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Agricultural Experiment Station

OF THE

Louisiana State University and
A. and M. College.

BATON ROUGE

Anthrax bacilli from blood smear.

ANTHRAX OR CHARBON

Points of Popular Interest

BY

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ANTHRAX OR CHARBON.

POINTS OF POPULAR INTEREST.

By Harry Morris.

This bulletin is designed to answer in brief form, free from technical expressions, all the important questions that come up in the discussion of the control and eradication of charbon or anthrax.

What is charbon or anthrax? Charbon is an acute infectious disease of man and animals.

History. One of the oldest diseases known to medical science.

Distribution. Almost world wide, much more common in Europe and Asia than in America. In the United States charbon is found in several states, but most commonly in the Lower Mississippi Valley and along the Gulf of Mexico.

What is the cause of charbon? A very small germ or organism known as Bacterium anthracis.

What is a spore? The spore of a germ or bacterium may be likened in a certain way to the seed of a higher plant. Keep the seed in a cool dry place and it may be kept for years, but supply heat and moisture and germination soon follows. Spores will live for years in soil or water without losing their power of germination. The spore is much more difficult to destroy than the rod in which it forms, just as is the seed of a higher plant.

How does the land become inoculated with charbon germs? From the carcasses of infected animals and also from the excrement of infected living animals.

How long will the germs live in the ground? For a number of years under favorable conditions.

What are the forms of charbon? External and internal.

What are the symptoms of the external form? This form is shown by a localized watery swelling at the point of inoculation. This swelling is hot and painful at first but afterwards becomes cold and apparently painless. It will soon spread under the skin along the course of the absorbent vessels. This form is
usually seen in horses and mules and may occur in man as malignant pustule or carbuncular anthrax.

What are the symptoms of the internal form? Unless the animal is under very close observation no visible symptoms are noticed, death is very sudden and without apparent cause. The animal is seized very suddenly with great depression and prostration; rapid rise in temperature and fall of same just before death, heart action is rapid; mucous membranous of eyes, nose and mouth of a dark red color; solid and liquid (urine) excrements may have a blood-stained appearance. As this form of charbon is found most commonly in cattle, mistakes are often made in identifying the disease; the hides are removed and the carcasses are not destroyed as they should be. Under no conditions should the hide of an animal be removed during an outbreak of charbon without first making a microscopic blood test for the charbon germs. Skinning a carcass not only spreads infection but endangers the life of the person removing the hide. Many people hold the false opinion that every case of charbon must show an external swelling. Sudden deaths of animals during the summer months should be considered suspicious of charbon unless the cause of death is absolutely known.

How is the first animal infected? The first case of the season is usually one of internal charbon caused by eating or drinking food or water infected with the germs.

How do outbreaks of charbon occur? Failure to observe the first cases and neglect to properly (sanitarily) dispose of their carcasses are important factors in the history of outbreaks. The following examples have been selected as typical illustrations of the above point.

Case No. 1. Dairy herd; cow died suddenly, supposedly from the effects of a fall, broken neck; skin was removed and carcass buried carelessly: Subsequent developments indicated this to have been charbon. Result: Outbreak of charbon with a loss of thirty head.

Case No. 2. Stock farm; bull found dead; cause of death diagnosed as "bloat." Skin was removed and the carcass dragged to the swamp and left exposed. Result: Loss of twenty-five head.

Case No. 3. Hides were removed from several animals found dead in the fields and cured with salt. Later they were sold,
delivered to the local station and thrown upon the freight platform, where they remained for some time. Teams licked the hides for the salt and at the same time infected themselves with the germs of charbon. Result: Outbreak of charbon.

Case No. 4. A swelling was noticed on the breast of a horse. The animal was taken to a secluded spot on the farm and the swelling covered with burlap sacks soaked in creolin. Death occurred during the night and the carcass was cremated at daybreak or before the flies had an opportunity to feed. A blood smear was examined by the writer and diagnosed as charbon. Result: The only case.

Case No. 5. Stock farm; five hundred head of cattle. Cow found dead in the pasture. Before burning a pound of gunpowder was sprinkled around and over the carcass and touched off with a fuse. Practically all of the flies were destroyed by the explosion. A blood smear taken from the animal was examined by the writer and diagnosed as charbon. Result: No more deaths on the farm.

The above cases illustrate some of the many that are reported indicating that lack of sanitary measures in disposing of sporadic (scattered) cases may bring about a general outbreak.

_Do flies transmit charbon?_ Yes. In this laboratory we have been able to transmit charbon from infected guinea pigs to healthy ones through the bite of the horn fly.

_How can the fly be controlled?_ In the external form of charbon cover the swelling with burlap sacks and keep them saturated with a good disinfectant or fish oil as a repellant to flies.

While preparations are being made for burning, the carcass should be covered with a good disinfectant or better with a piece of canvass that can be destroyed with the carcass.

The powder experiment noted in Case No. 5 above might prove successful. The most important points in the control of the fly is the rapid and complete destruction of all carcasses.

_How should a carcass be destroyed?_ Burn immediately on the spot if practicable by placing the carcass in a gridiron made of green poles or iron rods, and the fire built directly under it so that burning can be effected by using the least amount of fuel, either wood or crude oil. If necessary to remove the car-
cass for disposal plug all the natural openings of the body with cotton or rags saturated with some disinfectant to prevent the discharge of infected material.

If burning is impossible bury the carcass in a hole six feet deep and spread lime thickly both above and below it. Bury the blood-saturated soil in the hole. After the grave is filled heat all the shovels by passing through a flame to kill the germs of charbon that might be on them.

A good burial is better than a poor burning.

*How can the ground around a grave be sterilized?* By burning the area over with crude oil or straw or by covering with lime and a good disinfectant, such as crude carbolic acid or some of the coal-tar dips on the market.

*How are the germs of charbon diagnosed?* By a microscopic examination of the blood; inoculations of the blood into guinea pigs and recovering the germs from their blood, and by growing the germs outside the animal body.

*Can the germs be found in the blood of the living animals?* Not usually except for a very short time before death.

*How should a specimen be prepared for examination?* Prepare two pieces of clean window glass about one inch wide and two inches long. Place one drop of blood toward the end of one piece of glass and with the small edge of another piece spread the drop out into a thin smear, then dry thoroughly in the sun or air. Prepare a second specimen in the same manner, place the two smeared surfaces together, pack securely and mail to the Louisiana State Live Stock Sanitary Board, Baton Rouge. The address of the party sending should be carefully indicated on the package and an explanatory letter sent to the Board.

The blood can best be secured by puncturing the vein at the base of the ear with some sharp steel instrument, which should be boiled for ten minutes if it is to be used again for any purpose.

*Why send two pieces of glass?* One blood smear is stained and examined with the microscope. If unable to make a diagnosis in this manner, the other is used for making cultures and inoculation tests.

*Why should the blood be dried in the sun?* To prevent the growth of other germs in the blood.
Why is it not advisable to send blood in a bottle?

1. It is contrary to the United States postal laws to send dangerous material of such character.
2. In this warm climate the blood is decomposed before it reaches the laboratory and is worthless for examination.
3. Infection is spread while collecting the blood.
4. The flies are afforded a better opportunity to fill themselves with the germs.
5. The lives of the collector, carrier and bacteriologist are endangered.

Is the milk from a cow sick with charbon dangerous for human use?

Prominent investigators in different parts of the world have not found such milk to contain the germs of charbon and our own investigation seems to have verified these conclusions. Although we do not advise the use of milk from an animal showing signs of charbon sickness during an outbreak.

Can charbon be cured? In the case of a small swelling resulting from direct inoculation of the virus (germs) it is possible, by the injection of a sufficiently strong germicidal solution (such as 5% solution of pure carbolic acid) directly through the skin into the swelling underneath, to destroy the local infection at that point. To prevent spreading of the swelling this should be done as early as possible. There are other swellings which may occur later that are not from direct inoculation but are secondary enlargements. In such a case the above suggested treatment would not be so effective. Besides, many animals recover after showing those secondary swellings.

During the latter part of an outbreak the disease is not so acute and many animals recover in spite of, rather than, the result of treatment. In such cases the treatment is often erroneously given credit for the cure. All over the world the control and eradication by strict sanitary measures is considered of much greater importance than the treatment of individual cases.

Should swellings be opened? No. The shedding of blood by the opening of swellings or through any other means is one of the surest ways of spreading charbon infection, as the blood or discharge contains the germs.

If any should fall on the ground the latter should be thoroughly disinfected.
Is vaccination a sure preventive measure? While a positive answer can not be given to this question, as there is no preventive measure of any kind that is absolutely sure, it may be stated that the vaccination against charbon is the best preventive measure known, provided the material is perfectly reliable; that it is used at the proper time and that the necessary antiseptic precautions are adopted in its administration.

During the past four years the writer has vaccinated, annually, the live stock on the Experiment Station farms, numbering about one hundred head, and, although infection of charbon has existed on the pasture, during the above period we have only lost one animal from the disease. However, all the necessary precautions were adopted.

Of what does vaccine consist? Live germs of charbon that have been attenuated or weakened. Dose No. 1 of the double dose vaccine is weaker than Dose No. 2.

Will vaccination produce charbon? To a limited number of highly susceptible animals it may; the percentage of loss through vaccination, however, is very small and should not deter the free use of the vaccine. If any animals should die the carcasses should be promptly disposed of.

When should stock be vaccinated? Begin vaccination not later than the middle of February or the first of March.

What stock should be vaccinated? Cattle, horses and mules, although smaller animals should be kept from sources of infection.

How should the vaccine be injected? Boil the syringe for ten minutes; after washing the point of inoculation with a 5 per cent solution of carbolic acid, inject one cubic centimeter or 15 drops (directions usually accompany the package) of the vaccine under the skin.

In cattle the injections are best made just behind the shoulder; we usually make the first injection on one side, the second upon the opposite side. In order to prevent collar pressure upon the point of inoculation horses and mules should be inoculated under the skin on the side of the neck.

Vaccine No. 2 should be given ten days after No. 1 and in the same manner.
DON'TS ON VACCINATION.

Don't give vaccine No. 2 unless No. 1 has been given.
Don't open the package until you are ready to vaccinate.
Don't use vaccine if the cork has been removed for any length of time.
Don't wait until an outbreak of charbon before vaccinating.
Don't use a dirty syringe.
After vaccinating burn all empty bottles and boil the syringe again.

How soon after vaccination is protection afforded? It is generally claimed that about thirty days are required from the first injection to give protection.

How long will this protection last? From six months to one year is the usual claim.

Can milk be used during the period of vaccination? We have never known of any ill effects.

Can horses and mules be used during vaccination? Yes.

Is it advisable to vaccinate twice a year? In the infected areas of the state some vaccinate in the early spring and late fall with satisfactory results.

Should vaccination be practiced during an outbreak of charbon? Yes, if the animals are protected from infection during the time (one month) necessary to bring about immunity. They should be prevented from grazing on infected pastures or drinking at suspicious watering places, and should be protected from horse flies and other insect pests and every other necessary precaution taken.

There is a certain risk from vaccination during an outbreak unless the above precautions are adopted.

What measures may be necessary to clean a farm of infection? In addition to the protection of the animals and general sanitary measures, it is considered necessary in order to eradicate the infection from the surface of the ground to drain and cultivate infected lands.

Care should also be taken in the feeding of crops grown on lands known to be infected with charbon, as outbreaks have been recorded as occurring from the use of such feeding materials.

Do carrion feeders spread charbon infection? Without doubt the carrion feeders play an important part in the continuance and
spread of charbon in Louisiana. The buzzard or carrion crow is the most important because it is capable of carrying infection for many miles after feeding upon an anthrax carcass, and may start fresh centers of infection in pastures where it has never previously existed. The germs are carried on the feet, beak, and in the vomitus of the birds, but not in the excrement.

The germs of charbon may be found in the excrement of the dog, hog, cat and opossum for many days after eating flesh from an anthrax carcass. A detailed report on this subject is given in Louisiana Bulletin 136.

Neglect to properly dispose of anthrax carcasses is, without doubt, the factor most responsible for the continuance and spread of anthrax in Louisiana.
Plate I, Fig. 1. Picture of blood from a healthy animal, showing the blood cells. Enlarged 700 times.

Fig. 2. Picture of blood from an anthrax animal, showing blood cells and chains of anthrax germs. Enlarged 700 times.