ANNUAL ADDRESS

BEFORE THE

State Board of Health of Pennsylvania.

By PROF. SAMUEL G. DIXON, M.D.,

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

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Gentlemen: Before entering upon the important topics which I propose to discuss before you this evening, I will take the first opportunity that presents itself of expressing the great pleasure and honor which I experience in having been requested to deliver the address before a body of gentlemen whose high function it is to act as the guardians of the health of the people of this great State, and to keep a vigilant eye upon all measures, which, whether local or general in their application, are calculated in your judgment, either favorably or adversely, to affect the public health.

It is difficult, gentlemen, to overrate the importance of your mission, and it is a matter for congratulation that the age in which we live is far and away in advance in its recognition of the importance of hygiene as a public question than were the days in the earlier periods of our history.

Facts which were then ignored or scoffed at are now generally admitted, even if not fully realized and acted on; and the era of ignorance and unbelief, which was followed by that of speculation—times, no doubt, exceedingly trying to your predecessors intrusted with the execution of sanitary improvement and maintenance of proper precautions—has passed away.

And yet much remains in the way of public enlightenment before you can be expected to accomplish the full measure of your calling, or receive that general and cordial co-operation, without which your hands are tied and your work hampered.

Public sanitation can only be accomplished by a public body representing the State. Individual effort, however much directed by zeal, may be altogether without knowledge; and thus a single ignoramus may cultivate enough propagating germs of disease to infect a whole town or district, and so frustrate the good work of a representative board.

Therefore, it is upon a Board of Health, such as I see before me this evening, in a great measure depends the health of the people; but, at the same time,

State Government. A Minister of Agriculture is a very useful and important personage, and the health of our flocks and herds is of vital moment to us, yet it cannot be compared with the supreme question of human health and, therefore, happiness.

When we who are willing to march daily into the camps of the tubercle bacillus—the more deadly anthrax bacillus, those of diphtheria and typhoid fever—come to be regarded as soldiers who risk their lives for those who are living in their comfortable offices and counting-rooms, then, and not till then, can we expect that support which is justly due to those who will face leaden bullets and give their lives to benefit their fellow-creatures.

The discoveries which have been made within recent years encourage us to go forward in the endeavor to stamp out disease before it reaches a point beyond our grasp. "*Venienti occurrite morbo*"—Hasten to meet the coming disease—is the true watchword of our profession.

We know now that disease is either originated or, to say the least, much aggravated in most cases by a micro-organism which enters the body from without, thereby bringing more lives to a premature end than has ever been caused by the fiercest of wars and bloodiest of campaigns. With this knowledge before us we are encouraged and stimulated to take our lives in our hands in order to study and learn the life-history of these our greatest foes; and, therefore, it seems appropriate that we should take the subject of tuberculosis this evening as one of the diseases which has proved so deadly and caused so much suffering, and speak of what we know concerning its origin, growth, etc.

Yet, gentlemen, there is no subject that has been so thoroughly diagnosed during the last year as tuberculosis in regard to its causes and effects, its treatment and prevention, and I doubt whether it be possible to summon a set of professional men who are more conversant with this malady than those comprising the Board of Health of Pennsylvania, whom I am now addressing; therefore, all I can hope to accomplish is to lay open this subject in all its varied aspects for your more thorough discussion from a sanitary point of view, for there is now abundant evidence of the preventability of this disease to a greater or less degree.

In speaking of this disease, I must confine myself to phthisis and those maladies accompanied by the tubercle bacillus. Whether the tubercle bacillus only becomes a specific irritant, or is *per se* the cause of tuberculosis, after making caseous degeneration of inflammatory products its habitat, we do not know; we must not, therefore, scoff at Klein, Gibbes *et al.*, who are endeavoring to show that the tubercle bacillus is not always to be found in the very early stages of this disease. Work in this direction brings about a healthy condition of original research. At present we possess but little knowledge regarding the life-history of this microbe.

In our searches for this single-celled organism, as it is found in diseased animal tissues outside the animal body, we have only found it in such places and under such circumstances as justify us in believing that it has been secondarily deposited there either by the excretions of tuberculous animals or dead tuberculous tissue.

What its cycle of life is outside the animal economy we do not know, but we do know that on certain artificial culture mediums we can grow it to such an age that instead of its morphology being a straight rod, as usually described, it will be seen throwing out branches.

From the fact that we find these branches of such varying lengths, I am inclined to believe that it is not the result of a union established through coalescence, but to the displacement of the cells. This condition, however, is not at all permanent, as a fresh culture medium will, from masses of these branched forms, grow the simple rod-shaped bacilli, yet after continuing the transplantation of the micro-organism in this more complex stage on to a fresh medium twenty-five times or more, its power to produce tuberculosis in the animal economy is much reduced; in fact, I have young dogs, guinea-pigs and rabbits resisting large inoculations of these growths, while the control animals inoculated with the second removal of bovine tubercle bacilli have developed general tuberculosis, or a form of disease which means death to the animal affected, and, at the same time, have present all those features which are thoroughly characteristic of human tuberculosis in its histology, etc., etc.

This result, however, will make us halt at the threshold of the germ theory of disease, and prompt us to ask whether or not it is a toxic agent that is carried in with the bacillus, or whether the bacillus has been cultivated after living on caseous tissue to break down healthy cells into the caseous condition which may be essential for its own existence.

The very fact that we all breathe the so-called tubercle bacillus, and many resist its attack, shows, beyond doubt, that it holds, at least, an intermediate place between the lion and the maggot. The former overcomes and destroys the deer in full and perfect physical health, while the latter can only prey on lifeless matter. The tubercle bacillus may be saprophytic.

These speculations must stimulate us to carry the line of investigation still further, so that the results thus far obtained may be brought to bear in disproof or confirmation of one of these theories. If further investigation shows that the pabulum is the factor concerned in reducing its virulence, we must conclude that the tubercle bacillus at most only becomes pathogenic or disease-producing when cultivated on a particular pabulum.

Another interesting observation, that it has been my pleasure to watch, is that a mass of bacilli, far removed by artificial culture from the original tuberculous tissue whence it was taken, will not, when introduced subcutaneously into the animal economy, produce the immediate general toxic effect observed from the introduction of a mass only twice or thrice removed.

Again, my observations enable me to conclude that the power of the tubercle bacillus depends largely upon the health of the animal into whose system it is introduced.

If an animal is poorly fed the power of the bacillus is much more marked, as it is also in animals kept in small cages or exposed to bad ventilation, and, again, in those kept in filthy pens.

My animals, kept for experimental purposes in the country, under proper sanitary conditions, being well fed, in clean cages, placed in pure air, and per-

mitted to enjoy the sun's rays for many hours of the day, when not too hot, have a much greater resisting power than those kept in my city laboratory.

These experiments are quite consistent with the known facts, that where there is the greatest exemption from the malady, viz.: on the high mountains, in the deserts, in the Arctic and Antarctic regions, it is yet to be found under insanitary conditions.

These facts I will apply further on in my address.

While acknowledging, however, our ignorance regarding the life-history of the bacillus, as well as just how much power it has to produce tuberculosis when taken into the lungs or stomach of a perfectly healthy man, unless accompanied by much of the toxic substance so generally found with it, we do certainly know, beyond all doubt, that by feeding carnivorous, herbivorous and omnivorous animals with caseous masses of bovine tubercle bacilli, we can produce deadly tuberculous conditions, let them be quite similar or not.

I have accomplished this by feeding raw bovine tuberculous lung to a puppy-dog six months old.

This being established with the dog, in which animal exists a great similarity between its mucous membrane and that of man, plus the fact that the digestive juices of the dog's stomach are the more acid of the two, we are forced to the conclusion that man can contract tuberculosis by eating raw bovine tuberculous meat.

To bring this still nearer to a condition likely to be met with in everyday civilized life, I roasted in an oven a piece of bovine tuberculous lung, weighing, I should suppose, about two pounds, until it was certainly better done than most of the roast beef eaten by our epicures. From the center of this piece of lung I opened a tubercle and grew from it bacilli. This should have been carried still further in a practical line by injecting a mass of it into the body of some one of the lower animals, so as to eliminate, as far as possible, the element of conjecture; yet, gentlemen, the experiments were quite sufficient to confirm me in the belief that, in all probability, a man can contract tuberculosis from eating the muscles of the cow, sheep, horse or fowl containing tuberculous lymphatics, let alone the more dangerous viscera, such as the liver, spleen, lung, kidneys, etc.

If the tubercle bacillus is a spore-forming fungus, as I am inclined to believe it is, we do not know just how much heat is necessary to render the spores sterile; this can only be determined when we learn to recognize them when present.

As long as my conclusions in this regard remain unimpeached, I must look upon tuberculous meat as a very dangerous article of food, at any rate, for those who are at all disposed to a caseous breakdown of the tissues; and as that condition is often not manifested until the system has taken on tuberculosis, it behooves you, as our guardians of health, to forbid the rearing, selling or eating of such meat.

From our present knowledge on this point we must deem it prudent, nay, we must prohibit the consumption of any food containing micro-organisms recognized as tubercle bacilli.

Cows suffering from tubercular mammitis will produce milk and cream containing those bacilli, and I expect yet to be able to find them in the milk of

cows affected with pulmonary phthisis only ; however, in well-marked tubercular mammitis I have never failed to prove the presence of bacilli in the milk.

If a test-tube of this milk is set aside for a few hours the micro-organisms are found in greatest abundance in the sediment, while a few can generally be discovered in the cream. Some of the bacilli I observed so closely resembled those found in human sputum that I would have diagnosed them as growing in that medium. Some were quite as large, while others presented that beaded appearance that has so often been spoken of by bacteriologists as characteristic of those grown in the human economy.

This, however, was not at all surprising to me, as I have never been able to believe that the very slight morphological distinctions made by Klein, Gibbes and others were of any significance so far as the power of the germ or its toxic agent was concerned in producing a very similar disturbance in the animal economy.

Not that the bovine bacillus, as found in the giant cell of bovine tuberculosis, does not average smaller and of a more even texture, but from the fact that many are quite the same size, and that on removal on a nidus rich with glycerine immediately grow bacilli equally as long and as beaded in appearance as those found in the sputum of man ; and, again, when passed once through the tissues of a guinea-pig, they have produced the same morphological characteristics ; therefore, I cannot from my own practical experience, differentiate, as far as infection is concerned, between the human and the bovine tubercle bacillus.

Certain it is that we can, by inoculating the dog with human tubercle bacillus and its debris, produce a wasting disease, accompanied by tubercles quite similar to those generally found in man.

Scientifically, it will be of particular interest to have the bovine and human tubercle bacillus differentiated ; yet, at present, for all sanitary purposes, we will have to consider the tubercle bacillus of the cow, accompanied with its nidus, as being destructive to human life, for it is well established that the bacillus of man will produce in the lower animal economy, such as the cow, dog, guinea-pig, rabbit, opossum, etc., a deadly malady, and that the bacillus from the cow will also bring about a like disturbance in the same line of animals, and, further, bacilli from the rabbit, etc., will, in turn, reproduce tuberculosis in the cow.

From this intercommunicability we must believe the tuberculous lymphatics interspersed in the muscles and the liver and the kidney and other of the viscera that are subject to the growth of bacilli, such as found in the cow or fowl, are capable, when ingested into man, of producing a disease quite similar.

We must also look upon milk, cream and, consequently, butter as another channel through which like diseases, fatal to man, may be communicated.

It would seem well settled that matter containing either bovine, human or chicken tubercle bacilli, when subcutaneously injected into a variety of animals, will produce a deadly disease that many of us are yet unable to differentiate from a tubercular malady.

Again, we have undeniable evidence that like matter will manifest the same power of harm when fed to such animals as respond to the inoculation; yet, at the same time, we must admit that there is no direct proof of the transmission of such a malady to man by his feeding upon what is now designated as tuberculous meat or milk. And I fear it will be a long time before we can establish it by direct evidence, as man is exposed to this dire disease in a hundred and one ways during the long time elapsing between the period of infection and the manifestation of any symptoms.

Among the arguments against the probability of tubercular disease being communicated to man by the ingestion of tuberculous matter is the one that tuberculosis in man rarely manifests itself as a primary lesion in the intestine. This, however, is not at all conclusive, for it is quite probable that the lymphatics, situate so near the frontier, where they are continually skirmishing with the enemy, become, to a limited degree, immune; consequently, the invader will only gain the victory by making his way into a more remote portion of the territory, where there is less resistance, and there become established.

It may be taken into the lacteals, on into the chyle, and thence into the circulation, by which it can be carried to the most remote parts.

In children we often find tubercular lesions of the abdominal glands only, all other viscera being entirely free from any form of tuberculosis. I feel sure that time will soon reveal the fact that this is more often the case with adults than is generally believed.

However, from the fact that a tuberculous condition is transmissible through the digestive tract from man to many of the lower animals, and from one lower animal to another, backward and forward, we must, for the present, conclude that a tuberculous malady can be transmitted from tuberculous meat, milk and butter to man; also by dentists' instruments conveying sputum from one to another, by cooking and cooking utensils handled by those having tuberculous matter on their hands; for instance, bread or other dough-containing foods, pulled candies and the like.

In my individual search for tubercle bacilli, I have found them in human sputum, in tissues of man, horses, cows, dogs, cats, rabbits, opossums, guinea-pigs, hogs, ostriches, fowl, street railway cars, dwelling-houses, and bacteriological laboratories and in tooth-brushes.

If the tubercle bacillus is to be found in street cars and dwellings, we must believe it to be in the air of most inhabited places, and the more thickly populated and the more filthy the air the greater will be the proportion.

This being the case, it is for us to decide on general principles and facts whether or not we are to conclude, for our present purpose, the probability of tuberculous material infecting the animal economy when commingled with the inspired air with which our diseased mucous membrane and outside skin are being constantly bathed.

It seems to me we must suspect the abraded mucous membrane of the respiratory and oral tracts or injured skin, when covered with eczema or other skin diseases, as being likely points of entrance.

By lacerating the gums and the lining of the oral cavity of the mouth of a

guinea-pig—not more than the dentist often lacerates man's—and powdering the wounds with a mass of tuberculous material, I have caused to be produced a submaxillary disturbance macroscopically resembling tuberculosis, while the microscopical examination revealed tubercle bacilli.

While most of the inoculations on guinea-pigs for experimentation are made by subcutaneous injections, I have also succeeded in producing infection by rubbing a mass of the bacilli on a superficially lacerated skin, and sealing it over with rubber cloth and sticking plaster.

Other experimenters have irritated the respiratory tract with ground glass, and then compelled the animal so treated to inhale particles of the tuberculous material, and thereby produced what they have described as tuberculosis.

We must, therefore, believe, for practical purposes, that the lower animals can be infected with a deadly disease closely related to tuberculosis either by the inspiration of tuberculous matter on the injured mucous membrane of the respiratory tract or through the injured skin when besmeared with tuberculous material.

These facts, coupled with those already alluded to, showing that human tuberculous material is capable of infecting the guinea-pig, rabbit, opossum, calf and other animals, in almost, if not in precisely, the same manner as the tuberculous material of a cow will affect the same kind of animals, and, further, that tuberculous material from a guinea-pig will infect the other animals in exactly the same manner as when taken from man or cow, compel us to conclude that man suffering from inflammatory processes or traumatic conditions of the mucous membrane or skin may contract a deadly disease from germ particles in the air.

Just how long tubercle bacilli or their spores, if such exist, can retain vitality after isolation from a favorable nidus, such as tissue or pus, we do not know; yet we have a good right, reasoning from the life of higher fungi on up through green vegetable life to that of fish and mammals, to conclude that the act of separation from the nidus does not *per se* cause immediate death of the cell, but that some time elapses before the germ dies in its non-life-sustaining surroundings.

If this be so, and the separation is constantly going on in man's immediate presence, why should the toxic agent not again implant itself on his abraded skin or mucous membrane while it still has vital power?

Even should we have to admit that the very act of separation of the disturbing germ from its original pabulum is presently fatal to its life, we must not forget what experiment has already demonstrated—that a very slight current of air can carry with it not only the germ, but also its nidus.

From the fact that, in studying microscopic preparations of lung tissue, we often find particles of coal that have worked themselves down into the very alveoli, we must, at least, suspect the possibility, in fact strong probability, of the tuberculous matter also working its way into the finer ramifications of the air passages.

The function of the respiratory apparatus is to convey air from without into the body. Its construction is such that, in full health, it screens out most of the light, short particles of deleterious matter, yet, when at all diseased, it must, we believe, lose this power to a greater or less degree.

Dr. Arthur Ransome has shown that in bronchitis and catarrh, and other diseases in which there was much expectoration, the proportionate amount of organic matter exhaled from the lungs was only one-half of that from the healthy person—not that there was less organic matter excreted, but because it was held by the mucus before it reached the mouth ; and Prof. Tyndall, as you must all remember, has demonstrated, by means of the illuminated tube, the filtering action of the respiratory organs.

Under such conditions as chronic bronchitis the ciliæ must, of necessity, lose their power to expel foreign material. The muscular walls become weakened, and dilatation and plugging, in all probability, take place, and the bacilli find a quiet habitat and a medium wherein to fructify.

Catarrhal pneumonia furnishes a goodly example of this condition predisposing to tuberculosis.

We cannot, however, make any estimate of the possibility of the harm arising from the entrance of such material into even the most remote and inactive portions of the healthy lung tissue.

This, however, is not necessary for you to consider as sanitary officers, inasmuch as there are few men, with perfectly healthy respiratory organs, who ought to look to you for protection against the invasion of this most fell disease. This, coupled with the fact that the healthy, if any, are constantly commingling with the unhealthy, makes it incumbent on you to render all places sufficiently harmless to both, particularly if you believe that tuberculosis in the air is hurtful to man in such health as the average human being enjoys.

It would appear, from what has been said, that it is probable that man, when in a certain condition, is susceptible to tuberculous infection when exposed to the materies morbi, and that it may make its entrance into the animal economy either through the stomach, the mucous membrane of the digestive or respiratory tracts, or through the abraded skin ; and, further, that man is constantly exposed to the toxic agent, and yet all men are not affected with tuberculosis.

I have little or no doubt but that all of you can remember instances when men have been severely exposed to tuberculous material, and lived to a good old age untainted with the disease, while others who have been, in all probability, but slightly exposed have taken on the infection.

This special susceptibility demonstrates that some must furnish a suitable soil, and that, in such cases, the affinity of the constituents of the tissue must be weak, and thus enable the toxic agent to break it up and pass through the process of tuberculosis.

This condition, we must admit, is often hereditary. We have seen very many instances of members of the same family, living in different and far-distant localities, who have, at or near a certain age, succumbed to tuberculosis.

We cannot explain all the possible inherited factors, yet we can readily conceive mere abnormal and inconsistent proportions of the viscera as being a predisposing cause ; a mere mechanical course pursued by the air passages, weak ciliæ in the air passages, digestive glands that secrete a weak gastric juice, papilli of the intestinal canal incompetent to make a proper selection of food, or a weak phagocytic power may each afford a cause for susceptibility.

There is certainly inherited not only a tendency to contract but a marked readiness to yield to an attack.

Hereditary predisposition is often intensified by intermarriage. If we find in the bovine fœtus tubercle bacilli we have an heirship. The parent in this case certainly, to say the least, bequeaths to its offspring that which it actually possesses.

After an experience of breeding over a hundred animals, I am convinced that interbreeding intensifies either strong or weak characteristics. However, this predisposition only furnishes a soil or habitat for that material so universally found in tuberculosis.

A predisposition in man can also be cultivated. Vitiated air is one potent cause; under this condition the blood is not properly oxidized, therefore the digestive function becomes impaired, the tissue weakens, and susceptibility is acquired.

Prebreathed air or house air with a lack of physical exercise is responsible for much tuberculosis acquired by man, not only directly, but also indirectly, by rendering the cattle he eats predisposed to tuberculosis.

Active ventilation in our dwellings and public buildings, factories, and mills, etc., is essential for the prevention of the disease.

We have no scientific proof that foul air in any way nourishes the tubercle bacillus or that it increases its virulence, yet we do know that it reduces the resisting power of the animal economy, and that a lack of a free interchange of air permits of an accumulation of the bacilli.

For instance, if 10,000 bacilli are given off into 1,000 cubic feet of air, there would be ten bacilli in each cubic foot of air breathed; whereas, if the interchange of air furnished 10,000 cubic feet in the same length of time, each cubic foot of air inspired would only contain one bacillus.

Laboratory experimentation proves beyond doubt that the quantity of tuberculous material taken into the animal economy decidedly affects the rate of mortality. This fact is entirely consistent with the well-authenticated statistics showing a much larger mortality in crowded places, and goes to establish the absolute necessity of interspace ventilation to prevent the spread of tuberculosis.

This being the case, it goes without saying that the ventilation of the streets and air spaces of cities, towns, etc., is also necessary to maintain the health of the inhabitants.

Statistics show that in proportion as people are attracted to indoor occupations and in proportion to the degree of closeness from want of proper ventilation of the buildings in which they work, in that rate is the ratio of deaths from tuberculosis increased.

Dr. Bowditch has shown us the extreme danger of dampness of the soil as a cause of tuberculosis, and has called our attention to the necessity of the more thorough drainage of the land. . . Dr. Bowditch's results have been confirmed by Dr. Haviland and by the Registrar-General of Scotland.

In the conclusions drawn from the map of distribution of tuberculosis in Great Britain, Dr. Haviland states: "Damp, clayey soil, whether belonging to the wealdon, oolitic or cretaceous formation, is coincident with high mortality."

Gastro-intestinal disorders, that so generally precede tuberculosis, point to the necessity of proper and sufficient foodstuffs.

The disordered stomach may of course in a number of cases be secondary to tuberculosis, yet there cannot be a doubt as to its also being one of the predisposing causes.

As there is nothing that affects the wealth and happiness of the people of this great State more than ill-health, and as there is no one poison that interferes more with health than tuberculosis, which not only too often robs us of those in the prime of manhood and womanhood, but renders thousands upon thousands a burden to themselves and their families for years, yet it is happily a preventible disease, and this Board should be armed with authority and means to enforce and carry out sanitary laws essential to that end.

To accomplish this most important work it must be evident, after what we have reviewed this evening, that you should have legislation regarding the disinfection and destruction of tuberculous material, especially human tuberculous sputum.

There should be a law compelling passenger transportation companies to furnish receptacles containing either water or a germicide for sputum, both in their cars and stations. The same law should apply to all places where large numbers of persons gather together either for the purpose of work or amusement.

To enforce the expulsion of dust in our factories and workshops.

To compel the thorough sprinkling of the public highways immediately before cleansing.

To forbid spitting on the sidewalks.

To compel the drainage of damp soils before permits for building dwellings are granted.

Rules should be formulated for air space and ventilation of all buildings, and the builders and architects required to submit their plans and specifications before the work of building can be commenced. This certainly is quite as necessary and practicable as the present law in Philadelphia and other cities regarding plumbing.

Not only must we have a law requiring a certain air space and ventilation in our buildings, but also around our dwellings, workshops, etc.

The width of all new streets and passage-ways should be of a sufficient breadth. Every block of buildings should have a complementary garden or park. Every building should be accompanied by a certain air space.

Such topographical regulations must be insisted upon in our growing cities, if we mean to reduce the present alarming death-rate and suffering from phthisis.

This ventilation of our cities and towns by the laying out of wide and diagonal streets and reservations of open spaces for gardens and parks, is essential for the successful ventilation of our buildings.

A pure and constantly renewed atmosphere is requisite for the prevention of consumption. This is well known and universally admitted beyond doubt or controversy.

All knives, forks, spoons, cups and other eating utensils should be thrown into scalding water immediately after using, otherwise the tuberculous sputum will be carried from one person to other.

Dentists and physicians should be required to disinfect their instruments according to a law of the State, and be subject to inspection and a heavy fine for a violation of the same.

The cleansing of all public conveyances should be regulated by law.

We should have laws regulating the ventilation of our animal stables. Cows, like men, require physical exercise and pure air and light to enable them to resist tuberculosis.

The hot, close, dark and dirty stables throughout our State are important factors in promoting tuberculosis in our cattle; therefore, regulations should be formulated for ventilation, light and cleanliness of animal sheds and stables. These should be under the inspection of competent and honorable inspectors.

Soiling of cattle should be forbidden by law.

As there are at present so many cows predisposed to tuberculosis, and as it is more than probable that interbreeding intensifies predisposition, it should be defined and forbidden.

All consumptive animals should be condemned and killed after having been valued and paid for by the State. The vending of the meat of such animals should be made criminal.

At present cows suffering with this disease are constantly being sold in our markets for the manufacture of mince-meat and sausages.

The breeding of tuberculous animals, the killing of which, at any time, should be delayed for the want of a sufficient appropriation to pay for the same, should not be permitted.

The sale of the milk of such animals should be forbidden under a heavy penalty.

As tuberculosis, actinomycosis, lymphadenoma and rheumatism with enlargement of the joints would frequently be taken the one for the other by laymen, competent government inspectors should be appointed to make periodical and special inspection of all home cattle as well as those about to be brought into the State.

All butter and milk imported into the State should be subject to inspection for tuberculous material. All meat exposed for sale in our markets ought to be subject to inspection and condemnation.

The law should require physicians to report tubercular cases.

The proved transmissibility of tuberculosis from one person to another brings us face to face with the necessity of considering the question of admitting to our country tuberculous immigrants.

Inoculation with tuberculous matter for the cure or prevention of tuberculosis cannot at this stage be recommended for general practice, as too few test cases of cure have yet been brought to an entirely satisfactory conclusion, while immunity in some of the lower animals has been sufficiently demonstrated in my own laboratory, since my first publication in the *Medical News* of 1889, to confirm me in my belief that it can and is produced to a greater or less degree.

However, the risk of producing a diseased condition and the uncertainty of degree and duration of immunity are at present unknown quantities to me; therefore, I cannot now recommend that which my results on the lower animals give me reason to believe I will at some future time be able to advise as a public measure.

By the agency of the tubercle bacillus, I believe we will have a means to prevent tuberculosis, and to diagnose and cure those who have fallen victims to the malady, yet at present I am of exactly the same opinion as I was two years ago, when I cured my first tuberculous animal, which animal happily still lives to speak for itself.