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AVIAN TUBERCULOSIS

BY

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AVIAN TUBERCULOSIS.

The disease known under the names of Avian Tuberculosis or Consumption in fowls and other birds is of widespread importance.

It is only within comparatively recent times, slightly over a decade, that Tuberculosis has been observed among fowls in Canada. The affection had probably existed for many years but its true nature and significance was not recognized until diseases of poultry commenced to attract the attention of workers in comparative pathology.

The losses from Tuberculosis in poultry have been large, but there is at present no means of arriving, even approximately, at an accurate estimate of this loss. The poultry industry is a valuable source of revenue when plants are properly organized and managed, and all farms can, with advantage, carry more fowls than are usually found. To ensure profits, however, due attention must be given to keeping the flock entirely free from disease.

Once Tuberculosis makes its appearance in a flock, the aggregate losses are large, although a great number of birds do not die at one time. The general unthriftiness of the fowls, however, renders them unsuitable for table use and the non-production of eggs makes the industry very unprofitable as well as discouraging to the poultry owner.

As Avian or Fowl Tuberculosis, viewed from a causative standpoint, is almost identical with the disease as found in human beings and cattle, it is imperative that further research work be conducted in order to establish, if possible, its exact relation as a source of infection for other animals and man. This is more pertinent since Mohler and Washburn, of the United States Bureau of Animal Industry, have reported the transmission of Avian Tuberculosis to mammals by the direct feeding of diseased organs, and also the infection of guinea-pigs by artificial inoculation with the whites of eggs from affected fowls. That there is considerable variation in the morphology of the causative organisms found in the different forms of Tuberculosis cannot be disputed. Extensive investigations have shown that even these apparently specific characteristics can be altered by artificial cultivation upon various laboratory media, and also by growth in the tissues of different animals.

The fact that Avian Tuberculosis is transmissible to mammals, and the mammalian type communicable to human beings, serves to substantiate the theory that changes may occur in the human host whereby the avian and bovine types of organisms may undergo transformation into the human type.

During investigations conducted at this laboratory attention has been chiefly directed towards the microscopic detection of tubercle bacilli in eggs, the infection of experimental animals with these eggs, and the perfecting of a method of diagnosis whereby latent and incipient cases may be identified.

The possibility of Tuberculosis being present in chicks at birth has been given considerable attention, but our experiments in this connection have thus far given only negative results. Eggs from tuberculous fowls have been artificially incubated and the chicks immediately transferred to new quarters where special precautions were taken to prevent infection from outside sources. The most careful autopsies, however, failed to reveal lesions of Tuberculosis, while cultures from splenic tissues gave negative results.

The demonstration of acid-fast* organisms in eggs was also undertaken and in nearly 20 per cent of the latter, bacilli microscopically indistinguishable from those

*Tubercle bacilli from any source possess the peculiarity of retaining the dye material used for their study in the presence of acid, hence the term acid-fast.

of Tuberculosis were found to be present. The subsequent inoculation of guinea-pigs with material from these eggs produced a generalized tuberculous infection, from which typical avian cultures were procured.

PREVALENCE.

The prevalence of Avian Tuberculosis throughout Canada is every year becoming more apparent. This is evidenced by the fact that inquiries from widely-separated sources are from time to time received at the laboratory concerning this affection. These inquiries usually come from individuals extensively engaged in poultry production, while a few are received from farmers. There appears, however, to be a striking apathy on the part of the latter in regard to the diseases of poultry, due in no small measure to the false impression that the fowls are of small economic importance as compared with other species of the live stock. In the fall of 1913, while on an official inspection trip, a locality was visited where large numbers of poultry were being lost. On making inquiries it was found that the farmers in the vicinity had been losing immense numbers of fowls for which no cause could be assigned. Autopsies on several hens revealed the affection to be Tuberculosis and, on one farm, a clinical observation showed several to be suffering from lameness which was apparently tubercular in nature.

SYMPTOMS OF THE DISEASE.

The causative organism or germ of Tuberculosis gains entrance to the system usually with the food, and, finding a favourable location, grows and extends to the various tissues. This growth of the germ induces symptoms of unthriftiness which is followed sooner or later by death. The detection of Tuberculosis from the symptoms alone is not always easy. Some fowls may be observed to be *going light* yet they are seen to be good feeders. If picked up it is found that the flesh has almost entirely disappeared from the breast bone, and this should make one suspicious that something is wrong. A yellow or greenish diarrhoea is frequently present in affected birds, and where this is present the type of the disease is most dangerous to the remainder of the flock, as the germs are to be found in immense numbers in the droppings.

One of the most frequent symptoms seen early in the course of the disease is lameness, a result of the infection involving a joint of the leg. Lameness is mentioned by persons forwarding fowls for diagnosis more frequently than any other symptom where our subsequent examinations have proven the trouble to be due to Tuberculosis. So frequently is lameness the principal symptom observed that we are at once suspicious of Tuberculosis whenever the symptom is mentioned.

COURSE OF THE DISEASE.

Fowls affected with Tuberculosis may die in a few days from the first appearance of symptoms, or they may linger for weeks, gradually becoming more emaciated as the disease progresses until they die from exhaustion. The progress is largely dependent on the strength of the invading germ and the natural resistance of the bird. Some outbreaks of the disease follow a more rapid course than others; usually, however, the course in an individual extends over weeks, and sometimes months may intervene before death takes place.

DIAGNOSIS, OR RECOGNITION OF THE DISEASE.

The diagnosis of Tuberculosis in the living fowl presents many difficulties. No symptom or group of symptoms can be considered as particularly characteristic of the disease, and although suspicions may be aroused, it is only positively identified after death.

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Following the method employed for the detection of Tuberculosis in cattle, various investigators have attempted to establish a reliable method of diagnosis by testing with tuberculin. Good results have been reported from some quarters but our own experiments, although limited, have been unsatisfactory. The testing of fowls by this method is too technical to be of practical use as a proper interpretation of the result can only be made by a reliable veterinarian familiar with all the details. Where a large number of fowls are lost after a more or less lingering illness, Tuberculosis should be suspected and the examination of a dead bird will present sufficient evidence to determine this point. Debility due to worm infestation is mistaken for Tuberculosis, but here again the examination of the internal organs will settle the matter.

POST-MORTEM FINDINGS.

The post-mortem findings in fowl Tuberculosis, when considered in relation to the symptoms and general history, are characteristic. The liver is usually the principal organ affected and there are lesions, from the size of a pin point to that of a large pea, which are white or yellow in colour. The larger lesions when cut into give a gritty sensation as the knife passes through them. These lesions are distinct from the liver tissues, and may be quite easily separated from the liver itself. In the more acute cases the liver may be greatly enlarged, even to twice its normal size. This enlargement in chronic cases is noticeable. The spleen is usually involved, the lesions having the same characteristics as mentioned for those in the liver. The enlargement of the spleen is usual, and it may be four times its normal size. The intestines may or may not be involved. When lesions are present we find nodules from the size of a small pea to that of a medium-sized nut. The minute dissection of these usually presents a free opening into the inside of the bowel, and at this point of entrance there is an ulceration. It is through this opening from the nodule on the intestine to the interior of the bowel that the bacilli gain access to and are so easily distributed by the droppings.

Other visceral organs are seldom involved. It is frequently observed that the joints, notably that of either or both hips, may be the seat of tubercular ulcerations. Such an ulceration is the cause of lameness during life.

PREVENTION AND TREATMENT.

The principal factor in the eradication of poultry diseases is the adoption of proper sanitary measures at the outset. Infectious disorders *will recur* no matter how wisely treated, unless such treatment is supplemented by the liberal use of efficient disinfectants. Disinfection is the *one basic principle* upon which rests freedom from disease and *prevention* must occupy the foremost place if headway is to be gained.

In the prevention of Tuberculosis, sanitary surroundings with plenty of sunlight and fresh air are requisites of prime importance. In our opinion these factors are best obtained by the use of the modern cotton front house, of which a number of types have been described by various authorities. Once a flock becomes affected, there is no successful medicinal method of treating this disease and it is better to destroy the entire flock and thoroughly cleanse and disinfect the quarters which they have occupied. Disinfection is recommended owing to the fact that in Tuberculosis, as has already been indicated, the bacilli or germs are found in the droppings in great numbers, and these should be destroyed. This action is further recommended as it has been shown that fowls, dead of Tuberculosis, if eaten by hogs communicate the disease to them, and it is probable that the droppings would also communicate the disease in a similar manner.

We have found that eggs from tuberculous fowls may contain the bacilli or germs in the white, and we, as well as others, have demonstrated that they are in sufficient numbers to infect small experimental animals. This suggests a possible source through which Tuberculosis may be introduced into a flock, namely, by the unsuspecting purchase of eggs from some one who has Tuberculosis among his fowls.

When destroying the birds after it has been demonstrated that Tuberculosis is present, some may be suitable for food if, on examination, the liver shows no white or yellow spots the size of a pin point to that of a pea, and there are no nodules or lumps on the intestines. When these lesions are present the flesh cannot be considered suitable for human food.

The drastic measures above recommended should be followed in all cases when Tuberculosis appears among fowls. These measures, while temporarily entailing a considerable loss, will in the end prove the most economical to the owner and the community.

THE PROPER METHOD OF DISINFECTING FOWL HOUSES.

Remove all litter from the floor and nesting places and burn as near the building as convenient to avoid contamination of the surrounding soil. If possible remove nests, roosts, and other portable fixtures and place in the sunlight. Empty all hoppers, feed bins, etc., of dry mash and other grains and discard grit or scald with boiling water before using a second time. Scald all utensils, pans, etc. If cotton fronts are used, these should be removed and either washed thoroughly or scalded with boiling water. The windows should be taken out and washed with warm water and soap, the frames being well scrubbed with a hard brush. If straw lofts are used, the straw should be removed and burnt with the litter. The inside should then be thoroughly swept down to remove cobwebs, dust accumulations, etc., or if possible flushed out with a good hose. All accumulations of hard droppings should be loosened by softening with water and then scraped clean with a hoe or other sharp instrument. Disinfection may now be commenced. Mix fifty pounds of unslaked or quick-lime in a barrel of water and add to this one gallon of a good commercial disinfectant. If a smaller amount is required it may be made by adding two and one-half pounds of quick-lime to a pail of water plus half a teacupful of disinfectant. Be sure that the lime is not slaked by exposure to the air as all its disinfecting power is thereby lost. The easiest method of applying the lime-wash is by means of a spray-pump, which can be purchased at a reasonable cost and can be used to advantage in other buildings. Before using the lime solution it is advisable to strain it through a fairly fine sieve or cheesecloth as the filter is liable to become clogged. In the absence of a spray-pump, a whitewash brush may be used, although it is difficult to fill the cracks and crevices without a stream to drive in the solution. These cracks serve as breeding places for mites, lice, etc., and should be given careful attention. Where an infectious disease, such as Tuberculosis, has been present, it is wise to spray the interior at least twice with an interval of one week between each application. Otherwise one good treatment will be sufficient. The runs, if not too large, should be covered with a thin coating of air-slaked lime and then spaded or ploughed to a good depth. If lime is not available, a thorough spading may be sufficient although less effective than the former method. The runs should be changed each year if possible or divided up, one-half being sown to rape or other green crop. This cropping destroys the breeding-places of worms, etc. If portable houses are used, they should be moved frequently as feeding fowls and chicks on the same ground year after year serves to infect them with numerous diseases. Allow the fowls open range if such is available.

Disinfect in the spring and fall if possible and by all means in the fall before introducing fresh stock into the fowl houses.



Fig. 1.

Fig. 2.

Fig. 3.

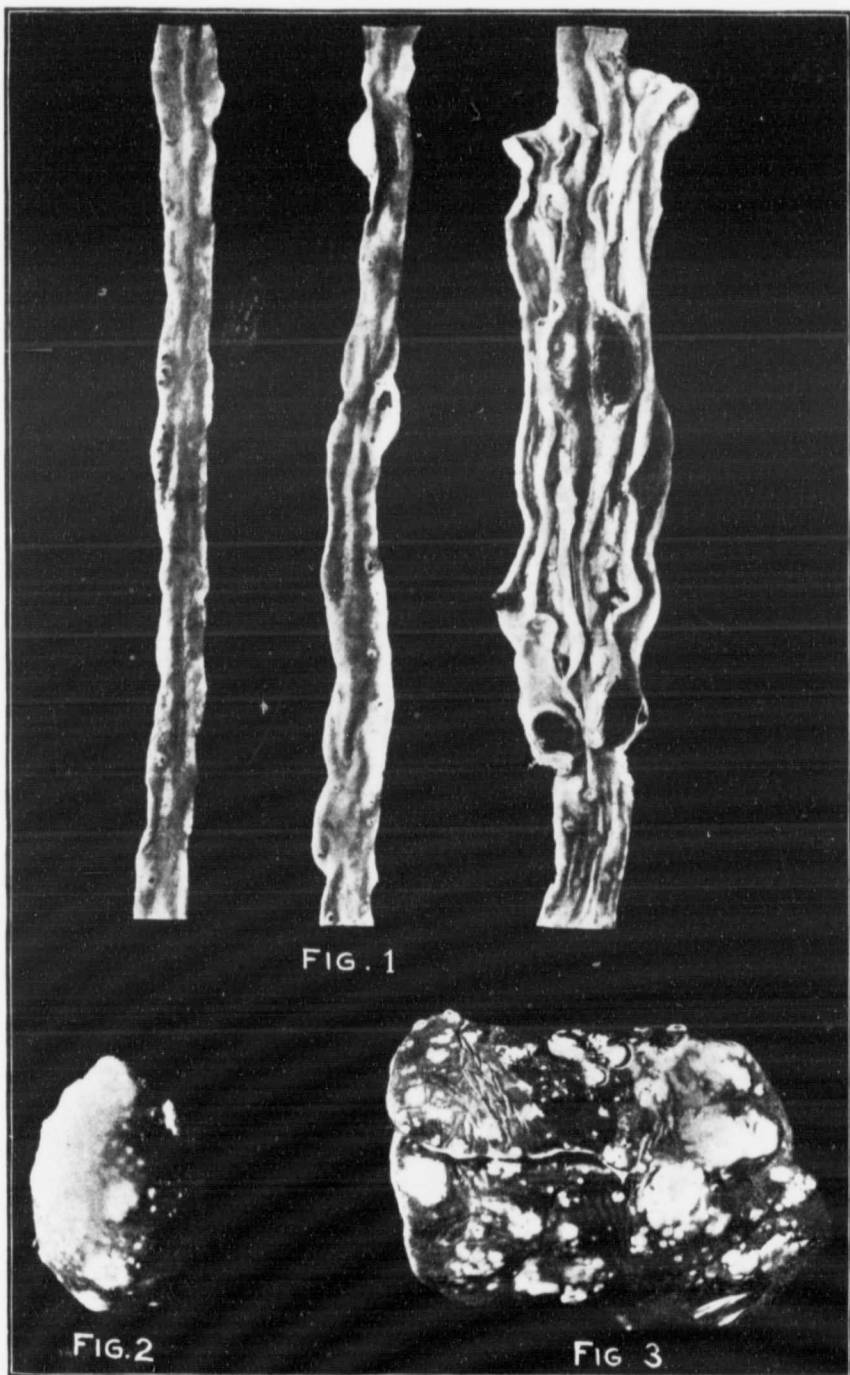
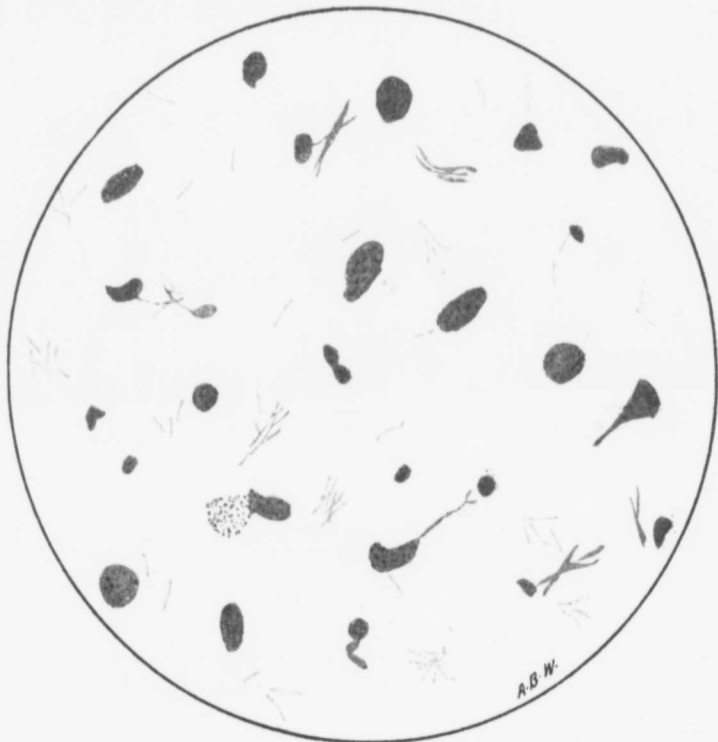


FIG. 1

FIG. 2

FIG. 3

- Fig. 1. Tubercular enteritis in a fowl. The right portion of intestine shows the caeca, also affected. One half normal size.
- Fig. 2. Tubercular spleen from a fowl. Actual size.
- Fig. 3. Tubercular liver from a fowl. Actual size.



Drawing of a microscopic field showing Avian tubercle bacilli. Preparation made from the liver of a bird affected with tuberculosis. The red rods are tubercle bacilli. Magnified 1500 diameters.