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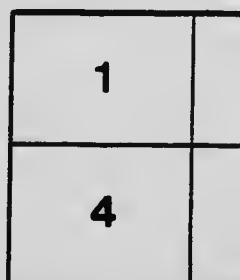
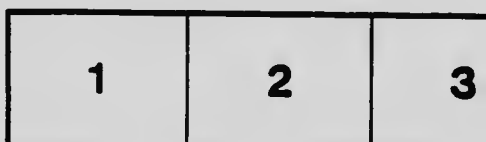
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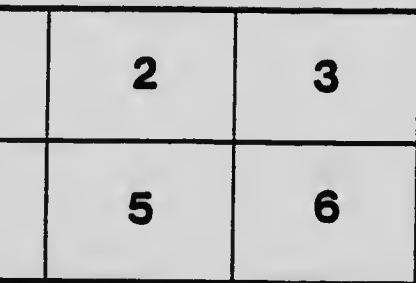
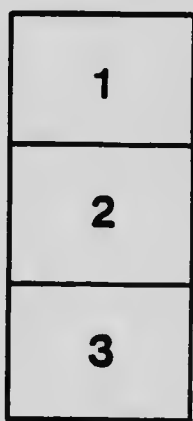
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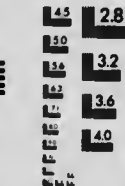
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Ontario Department of Agriculture

ONTARIO AGRICULTURAL COLLEGE

BULLETIN 255

Tuberculosis of Poultry in Ontario

By

DAN. H. JONES, B.S.A.

Professor of Bacteriology



TORONTO, ONTARIO, OCTOBER, 1917



Fig. 1.



Fig. 2.

Fig. 1. *Bacterium tuberculosis* (avian variety) in smear from intestinal tubercle of hen. Stained with Ziehl-Neelsen's method, x 1,000 di. (Original).

Fig. 2. Adult hen in advanced stages of tuberculosis showing extreme emaciation due to the disease. The owner of the bird who sent it for examination stated that it had continued to eat heartily but had not been laying for some time. The crop was full of grain. Other members of the flock were affected with the disease in all stages, and many died during the previous eighteen months. (Original).

Ontario Department of Agriculture

ONTARIO AGRICULTURAL COLLEGE

Tuberculosis of Poultry in Ontario

DAN. H. JONES.

INTRODUCTION.

We are constantly receiving sick and dead fowl for examination as to the nature and cause of their sickness and death.

A large percentage of the birds received are badly affected with avian tuberculosis.

During the last five years we have received tubercular fowl from the following places in Ontario:

COUNTY.	POST OFFICE.
Bruce	Lucknow.
Brant	Paris.
Durham	Courtice, Bowmanville, Ida.
Dufferin	Grand Valley.
Essex	Harrow, Leamington.
Grey	Blantyre, Clarksburg.
Halton	Freeman, Burlington.
Kent	Ridgetown, Cedar Springs.
Lambton	Camlachie.
Lincoln	St. Catharines.
Lanark	Perth.
Norfolk	Courtland, Vittoria.
Oxford	Ingersoll.
Ontario	Pickering.
Perth	Stratford, Listowel.
Peterboro	Peterboro.
Peel	Inglewood, Caledon.
Simcoe	Thornton, Elmvale, Orillia.
Victoria and Haliburton	Oakwood.
Welland	Ridgeway.
Wentworth	Ancaster.
Wellington	Eden Mills, Guelph, Ballinafad, Drew.
York	Toronto, West Toronto, Mount Albert.

Previous to receiving tubercular fowl from the above list of places we had received similar specimens from Algonquin Park and the counties of Elgin, Hastings, Huron, Middlesex, and Waterloo.

From the above list of places it will be seen that tuberculosis of poultry is widespread in the Province of Ontario. It is most probable that the disease is present in flocks in many other places in the province from which birds have not been sent to us for examination.

As the disease is liable to cause heavy losses by cutting down egg production and by causing heavy mortality in the flock where it is present, this bulletin is prepared to give information regarding its cause, nature, method of spreading and eradication.

CAUSE OF THE DISEASE.

Tuberculosis of fowls is produced by *Bacterium tuberculosis* (avian variety) gaining entrance to the system of the birds and multiplying in various of the body tissues where it produces the tubercles characteristic of the disease.

Bacterium tuberculosis is a very small microscopic organism, appearing under the high power microscope as a thin rod, straight or slightly bent, sometimes granular. It varies in length, usually from 2 to 5 microns, i.e., from 1/12,000 to 1/5,000 of an inch and is about 0.3 microns or 1/17,500 of an inch in thickness. It is present usually in large numbers in tubercular tissue taken from infected birds. Its presence in such material can readily be demonstrated by means of proper bacteriological technique. (See Fig. 1).

There are three recognized varieties of *Bacterium tuberculosis*: (1) *Human*, which causes tuberculosis in man; (2) *Bovine*, which causes tuberculosis in cattle, swine and sometimes man; (3) *A'van*, which causes tuberculosis of birds, but which has not been proven to be a common cause of tuberculosis in man or the domestic animals.

NATURE OF THE DISEASE.

FORMATION OF TUBERCLES.

When *Bacterium tuberculosis* gains entrance to the body tissues it feeds on the body juices surrounding it and multiplies sometimes rapidly, sometimes slowly. While so developing and multiplying it produces a toxin or poison which acts on the tissue cells surrounding it, thus causing a local disturbance, finally resulting in degeneration and death of the tissue cells affected. A mass of such cells constitutes a tubercle. From such a tubercle the bacteria pass in the blood or lymph stream to other parts of the body and produce more tubercles.

A tubercle is thus a mass of degenerated or dead tissue cells caused by the development of *Bacterium tuberculosis* within the tissue, and as the tubercles enlarge and multiply following the multiplication of the bacterium, the organ affected is slowly destroyed.

The tubercles thus formed are usually pale yellow in color, sometimes cheesy, sometimes fibrinous, sometimes gritty and sometimes pus-like in texture. In fowl they are usually cheesy or gritty and vary in size from smaller than a pin-head to as large as an egg, the most common being about the size of a pea.

OCCURRENCE OF THE TUBERCLES.

In fowl affected with the disease the tubercles are most commonly found in the liver, spleen, intestines, and mesentery. Other parts of the body, however, are frequently affected, such as the lungs, bones, ovaries, kidneys, etc.

SYMPTOMS OF THE DISEASE.

(A) ANTEMORTEM SYMPTOMS.

In live fowl it is difficult to detect the disease in its early stages. As the disease advances, however, the following symptoms are liable to develop:

1. **EMACIATION.** Notwithstanding the fact that the affected bird's appetite keeps good, and it continues to eat as much or more than the healthy fowl, it will frequently get thin until eventually it becomes little more than skin and bone. The breast and legs lose all their flesh, and on picking up the bird it will be found to be very light in weight. (See Fig. 2).



Fig. 3.



Fig. 4.

Fig. 3. Liver, spleen and intestines very badly affected with tuberculosis. This specimen was removed from hen shown in Fig. 2. The irregular-shaped, various-sized, white-looking swellings are the tubercles. Note particularly the large tubercle at the end of the intestines. This was at the junction of the colon with the cloaca and had almost closed the passage. The droppings from this bird were heavily infested with *Bacterium tuberculosis*. (Original).

Fig. 4. Liver, spleen and intestines of hen badly affected with tuberculosis, showing many small, as well as large tubercles.

This symptom, however, does not always occur; some birds even in advanced stages of the disease will remain fat, such birds will be very mopy and inactive.

2. **PALENESS.** The unfeathered parts of the head, around the eyes and mouth, the comb and wattles, become pale and dull and though the eyes usually remain bright and clear, they lack life and fire and are often closed. The feathers become dry and lack lustre of health.

3. **LISTLESSNESS.** Affected birds gradually lose their vigor and become listless and inactive, being inclined to mope around and lie down when not feeding.

4. **LAMENESS.** When tubercles develop in the bones and joints lameness occurs.

5. **EGG LAYING** is frequently reduced to a minimum.

(B). POSTMORTEM SYMPTOMS.

Though it may be difficult to determine with certainty whether or not the disease is present in the live bird, it is comparatively easy to determine the presence of the disease in birds suffering from it which have died, or have been killed for examination.

The presence of tubercles in the liver, spleen, intestines or other parts, as previously described, is indicative of the disease. But as there are other diseases which may cause conditions in the liver, lungs and intestines closely simulating tuberculosis, it is usually necessary, if we are to be certain whether tuberculosis is present or not, to make a bacteriological examination of the affected parts. This examination can be made only by the bacteriologist who has the necessary apparatus. We are prepared at the Bacteriological Laboratory of the Ontario Agricultural College to examine free of charge and report upon any suspected cases which are sent in for examination.

TUBERCLES IN THE LIVER.

The liver is the most commonly affected organ in cases of fowl tuberculosis. The tubercles are readily seen as pale yellow spots or lumps, varying in size, scattered over the surface, and sometimes projecting from the surface, and when the liver is cut open they will be found present throughout the whole mass of the liver tissue.

The tubercular liver is usually softer and more easily torn than the healthy liver, and the tubercles, as little lumps, are easily broken away from the surrounding tissue. (See Figs 3 and 4).

Sometimes an enlargement of the liver accompanies the disease. We have found tubercular livers that were five or six times larger than normal. Such livers were one dense mass of tubercles. In such a case, practically the whole of the liver tissue was dead, and the enlargement was due to an attempt of the liver to get the better of the disease. (See Fig. 5).

TUBERCLES IN THE SPLEEN.

The spleen is the little purplish red organ situated just under the liver. When the liver is tubercular the spleen is usually also affected. As in the liver the tubercles can be easily seen as white or pale yellow lumps varying in size and usually sticking out from the surface, thus making the spleen irregular in shape and frequently enlarged. (See Figs. 3 and 4).

TUBERCLES IN THE INTESTINES.

The intestines are the next most commonly affected organ in cases of fowl tuberculosis. Here the tubercles are found within or on the intestinal walls as hard lumps ranging in size from a pea to a chestnut. Their presence here is liable to cause considerable constriction leading to partial stoppage of the bowels. The droppings from a bird so affected are heavily infested with the tubercle bacteria, and readily spread the disease among the flock. (See Figs. 3 and 4).

TUBERCLES IN THE LUNGS.

While tubercular affection of the lungs is common in human tuberculosis, it is not so frequently present in avian tuberculosis. However, the lungs of birds are sometimes affected with tuberculosis, and, as in the case of the liver and spleen, the tubercles are found in the lung tissue as little hard, pale yellow lumps which

interfere with the action of the lungs, and gradually destroy the lung tissue. (See Fig. 6).

Similar looking lumps are produced in the lungs of little chicks, often resulting fatally, in the disease known as Aspergillosis, which is caused by the fungus *Aspergillus fumigatus*. The spores of this fungus are occasionally present on grain and other chicken food. When these microscopic spores get into the chick's lungs they germinate, and the fungus develops, producing tubercle-like lumps, which cannot be distinguished from genuine tubercles except by microscopic examination.

TUBERCLES IN THE BONES.

Tubercles are liable to be present in any of the bones of the body of infected birds. They are most commonly found in the leg bones, particularly at the joints. They will appear as pale yellow irregular swellings of the bone. Their presence at the joints causes inflammation, soreness, softening and decay with accompanying difficulty of movement. (See Fig. 6).

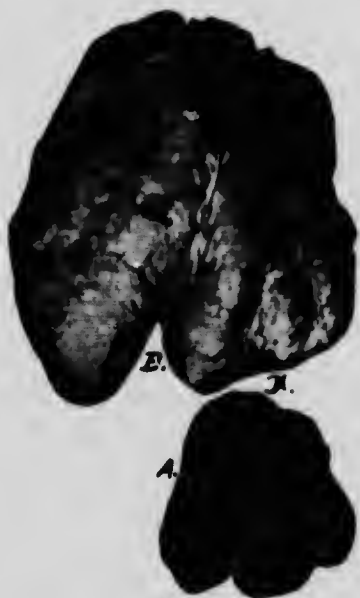


Fig. 5.



Fig. 6.

- Fig. 5. Livers from two hens affected with tuberculosis.
 A. Liver in early stages of the disease, a few small tubercles being present. This liver was normal size, being 2 oz. in weight.
 B. Liver in advanced stages of the disease. This liver was full of tubercles and much enlarged, being 9 oz. in weight. (Original).

Fig. 6. Tubercular lungs and bones from a hen. (Original).

TUBERCLES IN THE OVARIES.

Occasionally tubercles are found in the ovaries. In such cases there is danger of the eggs being infected with the tubercle bacteria. Chicks hatched from such eggs are liable to have the disease develop at an early date.

DISSEMINATION OF THE DISEASE.

Tuberculosis usually enters a flock through the introduction of a bird suffering from the disease. A bird, as previously described, may be quite seriously affected without showing any marked external symptoms. Such a bird will readily spread the disease through the flock by its contaminated droppings.

CONTROL AND ERADICATION OF THE DISEASE.

Care should be taken in buying new stock that birds are obtained only from flocks known to be free of the disease.

When once the disease gets established in a flock it is difficult to eradicate except by the most drastic measures. The quickest and most effective method is to kill off all birds that have run with those proven to have the disease and to disinfect the entire premises as thoroughly as possible.

New stock should be obtained from healthy sources, but should not be placed on the runs which had been used by the diseased flock, for a year or more. The houses, providing they have been thoroughly disinfected, may of course be used.

The first thing to do in putting the poultry premises in sanitary condition is to scrape the roosts, walls, ceilings, floors and nest boxes of the houses thoroughly clean with a hoe or other convenient implement. Accumulated manure may be mixed with lime, spread on the land and plowed under. Loose litter, pieces of boards or other valueless material should be completely burned. When this has been done the entire inside of the houses may be washed down with some good disinfectant such as carbolic acid, one part in twenty of water, zenoleum, lysol, chloronaphtholeum, or other disinfectants, in the strengths indicated by the manufacturers. Any of these may be put on with a spray pump. In place of these, quicklime in the form of whitewash may be used, prepared as follows: Slake the quicklime by adding water in the proportion of one and one-half pints of water to each quart of lime, or by weight, sixty parts of water to one hundred parts of lime. The resulting dry powder is hydrate of lime. For use mix one quart of this with four quarts of water. This must be freshly prepared in small lots and used immediately. It is best applied by means of a spray pump, although it may be put on with a brush or broom. If a spray pump is used, the slaked lime should be put through a fine sieve or strainer in order to prevent clogging of the nozzle. It is important that every crack and crevice and every particle of surface be covered with the disinfectant. After disinfection, clean boards may be placed beneath the roosts to catch the droppings, thus facilitating the work of future cleaning. Slaked lime placed on these boards will absorb the moisture from the droppings besides adding to their fertilizing value. Disinfection of the houses should be carried out at intervals as long as any diseased birds remain in the flock.

To disinfect the runs is a difficult matter, because it is impossible to have the disinfectant come into contact with each minute particle of soil. The best that can be done is to completely cover the ground with freshly-slaked lime and plow under. Sow some quick growing crop for green manure, lime and plow under again. By this method the soil can eventually be well disinfected. The fact must be kept in mind, however, that any tubercular fowls may be continually re-infecting the soil by voiding the tubercle bacilli with their droppings; consequently, it would be impossible to keep the soil free from infection so long as diseased fowls were kept on that ground.



