

noble women who could teach to the women tenants the art of good and economical cooking and careful house-keeping, and procure for all men, women, and children alike, such educational and social features as would make their home life happier and brighter, I would think that the ideal of housing the poor was attained.

After the description of all that you have heard and seen since this splendid exhibition has been opened, there is no need for me to tell you of the urgent necessity of better laws concerning the building of tenement houses, and you will realize that it becomes our duty as men and citizens to no longer tolerate existing conditions. But in the meantime we should combine our individual efforts to further all such enterprises as, independent of legislative help, will attain the same end. Though we may not reap what we sow, as our worthy chairman, Mr. Frederick W. Holls, at the opening of this exhibition so beautifully suggested, let us sow our grains nevertheless, and let us sow them well and diligently. In the proper housing of the laboring classes lies the welfare of the community and the sanitary, social and intellectual prosperity of every citizen.

Think of the difference between the old tenement, which we desire to abolish, and the new one we desire to erect, and you will need no further incentive. The one is a beehive of humanity living in filth and dirt, well-nigh without light and air, but with a multitude of sickening odors; with no attractions to foster home life, virtue and temperance; disease breeding in every room; a hot-bed of tuberculosis and other contagious diseases from which are spread the foci of infection throughout the city among old and young, poor and rich alike. The other is a well-regulated city within a city, its citizens living in airy, sunny rooms, in modest but attractive homes, which make the longing for the rum shop less, and create a love for temperance and purity; a home where infectious diseases can be controlled and from which the most bitter foe of mankind, "the great white plague"—consumption—can be ultimately and lastingly banished.

16 West Ninety-fifth Street.

NOTIFICATION AND STATE SUPERVISION OF THE TUBERCULOUS.*

BY JOSEPH MATTESON, M.D.

CHICAGO.

The general acceptance of the bacillus discovered by Koch as the exciting cause of tuberculosis in man and the food animals is based on the most careful experimental observations. Without the bacillus there can be no tuberculosis. Therefore, if we should destroy all these bacilli there would be an end to tuberculosis. This appears to some logical, simple and, to a degree, possible of attainment. It is a sequence of cause, effect and prevention which has produced a revolution in medical thought and action.

Whereas formerly an occasional instance of apparent communication of the disease from one individual to another excited some speculation as to its possible contagiousness, or was explained by heredity or coincidence, now all is changed—infection or communication from another is almost universally recognized as the essential factor.

Tuberculosis then being an infectious disease affecting a larger number of individuals than any other, it naturally falls into the jurisdiction of state medicine.

Since 1882 there has been an increasing and extending

agitation for the suppression of tuberculosis by special state supervision and control of the tuberculous.

We encounter here enthusiasts and extremists on the one hand and doubters on the other, just as in any other imperfectly understood problem in social economics. To quote one of the former, here is a widely circulated statement by Dr. Biggs, of the New York City Board of Health, whose earnest work for the suppression of tuberculosis in that city has commanded general approval. He says (*Forum*): "With our present knowledge we have it in our power to completely wipe out pulmonary consumption in a single generation." Again, Dr. Geo. M. Gould, says: "Phthisis, the most fatal of diseases, causing one death in eight, is now proved to be contagious. Its inception depends upon the passage of the living bacilli from one organism to another. When this is prevented the dread affection will no longer mow down its victims. Its prevention seems easy and by two feasible, simple means—the devitalization of the sputum of consumptives, the inspection of dairies and the slaughtering of animals." Dr. Schonock asserts that "Tuberculosis is a preventable disease and one of the unnecessary afflictions of humanity."

Admitting fully that the essential factor in the spread of tuberculosis is the bacillus, that its definite life history, its food, growth, and decay and manner of transmission have become known, let us consider whether the extermination of phthisis is in sight: whether it has become a simple problem—a bacillary premise and a legislative conclusion—the observation and experience of years as to the numerous contributing factors in the production of tuberculosis nullified, or only temporarily lost to sight.

While the dried sputum of consumptives and the milk of tuberculous cows are known to be the common distributors of infection there are other minor ones which may be noted. Spano demonstrated that seminal fluid may infect even when the genital tract is not involved in the disease. Of eight cases he demonstrated the presence of tubercle bacilli in the seminal fluid of three.

They have been found unharmed in the interior of large underdone joints exposed to the ordinary roasting point. Schugard demonstrated their presence in chancres and soft sores and gonorrheal pus. Successful inoculations are reported with the tissues of tuberculous infants, and the amniotic fluid of a tuberculous woman. Hirschfeld recently found the bacilli in the placenta and in the capillary vessels of the fetal liver. It is estimated that from 6 to 20 per cent. of cattle and 5 per cent. of milch cows are infected, and the bacilli may rest in the discharge from the mouth, nose and bowels, drying upon hay and grass. Hogs and domestic pets are not infrequently infected. Jensen reported 44 cases in dogs and 33 in cats. In Berlin an examination of a large number of parrots showed that 25 per cent. were tuberculous. Lortet demonstrated that earthworms are capable of ingesting and ejecting tubercle bacilli without the microorganisms losing their virulence, and that the bacillus has retained its virulence after being buried for one year. Experiments in the laboratory of Professor Flügg proved that it is possible to carry particles of infected sputum in the act of speaking, to a distance of four feet.

Besides the direct inhalation of bacilli from desiccated sputum we must note their deposit on bakers' goods and all articles of food consumed in the raw state. Schnirer rinsed the dust from grapes bought at a street stand and developed tuberculosis in two guinea-pigs out of three. Hoffman found that flies may carry the germs in their intestines and deposit them in their droppings.

*Read before the Chicago Medico-Legal Society, Dec. 2, 1899.

It has been estimated that a consumptive may expectorate several billion tubercle bacilli in twenty-four hours, and that there are at least 500,000 living individuals in this country with pulmonary tuberculosis.

What innumerable foci for the spread of the disease are thus provided in houses, railroad cars and public halls. We should expect an epidemic of a clearly communicable disease under such opportunities. At least tuberculosis should be increasing in frequency, but the opposite seems to be true: it has been decreasing for many years.

Heretofore no measures to isolate or disinfect consumptives have been in force, yet the disease is less prevalent than formerly.

The death-rate from consumption in England, from 1838 to 1852, decreased 26 per cent.; from 1852 to 1892, 50 per cent., all ascribable to general sanitary improvements, such as the extension of main sewers and house drainage. Sandberg made a critical inspection of vital statistics in England from 1850 to 1886, and proved that phthisis has steadily decreased in the agricultural districts; the decrease was 50 per cent. in females. Billings shows a decrease of 10 per cent. in the phthisis mortality of the United States between 1880 and 1890. Dr. E. F. Wells, of this city, has personally collected the death returns of the seventeen principal cities of the United States for such periods as they were matter of record, showing a marked decrease of the phthisis mortality in nearly every instance. And yet the centers of infection, though decreasing in numbers, must have been increasing in volume of expired bacilli if it be true, as Theodore Williams, supported by Pollock, claims, that the average duration of phthisis is now four times as long as in the time of Laennec and Louis.

In the extension of tuberculosis we should expect physicians and nurses who are in most frequent and close contact with consumptives and inferentially their bacilli to be unusually liable to infection. Making all due allowance for the errors, inconsistencies, and contradictions assignable to such collections we have considerable evidence on the negative side.

Haupt investigated the history of 275 female nurses who had been in habitual attendance on consumptives: only two became tuberculous. The collective investigation committee of the British Medical Association, in 1883 instituted an inquiry into the communicability of phthisis. Out of 1078 who returned answers less than one-quarter had seen cases which they believed had originated by communication from one person to another.

Da Costa says that in the Vienna General Hospital—before disinfectants were used—there were in three years nearly 3000 deaths from phthisis and not one medical officer or nurse became affected. In the Pennsylvania Hospital there never had been a time when there were not many consumptives in the medical wards. Of 147 resident physicians whose history he had followed but one died of tuberculosis. Of 93 male and female nurses employed in the last twenty-five years, only one showed signs of tuberculous disease.

Williams and Humphrey state that at the Brompton Hospital, during thirty-six years, not one clearly authenticated case of pulmonary consumption originated among all its staff and employees.

The statistics of Friedrichshain Hospital in Berlin, as given by Fürbinger, show that during sixteen years, out of 887 physicians and nurses there were only 9 who became consumptive and 3 of these were tuberculous before entering. Out of 108 Victoria nurses in the hospital 2 to 5½ years each, only 1 became tuberculous.

It will not do to attempt to attribute this immunity to disinfection of sputum, as much of the period covered was before the recognition of this source of danger.

There should be plenty of evidence also of the frequent communication of tuberculosis by married persons to their partners in the closest association of life. Dr. Cooper reported, on the other hand, that he had personally known and followed the history of 55 cases of phthisis in married persons; 40 of them had died of it, the surviving partners all living and free from the disease after six to thirty years. Flint, in 670 cases of death from tuberculosis of married persons, found but five cases in which the partners became similarly diseased. Dr. Schnyder observed 844 cases in married people. In only 32 were both husband and wife affected, or one in thirty.

Longstaff has made the calculation from averages that for every 148,000 men who die during the age of married life there would be 4358 of their wives who would have consumption without reference to contagion from their husbands, that is, 1 in about 33.

There is also experimental evidence on the negative side of easy infection from supposedly infected places. Praussnitz unsuccessfully tried to inoculate animals with dust from the floors of railway compartments carrying consumptives for many hours. Kusterman also failed to develop tuberculosis from the dust from the walls and floors of the Munich prison. Herne and Chaplin report, in the *London Lancet*, that they made inoculations of 100 guinea-pigs with dust from various, probably infected, parts of the City of London Hospital—and note that there must have been dry tuberculous sputum in the pathologic workroom. They met with evidence of tuberculosis in only two of the guinea-pigs.

Gardiner has recently inoculated with dust obtained from different rooms in the largest hotel in Colorado Springs, Colo., occupied by consumptives, with negative results in eight cases.

It is frequently asserted, in an offhand way, that certain resorts have become dangerously infected by the concourse of consumptives. Among others, Mentone is cited as a place where tuberculosis has become common among the resident population. But when we read the report of Dr. Bennett, the resident physician, which appears to be the foundation for this opinion, we find that what he actually notes is an increase among the women of the town who formerly worked in the fields with their male relatives, but who subsequent to the incursion of numerous consumptives became laundresses and domestic servants, and he asks if the increase of consumption which he notes only among these workers be not due to change from outdoor life to work in damp, close and ill-ventilated rooms.

Recent statistics of Falkenstein show that the village mortality from phthisis has been reduced 40 per cent. since the establishment there of the sanatorium for consumptives—an odd revelation of the death table, however, is the fact that the mortality from phthisis has increased from 5 per cent. to 15 per cent. in 1892-94, under the antiseptic régime, though still remaining lower than before the establishment of the sanatorium. So also at Göerbersdorf, the site of the largest sanatorium of the kind in the world, many thousand consumptives have deposited their expectoration in the streets of the village, so that the inhabitants continuously respired air potentially more or less laden with tubercle bacilli, with the result that the absolute number of deaths among them from phthisis is about half as many as before the estab-

ishment of the sanatorium, and the population has doubled.

It is rumored that Colorado resorts have become infected by the numerous consumptives who have sought the benefit of its climate, that there has been a great increase in the cases of tuberculosis originating there, and that the State Board of Health had under consideration the advisability of quarantine against more consumptives. Dr. S. G. Bonney, of Denver, has made a careful investigation and proves these statements to be untrue. The death-rate from indigenous cases was less in 1896 than in 1895—one-third of the patients were under 15 years of age—some the children of tubercular parents. Dr. Solly, of Colorado Springs, says that living for sixteen years among a people of whom many came to the country with tuberculosis, and not a few of whom live in crowded lodgings where free expectoration is commonly practiced, he knows of only four cases which could fairly be assumed to have originated in Colorado.

Dr. Gardiner reports that as a result of a circular letter of inquiry to many physicians of Colorado he could learn from them of only ten cases in fifteen years.

It certainly is a fairly reasonable conclusion from these facts that the spread of tuberculosis is not in accord with the degree of exposure to the bacillus.

The wide diffusion of the bacillus tuberculosis makes inevitable contact with it on the part of every individual in thickly-settled communities—the marvel then is not that one-sixth become fatally infected, but that more than half entirely escape. The evidence presented as to the escape of those in contact with the tuberculous is not offered in abatement of the claim of the bacillus as the essential factor. It is evidence, however, of the fact that one in fair health, living a regular and hygienic life, has little to fear from contact with the bacillus. We must assume, moreover, for those who do become infected, a weakness of resistance to the lodgment and multiplication of the bacilli, inherited or acquired. Hereditary predisposition, however explained, remains practically a factor to be dealt with in the genesis of tuberculosis. There is no time to even suggest all those circumstances of external environment, bodily formation, habits and degenerations which favor acquired predisposition.

A quotation from Jaccoud, recently cited and endorsed by one of our oldest and most eminent teachers, summarizes the interdependence of the bacillus and the predisposition most aptly in these words: "With this class of organisms pathogenesis by changes in the organism is the rule, and its traditional etiology based on heredity, congeniality, predisposition, temperament, somatic or cosmic influences retains all its force." That the natural history of infection, depicted as an active bacillus on the one hand and a comparatively passive resistance of the organism on the other, has been overdrawn, is confirmed also by recent bacteriologic development. H. P. Loomis made inoculations with the bronchial glands of persons dead from accident or acute disease apparently free from tuberculosis. One-fourth of the rabbits developed tuberculosis. Pizzini made observations on the lymph glands of thirty individuals who had died without any clinical evidence of tuberculosis—in twelve instances he developed tuberculosis by inoculation of guinea-pigs.

The recent bacteriologic work of Dr. Adami¹ of Montreal, so graphically presented to our local medical society recently has added new and convincing evidence of the not occasional, but constant, presence of noxious bacteria in the organism, and the equally constant bactericidal activity of the leucocytes and the disintegration and

elimination of the bacilli in the glands, the liver and kidneys. His observations point also to the etiology of cirrhosis of the liver by overwhelming invasion of the bacillus coli through coincident breach of the natural line of defense produced by catarrhal disease of the intestinal tract. These additions to our knowledge emphasize the belief that we are to rely for immunity from infection, not solely on an artificial absence of bacteria, but at least in equal degree on the maintenance of the inherent germicidal activity and vigor of the organism.

Until recently public preventive measures against tuberculosis have been directed only to the abatement of the predisposing conditions. The reduction in phthisis mortality as a result of these sanitary measures has been general and in many cases remarkable.

Acquainted now with the exciting as well as the predisposing cause of tuberculosis we are no longer restricted to defensive measures of increased vital resistance, but may undertake offensive action to destroy or limit the bacillus. The ubiquity of the bacillus suggests the magnitude of the task and assigns its accomplishment to that happy period when all men are honest, all women virtuous and the poor no longer with us.

We have it in our power, however, to greatly lessen the dissemination of the bacilli by practicable methods and thus decrease the chances of new infection. While there are many who do not share in optimistic enthusiasm as to the results to be anticipated, few will question the desirability of the attempt by unobjectionable methods.

The measures to be taken for the prevention of tuberculosis naturally divide into those directed against its dissemination by infected food animals on the one hand and those directed against infected man on the other. In regard to the former it may be briefly said that the conditions of success are comparatively simple. Rigid inspection of herds and dairies and the destruction of the infected animal solve the problem, requiring only the necessary law and its efficient execution.

Knopf, in 1897, reported that twenty-three states of the Union provided for official distribution of circulars of instruction as to the dangers of communication of human tuberculosis and the precautions to be observed as safeguards against infection. In Michigan and Pennsylvania resolutions had been adopted to include consumption in the official list of diseases dangerous to public health. In New York notification of all cases is compulsory. It is evident then that action against human tuberculosis has been confined, with few exceptions, to a commendable effort of education of the people, but that there is a growing tendency to more radical action. The statement was recently made in a medical journal that not long ago, in Detroit, Dr. E. A. Shurly was prosecuted by the local board of health because he refused to report his cases of phthisis; that in the defense Dr. Gibbes took the ground that there was no proof that consumption is contagious. Judgment was rendered against the physician and appeal taken to the supreme court. The report of the Department of Health of New York City, 1897, laments the difficulties of effective preventive measures because of the lack of special sanatoria, that is to say segregation, and incidentally intimates that "the work of restriction of tuberculosis has just begun."

On Sept. 15, 1899, the following preliminary resolution was passed by the State Board of Health of California: "*Resolved*, That the State Board of Health consider the propriety of quarantining against human beings and domestic animals with tuberculosis entering the state."

¹ THE JOURNAL, Dec. 16 and 25, 1899

In its present form the New York City compulsory registry law stands as a compromise measure: the result of attrition between the enthusiastic contagionists of the Department of Health and the opposition of the local practitioners. It may serve as a model of the most advanced action which will at present meet general approval. With the copy of the act requiring registration of all cases public or private coming under the observation of the physician within one week, is mailed a circular of information for physicians, which says that there will be no sanitary inspection or interference by the Health Department in private cases unless requested by the reporting physician, nor in those in lodging-houses or tenements where the reporter specially asks for non-interference. The law further provides for inspection of the premises occupied by the tuberculous, and the instruction of the family in preventive measures, and the disinfection of premises vacated by the affected, which must not be reoccupied until orders of the Health Department are complied with.

Preventive measures against infectious diseases self-limited, of brief duration, meet common approval, and are enforced with little inconvenience or difficulty. Tuberculosis, on the contrary, affects the individual for a number of years. During this period, instead of being confined to bed by the severity of his illness, the consumptive is little incapacitated for movement: he engages in the ordinary occupations and diversions of life, and frequents stores, factories, public halls and conveyances. During all this time he is hypothetically an ambulant source of infection. If these patients be put on the infectious list by compulsory registration, the first step is to instruct them in the danger of infection from their expectoration, and direct the means by which they shall dispose of this source of infection. If there be no further procedure it would seem as if registration were but a means of obtaining statistics as to the location, age and occupation of the tuberculous not worth the consequential interference in private affairs: for it is evident that the carrying out of the preventive measures must be left to the care and conscience of the individual: any practical degree of surveillance of the careless and indifferent while at large, by the authorities, being of course impossible.

To be more than of instructive benefit there must be, for the careless or incapable, penalties, or means of enforcement of the preventive measures. Segregation offers itself as the only reliable protection. The state must then provide places where these people may be separated from the community with favorable conditions for recovery. Needless to say these places do not yet exist.

The next step in preventive measures against tuberculosis easily suggests itself as a sequence to segregation. If it were well to isolate the tuberculous already in the community, it were better still to prohibit the entrance of more from the outside. So we have quarantine as the legitimate outcome of compulsory registration. The California Board of Health, with characteristic western disregard for precedent, jumped the intervening steps and landed at the top.

While I share in the general recognition of the value of instruction of the people in the danger of the dissemination of tuberculosis by the sputum of the consumptive, and in the method of disposal or disinfection by which this danger may be minimized, I believe that in spite of the agitation for state preventive measures there exists in the mass of the medical profession a strong, if quiet, opposition to any radical steps in state interfer-

ence with the tuberculous, and that it is based on: 1. An underlying belief that there is a variance between the infectiousness of tuberculosis, predicated on scientific experiment and deduction and the actual everyday facts of common observation. 2. On the instinctive recoil of reason and humanity at the difficulties and hardships of the progressive measures which are the logical sequences of the first step. 3. On the evidence we have that tuberculosis in man is to be decreased by increasing vital resistance, discouraging tuberculous marriages, and improving general and individual sanitary environment and living.

70 State Street.

DISCUSSION.

DR. E. FLETCHER INGALLS, Chicago.—The control of tuberculosis is one of the most important problems that confront the science of medicine at this time, and this very fact has led to a vast amount of visionary talk by some members of the profession, and to some vicious legislation, in an attempt to accomplish something toward the diminution of tuberculosis. This problem, in its effects on the human mind, excites action similar to that called forth by the financial problem, which is always paramount with the majority of mankind.

A considerable percentage of men will at once accept the most visionary schemes if they promise speedy riches, and a much larger percentage will place implicit confidence in other schemes, right in part, but lacking in one or more of the essential elements of success; so some physicians and laymen adopt, with more or less enthusiasm, absurd, or more or less visionary propositions for stamping out tuberculosis, while they ignore some of the essential facts that must be considered if anything of value is to be accomplished.

Pulmonary tuberculosis is in many respects analogous to croupous pneumonia: both are very frequent and both are frightfully fatal; both are recognized as of microbic origin, and consequently both are considered by some to be contagious; however, it is only in very rare instances that we can find any evidence of contagion in pneumonia, and it is in a very small percentage of cases only that we are able to find anything like proof of tuberculosis having been contracted by one person from association with another suffering from the disease. The diplococcus pneumoniae is thought to be present in all or nearly all cases of croupous pneumonia and the Koch bacillus may be found in practically all cases of pulmonary tuberculosis; but the diplococcus pneumoniae is also present in the secretions of the mouth in a large percentage of healthy people, and the tubercle bacillus is also present in some of the tissues of the body in a very large percentage of perfectly healthy subjects, facts which prove beyond doubt that there are other elements entering into the etiology of these diseases. These two diseases present so many points of similarity that we can no more hope to stamp out one of them than the other. A well-known pathologist said to me recently, that before we were able to stamp out pulmonary tuberculosis the human family would, in the natural course of events, have become immune to the influence of the Koch bacillus.

We must do all in our power to control both of these fatal maladies, but we can not accomplish much by attacking any one of their several etiologic factors. We should work for that which is possible, and not waste our time crying out and striving for what is far beyond our reach. Before making up our minds what should be done toward requiring physicians and friends to report all tuberculous cases to the Board of Health, we should carefully consider some facts that are often ignored.

Although it is recognized that the tubercle of Koch bacillus is the essential cause of tuberculosis, yet no one has thus far been able to determine why certain individuals are attacked by the disease and why others escape. The knowledge that these bacteria cause tuberculosis under certain conditions, has led many to believe that nearly all persons affected by the disease are infected through some other individual. All told, a considerable number of cases have been reported that can be fairly charged to contagion, but as against this there are hundreds of thousands in which there is not the slightest evidence to justi-

fy such a conclusion. Out of about 1600 of my carefully kept records of private patients suffering from pulmonary tuberculosis, I have taken at random 100 records which may be supposed to give a fairly good idea of how the rest would run. Of these 100, only 1 or 2 per cent. show any evidence of contagion. There were just two cases of this sort, in one of which there was no evidence of heredity, but a history of having been associated with a friend who had phthisis. In the other, a widow free from hereditary taint developed tuberculosis 2¼ years after the death of her husband from consumption. These may both have been contagious, but either or both may have resulted from some of the other causes of the disease and the association may have been merely a coincidence. In 27 per cent. of these cases, however, it is found that some other member of the family had had tuberculosis. Some of these may have resulted from contagion, however, in many instances of this kind, as, for example, when the person had grown and left home the patient may never have been at all intimately associated with the other member of the family who had tuberculosis, and there is certainly no *proof* when we consider the influence of heredity. A summary of these cases shows that in 1 instance the father only had died of pulmonary tuberculosis; in 12 the mother only; in 2, both father and mother; in 5, a brother only; in 5, a sister only; in 1, a son only, and in 1, a daughter only had died of pulmonary tuberculosis. All of these may have been the result of inheritance, and certainly they could not be taken as even circumstantial evidence of contagion. That only one should have inherited or acquired pulmonary tuberculosis from the father, but that twelve did from the mother affords an opportunity for interesting speculation. Was it because the young child was so much more with the mother than with the father? The answer would have to allow for the fact that after a father had become seriously sick with consumption he would be quite as likely to be with the children as the mother. Was it because the mother's milk contained the bacilli or because her depraved condition prevented the furnishing of adequate nutrition to the nursing infant? As these were all patients from 20 to 36 years of age, neither of these suggestions would seem to account for the condition. In studying this subject we must take into consideration the very great prevalence of tuberculosis, a fact which of itself would explain the occurrence of the disease in a considerable percentage of the patients in whom it has been attributed to contagion. I believe that by the most liberal estimate less than 2 per cent. of all cases of the disease result from contagion by association with another person having consumption.

Surgeons claim that 80 per cent. of the human family have tuberculosis in some form. Vital statistics show that 12 per cent. of the human family die of pulmonary tuberculosis, and the records from the dead-house show that 25 per cent. of those dying from other than pulmonary diseases have previously had and recovered from pulmonary tuberculosis, which has left distinct scars, therefore, there must be at least 37 per cent. of the human family who at one time or another suffer from pulmonary tuberculosis, and it is probable that the percentage is much larger. Tubercle bacilli have been demonstrated in the bronchial glands in about 40 per cent. of a series of cases of persons dying from acute injury who had never presented any evidence whatever of pulmonary tuberculosis. If this 40 per cent. be added to the 37 per cent. already found we find that 77 per cent. of the human family, at one time or another, harbor the tubercle bacillus either in the lungs or the bronchial glands. If careful examinations were made of all the mesenteric glands and other tissues of the body, it is probable that these bacilli would be found in nearly all; even from the evidence we now have it appears that practically every member of the human family, at least in civilized countries, harbors the tubercle bacillus in some part of his body at some time. Personally I doubt very much whether there is a person in this room who is not at this moment carrying about a greater or less number of tubercle bacilli.

For the sake of the argument let us admit that not more than 75 or 80 per cent. of the human family ever suffer from tuberculosis. An important thing to be considered in our efforts to prevent tuberculosis is that it also affects many of

the lower animals, as cows, chickens, birds, monkeys, fish, etc., and also plants. The facts just presented indicate some of the difficulties which will be met in the outset of this undertaking. Notwithstanding the very great prevalence of the disease, as I have already shown, only a very small number can reasonably be supposed to have contracted it from other persons. It is commonly believed, though we must admit upon very insufficient evidence, that tuberculosis is nearly always caused by the inhalation of bacilli which have been taken up in the air from dry sputum; yet it is a well-known fact that these germs are usually destroyed by a short exposure to the air and sunshine. I am inclined to the popular belief, but we must admit that no one knows the origin of the bacillus. Pathologists have recently shown that these bacilli are often branching like the ray fungus of actinomycosis, and that their passage through cold-blooded animals produces bacteria morphologically very different from the Koch bacillus. Miller has succeeded in obtaining bacilli from grasses that are morphologically identical with the bacillus of tuberculosis. Much valuable information concerning the branching forms of the tubercle bacillus will be found in an article by Friedrich and Nösske (*Beiträge zur Pathologischen Anatomie und zur allgemeinen Pathologie*, Jena, 1899), and in the articles by Schulze and Mubarsch; the two latter will be found in *Zeitschrift für Hygiene und Infektionskrankheiten*. Among others who have worked with these actinomycelial forms of the bacilli are Coppen Jones, E. Klein, Babes, Dixon and H. Bruns. Lydia Rubenovitch has succeeded in obtaining the bacilli from butter, and the experiments of Strauss with cooked meat show that the bacilli may retain their virulence for a long time under most adverse circumstances and be introduced with the food.

When the state libels a person as a consumptive it places on him a brand like that of Cain, which can never be effaced. I have seen many patients who believed they had consumption, who insisted on not being told of it even though they came to me for a diagnosis. In the majority of cases that I see the friends request me not to let the patient know that he has consumption, believing as they do that it would work great injury to the sufferer. From my experience it is my impression that at least 75 per cent. of those having this disease do not wish to be told of it even by their physician, and it is my uniform practice not to tell a patient that he has it unless he requests the information, while it is comparatively rarely that one of these unfortunates asks me what is really the matter.

I am confident that a law requiring physicians to report to the state all cases of tuberculosis that come under their observation would cause patients and friends, from fear of being reported, in a large percentage of cases to avoid the physician as long as possible, thereby losing the most important, and in many cases the only, chance for successful treatment. Bringing the matter directly home, I would ask how many of you physicians would report to the state a case of consumption in your own household. I have no doubt that some would do so from conscientious motives, but I am quite as confident that the majority of physicians would feel that their duty to the patient required them to protect him from this stigma. Two results of such a law would be that many patients would not consult the physician until it was too late and that the majority of physicians would consider themselves in duty bound to protect their patients rather than to turn them over to the tender care of the state.

The branding of consumptives could not fail to be detrimental in many cases. To many a person the mere knowledge that he had consumption would be like a warrant dooming him to slow death, and of the 60 or 70 per cent. of those having pulmonary tuberculosis who now recover, many would die from the depression caused by the mortification, disgrace or despair of being thus pointed out. So true is this that I firmly believe that in many cases it would be much more humane for the state to give such persons an overdose of morphin or chloroform.

Our duty as physicians is not only to heal the sick but to comfort them and their friends, and I can hardly conceive of a more cruel thing, in some instances, than it would be to inform on them to the public officers, especially as there is

little reason to think that these officers could do any good to the patient or in protecting others. As not only friends but physicians would probably conceal the majority of tubercular patients as long as possible, if we had such a law, it could not be thoroughly enforced and it would be worse than useless. It will be urged that the good of the many must be considered, as in the case of diphtheria, scarlet fever and other markedly contagious diseases, but when we recollect that 80 per cent. of the human family have tuberculosis, the impracticability of such a law seems self-evident, and it appears clear that it would be much better to banish the 20 per cent. who can not be proved to have the disease, in order that they may be removed from its dangers. They certainly would be better able than consumptives to fight the battles of life alone. Even if the application of the law were confined to the 12 or 20 per cent. of the consumptives who can not be recognized even by the laity, we would have to reckon with very many hostile to the law because each of these consumptives has friends who would not tolerate his banishment. There are not a few who would object even to killing off cows and other domestic animals that might possibly be harboring the bacilli. With the tuberculin test tuberculosis in the lower animals can be readily detected, in most cases at an early stage, but it is not infallible; therefore, in order to be sure that we are getting rid of all of those infected it would be necessary to destroy a great number that were simply suspected, although a positive reaction may be accepted as practically a sure sign that the disease is present somewhere in the animal. If we could destroy all suspected animals and the 80 per cent. of the human family who have tuberculosis, it is a question whether the 20 per cent. that were left would be free from infection. As I have already stated, no one can tell whence the tubercle bacillus comes, and no one can be certain that he is not already tuberculous or that he is not at least harboring this omnipresent microbe. It does not appear to me practicable to quarantine or sequester those suffering from consumption.

From what I have said many may think me pessimistic and hopeless about the management of these unfortunate cases. This is not the case, but I have no sympathy with the extravagant views entertained by those who believe that the prevention of tuberculosis is to be carried out on the same lines as that of yellow fever, and who believe that if this be done the disease would be stamped out within a few years. Although libeling and quarantining tuberculous patients can not be satisfactorily carried out, and although it would be of doubtful utility if it could, I think there is much that may be done to check the spread of the disease, or to cure it in individual cases, in its early stages. Although we do not know where the tubercle bacilli come from, it is believed by most physicians that most patients acquire tuberculosis through the atmosphere from the dried sputum of tuberculous human beings, the only animals so far as I know that have the disgusting habit of spitting; therefore, everything practicable should be done to prevent expectoration on the streets or in other places where the sputum may become dried. This should apply not only to those who are recognized as tuberculous but by every one else, for it is probable that the majority of persons suffering from consumption recover before the disease is detected.

Friends and physicians should do all in their power to dissuade consumptives from marrying.

Children predisposed to consumption should be carefully watched to prevent deterioration in the general health and they should as far as possible be placed in good environment.

The most important thing in the prevention of consumption is attention to the general health, especially of children and young people, so that in case the bacilli find entrance into the system the local power of resistance may be sufficient to prevent harm. The person affected with consumption should, if possible, be immediately removed from a damp or otherwise deleterious atmosphere; the pale, feeble child should be kept in the open air as much as practicable and his diet should be carefully watched to secure proper nutrition. Such persons should be carefully clothed, sleep in well-ventilated rooms, and should not be overworked. The young man or young woman predisposed to consumption, if in school, should be carefully

guarded to prevent excessive application to books and undue confinement. They should be induced to take an abundance of vigorous exercise, and they must be supplied with good food; if away from home they should be especially cautioned to shun poor boarding-houses.

Those having the responsibility for the young should attend at once to the first evidences of impaired nutrition or strength, and should not wait for the development of cough or other suspicious symptoms before they adopt proper methods for the prevention of disease. With the first evidences of the approach of tuberculosis, such as pallor, weakness, malaise, acceleration of the pulse and daily rise in temperature, symptoms often attributed to malaria, the best methods for detecting the disease should be at once adopted, and the measures most calculated to abort or cure the individual case should be instituted at once. Physicians and enlightened laymen should join forces in disseminating among the people a knowledge of the predisposing causes of this disease and of the methods best calculated to prevent or abort it.

In conclusion I would ask, should we have laws requiring all physicians to notify the state authorities whenever they find a patient suffering from consumption? To this I would answer emphatically, No! not only because of the injustice and inhumanity of such a law, but because it could not be enforced.

Shall consumptives be proscribed, sequestered or quarantined? To this I would also answer, No! because at best only a limited number of those so affected could be thus treated, because of the deleterious effects on the patients themselves, because these patients are sick and need sympathy and care rather than banishment, and because it would be cheaper and more humane to banish those who have never been infected by the tubercle bacillus.

DR. H. N. MOYER—In discussing the subject of the control of tuberculosis, there has been not a little narrow reasoning based on the idea that it was only necessary to catch and kill the germ of tuberculosis in order to stamp out the disease. This conception of the public health duties is reflected in the laws which it is urged should be adopted in the prevention of this malady. They include quarantine, notification, and other equally drastic measures. The essayist, and Dr. Ingals, in the discussion, both point out that such laws are foredoomed to failure. It is not practicable to try to stamp out the disease in this way. All that such laws can possibly do is to educate the people to the view that tuberculosis is to a moderate extent contagious, and that care should be exercised in the disposal of the sputum of these individuals, and that such a patient may be dangerous to those about him. The failure of attempting to stamp out tuberculosis by quarantine and segregation is shown by the efforts which have been made in Hawaii for the past twenty-five years, to banish leprosy. During all this period the Sandwich Islands have tried to enforce a law compelling lepers to live upon an island separate from their friends. Every effort is made to detect cases of leprosy, and, as soon as found, they are sent to the island. Most of those who have studied leprosy on the islands agree that all of these efforts have failed—that leprosy is now quite as common as it ever has been. This is due to the fact that people have no fear of the leprosy; that cases are concealed as long as possible, and that in this class of infections quarantine is of but little value. In diseases in which duration is short and the period of danger of infecting others is comparatively brief, then segregation may be useful. Such is not the case with tuberculosis. The histories of leprosy and tuberculosis are quite parallel.

Control of tuberculosis is to be effected by general hygienic methods which look to improvement of dwellings and food of consumptive patients. Much is to be hoped from the establishment of sanatoria, to which cases may be sent in their incipient stage. It is just as important that hospitals should be located for the care of this trouble as that we have hospitals for the care of those attacked by the acute infections. An individual should not be compelled to work in confined and ill-ventilated quarters until his lungs are so diseased that he can no longer follow his employment. He should be given a chance early in the history of the disease. This, however, should not

be compulsory. Medical men should not be compelled to inform on their patients, but the state should co-operate with them in securing early treatment for tuberculosis.

Legislation must always be behind and not in advance of public opinion. Public health laws which seriously interfere with personal liberty can only be enforced when an active public sentiment is behind them.

DR. E. KLEBS—I quite agree with Dr. Moyer that we must have public sanatoria, but how many? In Chicago alone we would require 20,000 beds. It is not possible to seclude all these patients—to take them away from their families, or the workshops or from the schools, but we must look to reducing this danger as much as possible. We must have physicians appointed to inspect schools; if a school inspector finds a child that expectorates an enormous quantity of tubercle bacilli each day, that child must be excluded from the school. The dissemination of tuberculosis in the workshop is another source; there should be an inspection of these people. If they can not be excluded, there must be means furnished by which the expectoration may be sterilized or destroyed. In tuberculosis, the state has very great duties to perform, and it is a matter for careful consideration; radical measures, however, should not be resorted to.

DR. A. R. REYNOLDS—I have never been able to make myself believe that good could be accomplished by insisting on exclusion of tuberculosis. I am of opinion that we already have law enough in the state to insist on tuberculosis being a notifiable disease, but I believe, with the essayist, that it would be a difficult matter to segregate patients. If a patient knows how to take care of himself, he need not be excluded. It is along this line that the laws must be shaped; the state can only help in disseminating this information. I think the public is well informed on these matters at the present time, considering that it is only a few years since the discovery was made; all understand that this is an infectious disease and are eager for information regarding protection against it.

I do not quite agree with Dr. Ingals in his assumption that patients do not wish to be told of their ailment, especially when I consider that 70 per cent. of his patients are consumptives. Although I have no reason to doubt his word, I can scarcely conceive that so large a percentage would shrink from a knowledge of their trouble. It is for this reason that they consult physicians, and if it were not for the skill that physicians have in diagnosing disease, the calling would not be so much sought as it is. In the treatment of consumption they are not altogether successful. This subject can not be discussed too often nor published too widely.

DR. JOS. MATTESON—I did not suppose that this was the popular side of this subject at the present time, judging from the extended discussion it is receiving and the number who seem to be in favor of excluding tuberculous patients. I have been gratified by the substantial concurrence of opinion expressed by the gentlemen who have discussed the paper this evening.

TRAUMATIC PERFORATIONS OF THE MEMBRANA TYMPANI.*

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In 1500 consecutive cases taken from the out-patient record books of the Pennsylvania Hospital there were eleven in which the membrana tympani was ruptured by traumatism. The cases were as follows:

CASE 1.—An Irishman, aged 46 years, a longshoreman, was struck on the head by a hammer weighing 3 pounds, which had fallen forty feet. He sustained a severe lacerated wound of the scalp and was rendered unconscious for some minutes. On recovering consciousness, he was deaf in the left ear and suffered from much roaring noise in it. The left auditory canal con-

tained considerable blood. There was a large laceration in the anterior lower segment of the left membrana tympani. At the end of three weeks' treatment his hearing was normal and he had no tinnitus.

CASE 2.—A longshoreman, five days previous to presenting himself at the dispensary, had fallen thirty feet, sustaining severe contusions of the head and shoulders. Ever since the accident there had been considerable bloody discharge from his left auditory meatus, and he had had much tinnitus in that ear and been totally deaf in it. Examination showed that while sound conduction through the external auditory canal was lost, bone conduction remained normal. There was a large perforation in the central portion of the left membrana tympani. This case pursued a very tedious course. Three months after the patient's first visit the discharge had ceased, but hearing was impaired and there was considerable tinnitus.

CASE 3.—A telegraph operator, aged 39 years, who one week before coming to the dispensary was poking in his left ear with a penholder, suddenly felt something give way and suffered a sharp pain and heard a roaring noise in his left ear, which at once became deaf. Next morning there was much bloody discharge. Examination showed his left external auditory canal full of bloody pus, and after careful cleaning a large ragged perforation was found in the lower posterior portion of the left membrana tympani. The handle of the malleus was fractured, the two fragments being bent on one another at an angle of 45 degrees. This man recovered perfectly in six weeks, the discharge ceasing, tinnitus disappearing and his hearing becoming as sharp as ever. His right membrana tympani was perfectly normal.

CASE 4.—An Italian musician, three weeks before presenting himself at the dispensary, had been struck by a very high sea-wave, while bathing in the surf. It knocked him down and when he arose and got out of the water, he found he was deaf in his left ear, and had much roaring and pain in it. The next day a bloody discharge made its appearance at the left external auditory meatus. Examination revealed a small amount of purulent discharge in the external auditory canal, and a linear, vertical perforation in the lower posterior segment of the membrana tympani. He remained under treatment for some weeks, and when last seen his discharge had stopped, but his hearing remained somewhat impaired, and he still had a slight amount of tinnitus.

CASE 5.—An Italian artist, who had received a blow on the left ear two days before coming to the dispensary, presented himself, complaining of deafness and roaring in the left ear. Examination revealed a considerable bloody muco-purulent discharge in the left external auditory meatus. On removing it, a large tear was visible across the center of the left membrana tympani. This man's discharge ceased in a few weeks, and his hearing was restored and the tinnitus checked.

CASE 6.—A married woman, aged 36 years, presented herself at the dispensary with a history of having received a blow on the left ear one week before. Since then she had been deaf in the left ear, and had had much tinnitus in it, and considerable bloody discharge. The left membrana tympani showed a large perforation, the definite location of which was not obtained at the first examination, and subsequently, through neglect, no note was made of it. This woman pursued a good course to complete restoration of function and cessation of symptoms.

CASE 7.—A laborer presented himself complaining of

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