patients apparently in the spirit in which they were given, and while it is impossible to say how far they have been followed, they do not seem to have increased the difficulties of the patient by alarming his friends as to any danger which they may run by associating with him. The circular runs as follows:

- (1) Consumption is a contagious disease, but the breath of consumptives is not directly infectious.
- (2) The seeds of the disease are found in the phlegm or spittle which is coughed up, but it is not a source of danger till it has become dry.
- (3) Do not, therefore, spit upon the streets or upon the floor of your house or shop.
- (4) In-doors use a special spit-cup which either contains water or is lined with paper. The cup must be often emptied into the pan of the water-closet or into a bright fire, never anywhere else, and then washed out with boiling water.
- (5) Out-doors use a bit of rag or paper which should be burned as soon as possible.
- (6) Handkerchiefs should never be used for the phlegm; if used at all they must be boiled for half an hour.
- (7) Keep your room clean; use a damp cloth for dusting.
- (8) Throw the windows wide open when you leave your room; at night sleep with the windows somewhat open from the top.
- (9) Consumptive patients should sleep alone.
- (10) Consumptive mothers should not nurse their children.

Of the causes to which the patients ascribed their illness, exposure, "catching cold," naturally came first with 57 cases. The inhalation of dust was supposed to be responsible for 15, gripe 13, rapidly succeeding pregnancies 7, injury 3, and pneumonia 3. In 8 the first symptom noticed was hemorrhage, more or less severe. There was a history of malaria in 3 cases, and of the abuse of alcohol in 10; 19 had had pleurisy from a few months to a few years before, 15 however, had had pneumonia. Two had suffered previously from lupus of the face and one from Pott's disease. Three had had syphilis, one year, fifteen years, and twenty-six years ago respectively. Among the complications there were found 6 cases in which the cervical glands were affected, apparently before the development of the pulmonary trouble, 4 had fistula in ano, and 2 valvular cardiac disease. One case was complicated by patches of tubercular caries on sternum, ribs and ulna.

Many of the cases were seen for the first time after the disease was considerably advanced, so that it was often impossible to tell where it originated, but those in which one lung only was attacked showed a marked predominance of the right side, 59 to 32, in 47 the disease being confined to the right apex, and in 28 to the left.

Owing to the very incomplete condition of the records as well as the short time during which many of these cases were under observation, the results of treatment can only be given in the form of an impression, which is, however, less liable to be wrong in out-patient practice than among other classes of patients, since there is usually but one factor to be estimated. In private or hospital practice when it is possible to modify the diet and general manner of life, doubt always arises as to whether improvement, should it take place, is to be credited to this or to the drugs prescribed, while among out-patients such modification is rarely possible and then usually but to a limited extent. It is of little use to order a special diet to those

who are already a drain upon a family struggling for the bare necessities of life, or to recommend an abundance of fresh air to those who fear a draught more than death, or to give special directions as to exercise where intelligence is lacking to appreciate its value. Drugs, however, are usually conscientiously taken, so that whatever change for the better takes place can with a certain amount of confidence be ascribed to them. This limitation of one's resources makes the treatment of such patients at best discouraging work, yet it has seemed to me in watching the progress of these cases, that a larger proportion of them improved than previous experience had led me to expect, while a cure, as shown by the disappearance of all signs and symptoms, occurred in a few instances. Routine treatment, when the prognosis was not absolutely fatal, consisted in the administration of guaiacol (occasionally creasote) in doses rarely exceeding five minims three times a day, together with arsenic and Merck's digitalin. In a few cases the dose of guaiacol was gradually increased to fifteen or twenty drops, but no advantage could be seen in the larger amount. Except in one or two cases, where it excited some digestive disturbance which disappeared with a reduction in the dose, patients took it without trouble, almost the only complaint ever made being of the somewhat acrid taste and the persistent odor of the breath, of which they were themselves very conscious. The most marked effects for good were seen in the improvement in the general well-being of the patient, and were shown by a gain in appetite and weight, and a decrease in the cough, even in many where the physical signs remained stationary or even seemed to be advancing.

TUBERCULOSIS AMONG OUR NEAT CATTLE.¹

BY DR. F. H. OSGOOD.

TUBERCULOSIS is a contagious and infectious disease so widely disseminated, so insidious in attack, and so fatal in results, that it is, no doubt, the most important disease which we are called upon to combat. Not only does it cause one-seventh of the deaths of mankind, but it is the most widely distributed and disastrous disease among our cattle. Since the discovery, a dozen years ago, of the bacillus tuberculosis, and the demonstration of the identity of the disease in man and the lower animals, a great interest has been manifested in the question of the meat- and milk-supply in our large cities. This interest has given rise to the establishment of an inspection service, which, notwithstanding its necessarily superficial character, has revealed many startling facts respecting the prevalence of tuberculosis among our milch cows and beef cattle; so that at the present time there is little or no question concerning its quite general prevalence.

Accurate statistics as to its extent are not yet attainable, but the abattoir reports show in Prussia 6.3 per cent., in Berlin 12 per cent., in Dresden 14.4 per cent., in London 25 per cent., in Midlothian 20 per cent.; in England, during an outbreak of contagious pleuro-pneumonia, in 1890 and 1891, there were slaughtered, as being infected, or having been exposed, 12,000 animals, all of which were subjected to critical post-mortem examinations, and 12½ per cent. were found to be tuberculous.

¹ Read before the Suffolk District Medical Society, Section for Clinical Medicine, Pathology and Hygiene, January 16, 1895.

The result of the work at our own quarantine stations at Brighton and Watertown, where every animal is subjected to the tuberculin test, before being allowed entry to the State, show that of the animals being brought there for sale, during the first week, 15 per cent. of them were tubercular; during the second week 12 per cent., during the third week 8 per cent., during the fourth week $4\frac{1}{2}$ per cent., and up to December 15th, in the total examination of 1,700 animals, 6 per cent. were affected with the disease. Animals so tested and found diseased, if they have not been within the borders of the Commonwealth for at least six months are destroyed without compensation.

In our examination of animals in this State, we have found some herds with every animal tuberculous, though kept in the most careful way, many of them apparently in the best of condition. Other herds, under precisely similar surroundings, were entirely free from the disease; but in these cases it could be clearly shown that the animals had been bred upon the premises, and no animals brought from without, during a period of at least nine years. Where, however, there has been an interchange of animals during this period of time, in a large majority of cases there is a variable percentage of disease. In many instances the introduction of infected animals into apparently healthy herds has resulted in the transmission of the disease to a large per cent. of their number. In many expensive herds, kept for private use to insure a pure milk-supply, we have found the disease in startling proportions, frequently as high as 80 or 90 per cent.; the autopsy showing lesions of the worst type in well-nourished animals.

The point has been raised that it is impossible to exterminate contagious disease. In this connection I would point to the fact that the incurable contagious diseases among the lower animals can be combated only by slaughter of infected animals, rendering possible the extermination of the disease which might not be possible in men. It may not be without interest in this connection to speak of the importation of a number of animals, some thirty-four years since, consigned to the "Chenerys," some of which were affected with contagious pleuro-pneumonia. The disease spread among our cattle so rapidly and disastrously, that special legislation was secured, which provided that not only those animals manifesting evidence of the disease should be destroyed, but that also all animals which had been exposed to the contagion. The results were gratifying in the extreme. The disease was thoroughly eradicated at an expense of \$60,000, since which time, for a period of about thirty years, there has not been known a case of contagious pleuro-pneumonia in Massachusetts. Some of these animals were sent to New Jersey, but the same methods were not adopted; the policy of that State was to destroy animals which showed evidence of the disease, without destroying those that had been exposed; the disease spread over New Jersey, Pennsylvania, New York, Virginia, and the District of Columbia.

In 1887 it was gaining a foothold in the West, when the United States government took into their hands the extermination of the disease, adopting the methods pursued in Massachusetts, some thirty years before; but so rapidly had it spread that five years were required and many millions of dollars before it was possible to exterminate the disease; since which time, some two years ago, there has not been known a

case of contagious pleuro-pneumonia in the United States.

The history of the treatment of this disease in Great Britain, and the immense amount of money that has been expended, only show the wisdom of the policy adopted by Massachusetts so many years ago.

Until 1892, tuberculosis was not considered of enough importance in Massachusetts to receive even passing notice. At this time, however, a bill was passed entitled, "An Act to more effectually prevent the spread of tuberculosis among cattle." Under the provision of this Act an earnest endeavor was made by the Board of Cattle Commissioners to do all in their power toward the suppression of the disease; but the legislature of 1894, realizing more fully the importance of the subject, enlarged the Commission, increased its powers, and added to the appropriation, making possible the adoption of a new policy, which, it is believed, will prove efficient in accomplishing such end.

Cattle seem especially predisposed to tuberculosis, as has been explained by authors in different ways. It may be that their normal temperature 102° F., is better suited to the growth of the bacillus, as it develops with great rapidity in fowls, whose normal temperature is 107° . Then, too, the health and vigor of cattle is greatly diminished by the conditions under which they are kept, namely, the unsanitary stables, lack of exercise, and the prolonged lactation of the dairy cows, under all the stimulation possible. Their constant breeding throughout their lives, also constitutes a tax upon the system which leaves them in no condition to resist disease to which they are exposed.

In many of our city dairies cattle are tied in the stable from October to April, often remaining for months, without moving out of their stalls, their heads confined in stanchions; and not infrequently their coats are removed by clipping, that they may be able to stand the temperature to which their stables are heated, for the highest production of milk is the only object sought, to attain which, everything else is sacrificed. The ruinous effect of this policy is shown by the great percentage of disease among our dairy cattle, as compared with those that live an out-door life.

The disease may be transmitted by inhalation of the bacillus, by ingestion of the meat or milk of tuberculous animals, and by direct inoculation through an abrasion in the skin. Numberless instances of infection by milk may be quoted, both by experiments on small animals and accidental infection of people using the milk. German, French and American investigators, working independently, found about the same time, that animals using the milk from tuberculous cows rapidly became the victims of the disease. An interesting experiment was made by taking six little pigs about three weeks old. Two were placed in a pen and fed upon cereals; the other four were placed in a separate pen and fed upon the milk of a tuberculous cow. At the end of two months the post-mortem of the cow revealed extensive pulmonary tuberculosis, but no lesions in the mammae. The pigs were also killed and examined. The grain-fed animals were poor, not having had the flesh-forming food, but they were free from the disease. The milk-fed pigs were fat and hearty, but every one was tuberculous. Hirschberger also cites a precisely similar instance which came to his notice. The owner of a herd, learning of their infection with tuberculosis, discontinued selling

the milk, but used it to feed his hogs. When they went to the slaughter they were found affected with general tuberculosis.

Inoculative experiments are so positive and so frequently quoted that I will not cite them, as you are undoubtedly familiar with many.

The result of feeding experiments upon the lower animals leads us to consider the probable transmission of the disease, especially to children and invalids, their ability to resist the disease being at a minimum. Milk is often their favorite food, and is usually taken in the uncooked state. Direct experiment on man, is, of course, impossible; but no doubt you are all familiar with cases of accidental infection, as quoted by many observers. From these I select two, not that they are of necessity the strongest upon record, but because they are well authenticated, and occurred in the immediate vicinity.

A cow died of general tuberculosis in Providence, R. I., the lungs, most of the abdominal viscera, muscular tissue and udder being tubercular. The milk had been used in the family. In August the baby was taken sick, and died in seven weeks of tubercular meningitis. Post-mortem showed tubercular deposits in the membranes covering the brain, and some in the lungs. Two years later a two-year-old child in the same family died of tubercular bronchitis; and seven years after a nine-year-old boy, "delicate" for years, died of "quick" consumption. So far as is known the family on both sides were rugged and healthy.²

In the spring of 1890, Dr. Gage, City Physician of Lowell, Mass., had as a patient an infant which died of tubercular meningitis. Its parents were healthy and the surroundings good. It had never been fed on anything but the milk of a single cow. The cow's milk was microscopically examined, and found to contain the bacilli of tuberculosis. Guinea-pigs inoculated with her milk developed the disease. A second child, fed upon the same milk, was developing similar symptoms to those discovered in the child that died. Dr. Gage could find no way to prevent the sale of the milk, unless he bought and paid for the cow out of his own pocket. So far as he knew, she was still being used for a milk-supply a year later.³

Prof. James Law, of Cornell University, calls our attention to another danger which heretofore has rather escaped attention; namely, there is being constantly produced in tuberculous animals the product called tuberculin, varying in quantity with the number and activity of the bacilli present. This is diffused throughout the animal economy, the blood, lymph, and milk all containing it. When introduced into a person or animal having tuberculosis its effect is well known; namely, it excites the bacillus to renewed activity, thus augmenting the disease, and, therefore, although the milk may be absolutely free from bacilli, much harm may be done by this product, since sterilization has upon it no effect whatever. That its effects are not everywhere recognized is no evidence that they are not produced, as Professor Law very well says, "It is the scrutiny, and not the facts, that is wanting." We have not been looking for these facts, and so have not seen them; but that such effects may be produced there seems to be little room to doubt.

This matter is certainly worthy of consideration, although it is right for me to state clearly that this view has not, as yet, been generally accepted by the medical profession at large. Tuberculin is not destroyed by sterilization, nor by a temperature of 212° F. If present in the animal when alive, it will certainly be present in its flesh and milk; and those who make use of these infectious substances as food must run a risk of injury. From the results of the post-mortem study, by which we have learned that in large cities at least one-half of the poor population are more or less affected by tuberculosis some time in their lives, it is evident that an equal number of those who make use of the flesh or milk of tuberculous animals are likely to suffer the greatest injury thereby, through the intensification of the tubercular process or the diffusion of the circumscribed disease. If then it be true that the temperature of 212° F. offers nothing in the way of protection, it is evident that a thorough individual inspection of each animal is the only means of accomplishing valuable results; and such inspection must include a careful physical examination together with the application of the tuberculin test.

In view of the prevalence of bovine tuberculosis and the consequent danger to us from such conditions of our food-supply, there is no doubt that its prevention and control are among the most important sanitary problems before us to-day. So slow and insidious is the course of this disease that it may be present for a long time, even for years, the animal apparently in the best of condition.

DIAGNOSIS.

Up to within a very short time, the only positive means of diagnosis was microscopic examination of, or inoculative experiments with, the nasal vaginal, or mammary secretions whereby the presence of the germ could be demonstrated. These methods could not be put into general application. Physical examination is very difficult and unsatisfactory in a disease which may affect so many organs and tissues. The recognition of the disease in the early stages is almost impossible, because in whatever organ it may be situated, the changes are so slight, that the functions are not seriously interfered with, and consequently no marked symptoms are developed. There are certain anatomical difficulties in the way of making a perfect physical examination of cattle that are not met with in man. In cattle fed for milk or beef, the digestive function is all important, the abdominal organs having been developed by nature and breeding until they encroach upon the thoracic cavity. The first stomach, or rumen, with a capacity of fifty-five gallons, presses forward against the diaphragm, crowding it into the thorax, materially alters the sounds elicited upon percussion over the posterior portion of the lung. This influence is so irregular, and at times so great as to render the results obtained by percussion in this region of but little value. Auscultation is also interfered with by the soft breathing of cattle, by the thick layer of interlobular connective tissue, by the confusing sounds which originate in the rumen, as well as by the thick skin and mass of muscular tissue interposed between the ear and lung. When the tubercular lesions are located in the liver, intestines, mesenteric and mediastinal glands, it is impossible to make a positive diagnosis till after death; but, fortunately, we now have an agent by the use of which the disease can be detected in its early stages. Although Dr. Koch's

² Ernst: Report to Massachusetts Society for Promotion of Agriculture, p. 4; also reprint in Hatch, Experiment Station of Massachusetts Agricultural College, and Bulletin No. 8, p. 16.

³ Ernst: Hearing before Committee on Public Health, Massachusetts Legislature of 1891, publications of Massachusetts Society for Promotion of Agriculture, p. 19.

endeavors to find a cure for the disease ended in disappointment, the result of his researches led Professor Gutman, of Dorpat, Russia, in 1891, to experiment upon the cattle. He found that inoculation with tuberculin caused in them a characteristic reaction. Since that time tuberculin has been used in many parts of the world with almost uniform satisfaction in the detection of tuberculosis in cattle.

In making the test the temperatures are taken once or twice prior to the inoculation, which is generally made in the evening. About nine hours are usually required before the reaction occurs, though it may be delayed until the eighteenth hour. The temperature is taken every two hours beginning with the ninth hour after inoculation, until about the twentieth. In a typical case the fever ranges from two to five degrees above the normal, increasing regularly to the maximum, and then showing a gradual decline as the tuberculin is eliminated from the system. In conducting the work throughout the State up to December 15th, the Commission have made over 6,000 tests upon cattle, of which 810 were destroyed as tubercular and the post-mortem confirmed the diagnosis in every instance. There have, however, been destroyed 26 animals in which no disease was discovered; 20 of these were killed at the quarantine stations at Brighton and Watertown during the early part of our experience in a practically new field. These apparent mistakes were made, in several instances, owing to the policy adopted by the Commission, namely, while these animals showed no reaction they appeared to us upon physical examination to be tuberculous. We did not dare to put the brand of the Commission upon them as a guarantee that they were free from tuberculosis, although tuberculin had said so. In every one of these cases the animals proved free from disease in spite of their appearances, and the carcasses were sold for beef.

Another condition with which we were confronted was that some of the animals just unloaded from the cars were about to calve, and were, consequently, in an irritable condition. We considered it better to seize them as they were suspicious, and if free from the disease the loss to the State would be less than if we continued them in quarantine for a re-test. Since this time we have gained such experience that our markings have been almost absolutely correct.

The government stations and live-stock commissions of this country, Canada, Great Britain and Europe, are all agreed that tuberculin is a reliable agent for the detection of tuberculosis in cattle, and from our own experience we are satisfied to base our future work upon its accuracy as a diagnostic agent.

THE FLAXSEED-MEAL POULTICE AS A STERILE DRESSING.¹

BY R. W. LOVETT, M.D.

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FOR an indefinitely long time the flaxseed-meal poultice held its place as an invaluable surgical dressing. With the advent of antiseptic surgery, however, it began to be condemned as dirty; and its use has been generally discountenanced by surgical writers, in

spite of the fact of its undoubted practical utility in many conditions. The present paper represents an attempt to determine by experiment the question, whether this form of dressing can be considered a sterile one.

As an instance of the practical usefulness of flaxseed-meal poultices the following series of cases may be mentioned. After operations for chronic or acute glandular abscess, the writer has treated cases in two ways. In the first series of cases a wet corrosive dressing, with perhaps iodoform, was at once applied, and so far as possible was kept continuously wet. In the second series of cases a flaxseed-meal poultice was used from the first, and was changed every two or three hours. The cases observed have amounted to some forty in number altogether; and in those treated by the flaxseed poultices the patients suffered less pain, the induration disappeared more quickly, and the progress was in every way more favorable than with the corrosive dressing. To a certain extent the same is true with regard to felons and similar inflammatory conditions.

The following experiments deal with the flaxseed-meal poultice as a dressing considered from a bacteriological standpoint:

(1) In the diphtheria ward some flaxseed-meal was taken from a tin box in which it was kept, and boiling water was poured upon it in the ordinary copper poultice dish. It was kept hot over the gas heater for three minutes, a little hot water being added from time to time. It was then poured out in the usual way, smoothed with a clean knife and covered with a piece of gauze not sterilized. A culture from the inner surface of the poultice, including the gauze, showed it to be absolutely sterile.

(2) In the surgical out-patient dressing-room, where fifty to one hundred wounds are dressed daily. The air in this room is foul on account of the large number of patients always there and on account of the presence of many foul leg-ulcers, etc. A poultice was made in a clean copper tin by pouring boiling water onto the meal. The meal was taken from a tin box kept in the room. The water and meal were mixed with a knife. No precautions were taken to render the poultice sterile. A culture from the meal as it was poured out was sterile.

(3) Ordinary gauze, not sterilized, was placed over the inner surface of the meal. A culture showed a few cocci resembling pus cocci and a few thin bacilli.

(4) The hands were sterilized; the poultice dish was thoroughly cleansed; the meal and water were heated for three minutes over the heater.

Culture from the meal as poured out showed a few long, thick bacilli, probably non-pathogenic.

(5) Sterilized gauze was placed over the inner surface of the meal and wet in the moisture of the poultice. A culture from this was sterile.

(6) A poultice made in the ordinary way without precautions, covered with non-sterilized gauze. A culture from inner surface showed many confluent colonies of whitish color, which microscopically were seen to consist of short, thick bacilli, probably non-pathogenic.

(7) Poultice made as in No. 6, but heated for five minutes at a temperature somewhat above 212° F. A culture showed a few small, whitish colonies seen to consist of micrococci.

(8) December 12th. Men's surgical ward. Poul-

¹ This paper will appear in the Boston City Hospital Reports, Sixth Series.