria of all types at the Boston City Hospital, proper, from 1888 to 1894, and in the South Department from 1895 to 1905, inclusive, may be of interest. The broken line represents the laryngeal cases, and it will be seen that previous to 1895 the death-rate from this type of the disease was extremely high; that in 1895 the

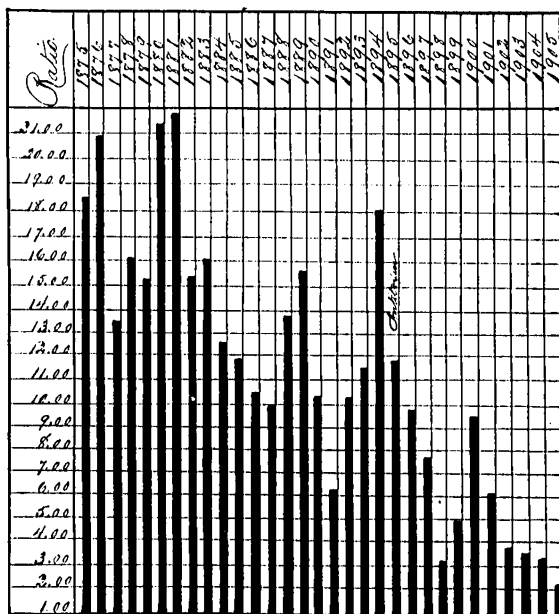
the types of the disease, it will be seen that the death-rate previous to 1895 was about 45%; that since 1895 it has been about 10%.

Chart B shows the ratio of mortality of diphtheria per 10,000 of the population in Boston from 1875 to 1905, inclusive. Without taking up each year in detail it will be seen that, in 1894, 18 people out of every 10,000 died from diphtheria. In 1905, two and a fraction died. The effect of antitoxin in the operative cases of diphtheria is shown in Chart C, an examination of which shows that there has been a very marked diminution in the mortality rate in this type of the disease since the advent of antitoxin.

Scarlet fever.—The diagnosis of a severe attack of scarlet fever after the appearance of the eruption is not particularly difficult. The diagnosis of a mild attack of scarlet fever is fre-

B.

Ratio of mortality of diphtheria per 10,000 of the population, in Boston, from 1875 to 1905, inclusive.



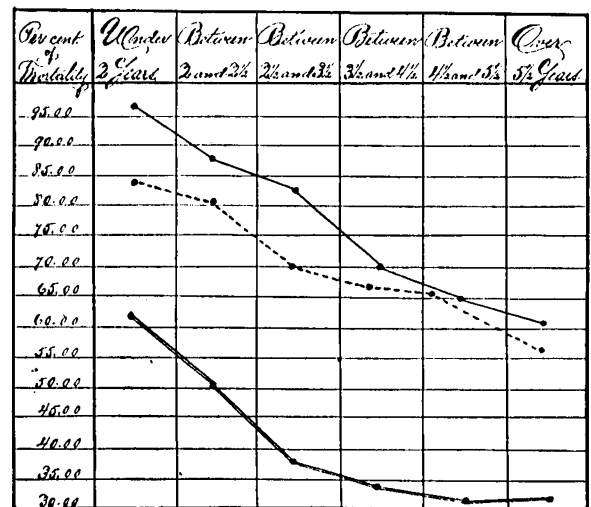
Average ratio of mortality from 1875 to 1894, 14.61.
Average ratio of mortality from 1895 to 1905, 6.

September of which year the South Department was opened, the death-rate commenced to fall in a marked degree. Or, to put it in another way, considerably more than three fourths of the patients ill with laryngeal diphtheria, before antitoxin was used, died. Since antitoxin has been used, nearly three fourths have recovered. By following the full black line, which represents all

C.

Percentage of mortality of tracheotomy cases and of intubation cases without antitoxin, and of intubation cases with antitoxin.

Bourdillat's Tracheotomy Cases = ————
Waxham's Intubation Cases =
South Department Intubation Cases = - - - - -



The percentages of Bourdillat's tracheotomy statistics are estimated on 1,024 operations.

The percentages of Waxham's intubation cases are estimated on 1,072 operations.

The percentages of the South Department intubation cases are estimated on 1,671 operations.

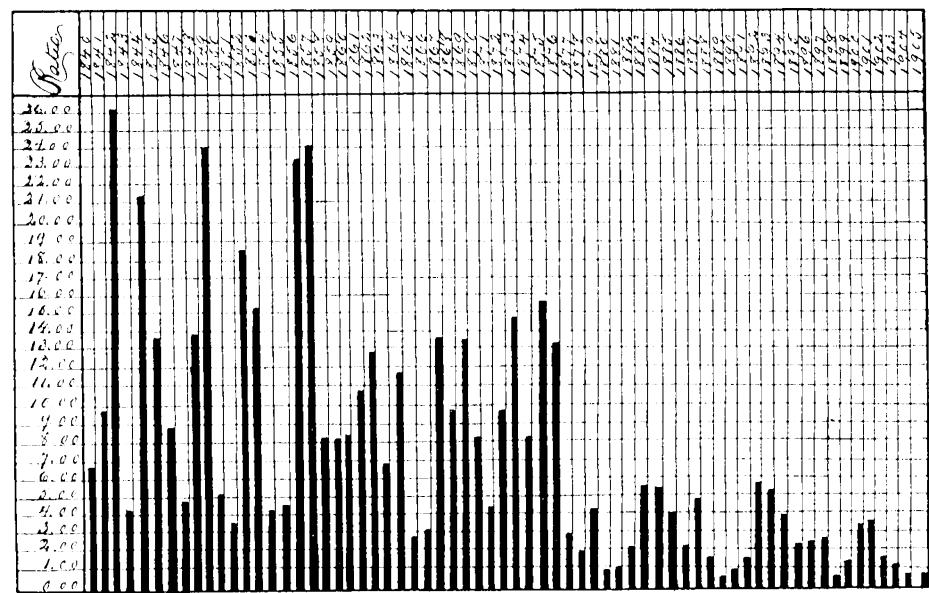
quently very difficult, but a careful examination of the throat and an appreciation of the peculiar appearance of the tongue will, in most instances, be sufficient to enable the physician to arrive at correct conclusions. There are cases, however, in which the symptoms are so slight that it is impossible, no matter how much experience a man may have had, to decide definitely for or against the existence of scarlet fever in a given case. The only safe course to pursue is to isolate the patient for a certain length of time until he either does or does not desquamate, although the absence of desquamation is not absolute proof that the patient may not have had scarlet fever.

The prevalence of scarlet fever in the community is not due to the severe and therefore recognized types of the disease, but is due to the

mild and unrecognized forms, as children suffering from which attend the public schools and cause epidemics of the disease.

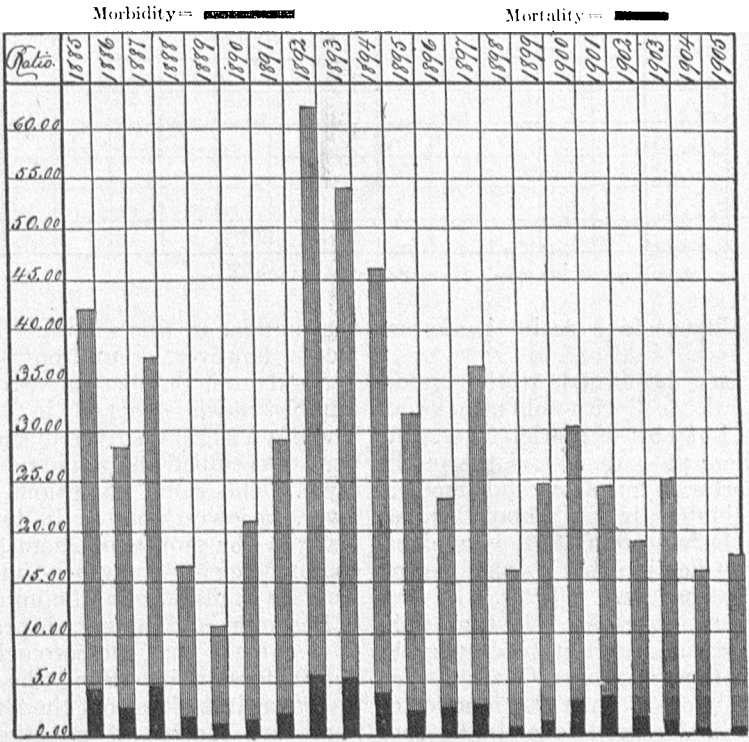
Chart D gives the ratio of mortality of scarlet fever per 10,000 of the population in Boston for sixty-six years. It will be seen that previous to 1878 scarlet fever was a very important factor in increasing the death-rate of Boston; that since that time, although there have been frequent outbreaks of the disease, there have been no frightful epidemics like those in 1842, 1848, 1856 and 1857. It is also worthy of note that since 1895, when the South Department was opened, there has been no general epidemic of scarlet

D.
Ratio of mortality of scarlatina per 10,000 of the population, in Boston, for sixty-six years, 1840 to 1905, inclusive.



Since 1895, when the hospital was opened, there has been no general epidemic of scarlatina in Boston, as compared with previous years.

E.
Ratio of morbidity and ratio of mortality of scarlatina, in Boston, per 10,000 of the population, from 1885 to 1905, inclusive.



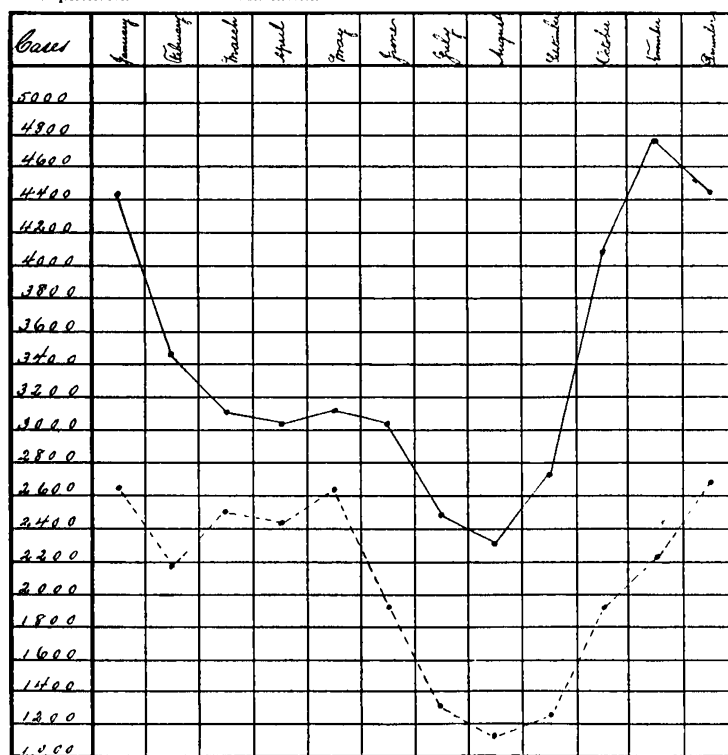
Average ratio of morbidity from 1885 to 1894, inclusive, 34.84.
Average ratio of morbidity from 1895 to 1905, inclusive, 24.25.
Average ratio of mortality from 1885 to 1894, inclusive, 2.00.
Average ratio of mortality from 1895 to 1905, inclusive, 1.53.

fever in Boston as compared with previous years.

Chart E shows the ratio of morbidity and the ratio of mortality of scarlet fever in Boston, per 10,000 of the population, from 1885 to 1905, inclusive. In 1892, 62 people out of every 10,000 in Boston had an attack of scarlet fever. In 1905, 17 people out of every 10,000 were ill with this disease. It is a significant fact as bearing on the importance of isolation hospitals that since 1895, when the South Department was opened, the ratio of morbidity of scarlet fever has diminished to a considerable extent; for instance, compare the years 1892, 1893 and 1894 with any of the subsequent years, and in no instance is

1890 to 1905, inclusive, a period of sixteen years, comprising 41,199 cases of diphtheria and 24,078 cases of scarlet fever. By following the curve of the full black line which represents the cases of diphtheria, it will be seen that in the month of January for sixteen years the number of cases of diphtheria was 4,400; that there was a diminution in the month of February; that during the months of March, April, May and June, although there was a slight diminution in the number of cases, it was not very marked. The schools close the last of June, and the diminution from June to July is quite marked. The number of cases reached the minimum in August. The schools open in September, and there is an increase in

F.
Cases of diphtheria and scarlatina in Boston, by months, reported to the Board of Health from 1890 to 1905, inclusive.
Diphtheria = ——— Scarlatina = - - - -



Diphtheria, 41,199 cases.

Scarlatina, 24,978 cases.

the ratio of morbidity as high as in the former years.

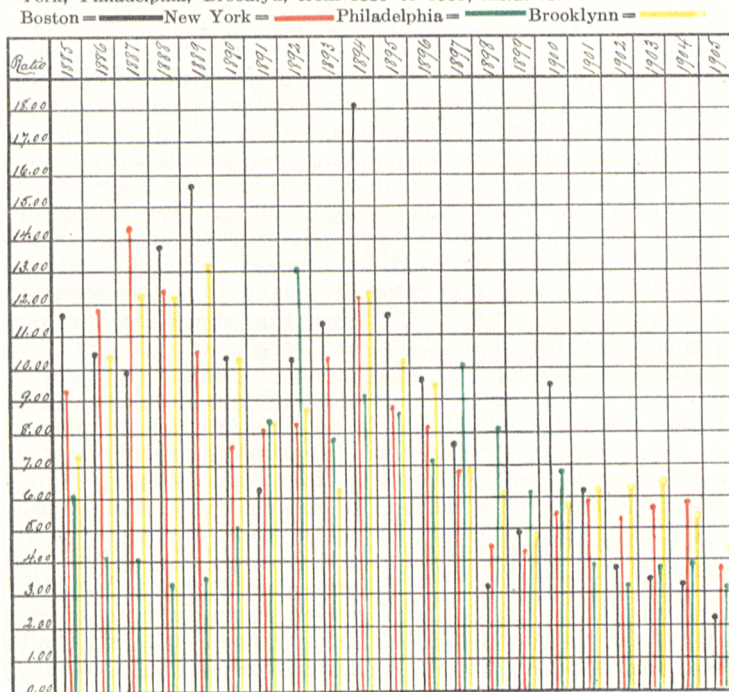
Allusion has already been made to the importance of isolating patients ill with mild attacks not only of diphtheria but also of scarlet fever. As the majority of these patients attend the public schools, the importance of a careful medical inspection of the children in the schools, as was recommended by the writer in 1891, is evident. It is a source of gratification that this suggestion has at last begun to bear fruit.

In order to demonstrate the rôle that mild attacks of diphtheria and scarlet fever play in the prevalence of these diseases Chart F has been prepared. This chart gives the number of cases of diphtheria and scarlet fever in Boston, by months, reported to the Board of Health from

the number in this month. The greatest increments, however, occur from September to October and from October to November, the highest number being reached in the latter month. There is a slight decrease in the month of December. December and January are practically the same. The same conditions obtain in scarlet fever, the lowest point, as in the case of diphtheria, being in the month of August and the increase commencing in September and ending in December. As in diphtheria, the number in the months of December and January is practically the same. It is evident that meteorological conditions are not factors in increasing the number of cases; therefore, it is plain that these mild cases are very important factors, if not the only factors, in causing the prevalence of these diseases.

It is always well to compare the results obtained on a scientific basis. Much of the work that has been done by local boards of health in this country has been crude and unsatisfactory. It is the duty of health officers, whether members of boards of health or appointed by them, to elevate the standard and increase the knowledge of public hygiene in this country, which cannot be done without the assistance and co-operation of the family physician. It is the duty of the general public to assist the family physician and the health officers in this work.

G.
Ratio of mortality of diphtheria, per 10,000 of the population, in Boston, New York, Philadelphia, Brooklyn, from 1885 to 1905, inclusive.



comparison. For instance, compare the years 1885, 1888, 1889 and 1894 with any of these other cities, as represented by the colored lines, New York being red, Philadelphia green and Brooklyn yellow; since 1895, with one exception, 1900, it will be found that Boston is lower than any of these other cities. In 1905 Boston is at the bottom of the list as compared with the other cities. This would seem to be a conclusive argument in favor of isolation hospitals.

In order to accomplish much in the suppression of infectious diseases it is all important that there should be cordial co-operation of the physicians, health officers and the public. There is always a certain amount of friction, which is a positive detriment to the well being of the community. The health officer should be specially trained for his duties.

In a paper by Prof. H. C. Ernst, read at the thirty-third annual meeting of the American Public Health Association, the importance of special instruction in medical schools for health officers was strongly emphasized. Foreign countries are very much in advance of us in this particular, and the result is that the investigations of subjects pertaining to public health are

MEDICAL INSPECTION IN SCHOOLS.*

BY ROBERT W. LOVETT, M.D., BOSTON.

THERE are certain propositions relating to the public health which would seem self-evident, but, curiously enough, the community adopts some of them while it neglects others. For example, it is pretty generally agreed that it is objectionable to allow sewage to run into streams or ponds used for drinking water; it is quite generally accepted that plumbing connected with sewers must be ventilated by traps; but with regard to the proposition that children should be placed under the most favorable possible conditions during school life there has been but little interest as expressed by public activity.

In the report of the Board of Education of Massachusetts, dated January, 1906, there were only fourteen towns and cities that had regular school inspection. The movement of school inspection was begun in this country, in Boston, in November, 1894. Governor Guild recommended in his inaugural message in 1906 that there should be a general school inspection in the state, and the legislature of 1906 passed a law

* Read at the Fourth Massachusetts State Conference of Charities, Worcester, Nov. 15, 1906.