Charbon (Anthrax): further investigation and suggestions, with summary and conclusions

William Haddock Dalrymple
SECOND SERIES, NO. 60.

BULLETIN
— OF THE —
AGRICULTURAL EXPERIMENT STATION
OF THE —
Louisiana State University and A. & M. College,
WM. C. STUBBS, Ph. D., Director and State Chemist.

CHARBON (Anthrax)
FURTHER INVESTIGATION AND SUGGESTIONS,
WITH
SUMMARY AND CONCLUSIONS.

ISSUED BY THE STATE BOARD OF AGRICULTURE AND IMMIGRATION,
LEON JASTREMSKI, COMMISSIONER.

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The Bulletins and Reports will be sent free of charge to all farmers, by applying to Commissioner of Agriculture, Baton Rouge, La., or to the Director of the Station, Audubon Park, New Orleans, La.
Dear Sir—I herewith transmit a report upon Charbon, the results of an investigation made during the outbreak in this State last year, with some wholesome suggestions. I recommend that this be published as Bulletin No. 60.

Respectfully submitted,

WM. C. STUBBS,
Director.
PREFACE.

Last June Charbon (Anthrax) prevailed to an alarming extent throughout lower Louisiana, in the alluvial and prairie sections. Several years ago this station published a bulletin on Charbon descriptive of the disease, with a recital of experiences in the alluvial districts of North Louisiana. To this bulletin, the reader is referred for a discussion of the disease, its nature, its symptoms and the preventive inoculation with Pasteur's anthrax virus. Since that time, every opportunity has been diligently utilized for the further study of this disease. Accordingly, at the outbreak in the early summer of last year, Dr. W. H. Dalrymple, Veterinarian; and Prof. W. R. Dodson, Bacteriologist; were sent to the field with instructions to study the disease upon each plantation where it occurred; to trace, if possible, its origin and propagation; to collect data upon the results of vaccination; to note the number of cases, with deaths and recoveries, and especially to instruct and educate the farmers and planters, along the lines of sanitation, by burning or properly burying the carcasses; use of disinfectants and care of stock during the outbreak; to prevent spread of the contagion.

They went from St. James parish down the river to the lower limits of the sugar plantations on the lower coast. Subsequently one or both of them visited East and Southwest Louisiana.

The results of these investigations are embodied in the following pages. There is also given a synopsis of the British law relative to the suppression and eradication of this disease and suggestions as to the enactment of a similar law in this State. The occasional outbreaks of charbon in this State for the past hundred years or more would indicate that heroic measures are needed to eradicate it.

It is believed that a law requiring the destruction of all animals which die with charbon, the quarantining of those afflicted with the disease, the proper disinfection of grounds and stables, will go largely towards a suppression of the outbreaks now occurring almost yearly somewhere in Louisiana.

If, to the proper execution of such a law, a custom prevailed for everybody within the infected district to use preventive inoculation early in the season every year, it would, in our opinion, check the spread and greatly reduce the number of outbreaks.

W.M. C. STUBBS,
Director.
<table>
<thead>
<tr>
<th>NAME</th>
<th>WHERE 1ST CASE OCCURRED</th>
<th>DISPOSITION OF CATTLE THAT YEAR</th>
<th>METHOD OF DISINFECTION OF SICK CATTLE, STABLES, ETC.</th>
<th>OBSERVATION AND CHARACTER OF FARM</th>
<th>OBSERVATION AS TO DATES OF OUTBREAK ON PLANTATION, ETC.</th>
<th>REMARKS</th>
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</thead>
<tbody>
<tr>
<td>Waggoner property. (St. James parish.)</td>
<td>1, 5</td>
<td>No.</td>
<td>Animal ground on fence.</td>
<td>Carrots not dis-infected; stables manured.</td>
<td>Rake broom into cattle, hosed bay first time.</td>
<td>Present outbreak occurred April 6, 1899. No previous cases on the plantation since June 1871.</td>
</tr>
<tr>
<td>Mount Airy. (St. James parish.)</td>
<td>5</td>
<td>1</td>
<td>Back pasture, near woods.</td>
<td>Carrots not dis-infected; stables burned.</td>
<td>Oats and bran to cattle in pasture.</td>
<td>June 17 to June 18, 1899. No previous outbreak.</td>
</tr>
<tr>
<td>Beauregard property. (St. John parish.)</td>
<td>1, 14</td>
<td>Yes.</td>
<td>Cut off on back woods pasture.</td>
<td>Carrots burned, stables, etc. (?)</td>
<td>“Pestilence,” changed to oats and bran,</td>
<td>Heard of no previous cases, except on place below, to the South.</td>
</tr>
<tr>
<td>Mr. Perkins, above Carrolton. (Jefferson parish.)</td>
<td>4</td>
<td>1</td>
<td>Back pasture, near woods.</td>
<td>Carrots burned, stables, etc. (?)</td>
<td>Oats, green grass hay, and a few ears.</td>
<td>No previous cases. Neighborhood 8 miles away lost a few hogs and cattle. A few cases are seen in this vicinity, which were laid exposed.</td>
</tr>
<tr>
<td>E. E. Lepper, above Carrolton. (Jefferson parish.)</td>
<td>4</td>
<td>1</td>
<td>Burned.</td>
<td>Carrots burned; stables, etc. (?)</td>
<td>Ears and heads.</td>
<td>No previous outbreak.</td>
</tr>
<tr>
<td>Southern University, Exp. Station. (Jefferson parish.)</td>
<td>3</td>
<td>Yes.</td>
<td>Burned.</td>
<td>Carrots burned; stables, etc. (?)</td>
<td>Rice bran and colon meal.</td>
<td>June 19, 1899.</td>
</tr>
<tr>
<td>Mr. Long, Konner. (St. John parish.)</td>
<td>4</td>
<td>1</td>
<td>Grazing on back pasture.</td>
<td>Carrots burned, stables, etc. (?)</td>
<td>Grass, grain (?)</td>
<td>Grass and grain (?)</td>
</tr>
<tr>
<td>Mr. W. S. King. (St. John parish.)</td>
<td>4</td>
<td>Yes.</td>
<td>Grazing on pasture.</td>
<td>Carrots burned, stables, etc. (?)</td>
<td>Very bad.</td>
<td>Very bad.</td>
</tr>
<tr>
<td>Wilson plantation. (St. John parish.)</td>
<td>2, 3</td>
<td>Yes.</td>
<td>Grazing on back pasture.</td>
<td>Carrots burned; stables, etc. (?)</td>
<td>Very bad.</td>
<td>Very bad.</td>
</tr>
<tr>
<td>Live Oak plantation. (St. John parish.)</td>
<td>8</td>
<td>Yes.</td>
<td>Burned.</td>
<td>Carrots burned; stables, etc. (?)</td>
<td>Very bad.</td>
<td>Very bad.</td>
</tr>
<tr>
<td>Avent de plantation. (St. John parish.)</td>
<td>8</td>
<td>Yes.</td>
<td>Burned.</td>
<td>Carrots burned; stables, etc. (?)</td>
<td>Very bad.</td>
<td>Very bad.</td>
</tr>
<tr>
<td>Fairfield plantation. (St. John parish.)</td>
<td>5</td>
<td>1</td>
<td>Slaughtered.</td>
<td>Carrots burned; stables, etc. (?)</td>
<td>Very bad.</td>
<td>Very bad.</td>
</tr>
</tbody>
</table>

Remainder of the year: Not exposed. No outbreak occurred in 1899. No previous outbreak occurred in 1871 or 1877. No previous outbreak recorded in this vicinity. No previous outbreak occurred in any previous outbreaks.
CHARBON (A nthrax).

Further Investigation and Suggestions.

W. H. DALRYMPLE.

Subsequent to the severe outbreak of charbon, in a number of the northern parishes of the State, during the summer of 1896, the State Experiment Station issued a bulletin (No. 44, Second Series) in which was embodied the salient facts regarding the disease, such as its history, cause, symptoms (in the various domestic animals), modes of spread, and the treatment, including preventive, curative and sanitary; as well as a record of personal experiences with the malady in the majority of those parishes in which it prevailed in epizootic form. We have good reason to believe that the information, contained in the bulletin cited, proved of value to those of our stockowners who availed themselves of it, and put it into practical use during recurrences of charbon which have taken place since. But we have also reason to believe that a great many did not so avail themselves. This may be accounted for in some instances, no doubt, by the bulletin having failed to reach them; in other cases, perhaps, because the contents were not, at the time, thought to be of sufficient import to be memorized or carefully laid aside for future reference; and still in other instances, because there are still to be found those who have "no use" for any information that savors of the scientific, but prefer rather to adhere to old and erroneous theories, as to the nature of the disease, and to empirical and dangerous methods of so-called treatment.

In consequence of the lack of knowledge on the part of those who have not had the opportunity—through want of accurate literature on the subject—to familiarize themselves with the most important features of this ancient and fatal malady; and indifference in others, who, as yet, do not appear to fully appreciate the gravity of this disease as affecting both
individual and State interests, charbon has been permitted to spread during the past two summers, until a much more serious condition of affairs confronts us than has for years, if ever, existed. This may seem a pessimistic assertion; but when we take into consideration the immense area of this State over which anthrax prevailed in epizootic form during the heated terms of 1898 and 1899, and the vastly increased number of infected foci, on account of the almost total lack of sanitary care in the disposal of charbonous carcasses from which the disease may again arise and spread, when favorable conditions exist, the apparent truth of the statement may be appreciated. In view of these facts, then, and of the importance of disseminating, throughout the State, as much practical information as possible, relative to the disease, with the object of putting forth every available effort to control and, if possible, eradicate it, we believe the time opportune to again bring the subject prominently before the minds of our citizens for their serious consideration and decisive action.

Already the amount of money that is represented by the livestock of the State is very large, but when we come to consider the probability of Louisiana becoming a great beef-raising State, which is indicated by the importations of high-priced animals that have already, and are likely to continue to come within our borders, it is impossible to even approximate computation of the future value of our livestock interests.

With such a scourge as charbon in our midst, this new industry, which is being entered into with such enthusiasm, and which is so valuable a branch of diversified agriculture and likely to improve the condition of our farmers, is in jeopardy, and is, to say the least of it, discouraging to those who are pioneers in these high-priced importations for the benefit of themselves and of the State as a whole.

This disease has assumed such proportions, in the number and extent of infected areas, that the time has arrived when some stringent measures will have to be adopted, and enforced by law, to place a check upon its ravages. Up to the present little has been done in this direction, except by individuals to safeguard their own interests, or by certain parishes for a
similar purpose. But it is futile ever to expect to control or eradicate charbon without the combined effort on the part of the whole State, backed up by law which must be rigidly carried out. The reason for this is that there are so many different agencies by which the disease may be disseminated; which fact alone would indicate that, at least, the sanitary control should be, by State legislative enactment, placed in the hands of responsible and intelligent individuals who have made themselves familiar with the nature of the disease, the agencies by which the infection can be carried, and the most effective measures to adopt to prevent its spread.

In emphasizing the importance of placing the control of charbon in the hands of the State government, to obtain the most beneficent results, we are not suggesting anything new, so far as this disease is concerned, in some other sections of the United States, and in other countries, especially Europe, where it is prevalent. In Great Britain, for instance (according to a British government “Anthrax Order” which we have before us), when a case of charbon appears on a place, the owner is compelled by law to report it to the local authority through its nearest officer; the matter is taken entirely out of his hands, and the premises and the case, or cases, placed in charge of that local authority until all possible chance of the spread of the disease has been removed. The object here being, not only to protect the interests of the owner, but to destroy, as far as possible, all contagion, and prevent the spread of the disease to other places and localities.

The following are a few articles from the Anthrax Order referred to, for the control of charbon in Great Britain, which may serve the purpose of drawing the attention of our legislators, and other citizens, to the dread in which the disease is held in that country:

NOTIFICATION.

2. (1) Every person having or having had in his possession or under his charge, an animal affected with or suspected of anthrax (charbon) shall, with all practicable speed, give notice of the fact of the animal being so affected or suspected, to a constable of the police force for the police area wherein the animal so affected or suspected is or was.

(2) The constable shall forthwith give information of the receipt by
him of the notice to an inspector of the local authority, who shall forthwith report the same to the local authority.

(3) The inspector of the local authority shall forthwith give information of the receipt by him of the notice to the medical officer of health of the sanitary district in which the affected or suspected animal is or was.

**DUTY OF INSPECTOR TO ACT IMMEDIATELY.**

3. An inspector of a local authority on receiving, in any manner whatsoever, information of the supposed existence of anthrax, or having reasonable ground to suspect the existence of anthrax, shall proceed with all practicable speed to the place where such disease, according to the information received by him, exists, or is suspected to exist, and shall there and elsewhere put in force and discharge the powers and duties conferred and imposed on him as inspector, by and under the act of Parliament of 1894 and this order.

**PUBLIC WARNING AS TO EXISTENCE OF CHARBON.**

4. (1) The local authority may, if they think fit, give public warning by placards, advertisement, or otherwise, of the existence of charbon in any shed, stable, building, field or other place, with or without any particular description thereof, as they think fit, and may continue to do so during the existence of the disease, and, in case of a shed, stable, building, or other like place, until the same has been cleansed and disinfected in accordance with this order.

(2) It shall not be lawful for any person (without authority or excuse) to remove or deface any such placard.

**MILK OF DISEASED OR SUSPECTED COW NOT TO BE REMOVED.**

5. Where charbon exists or has existed in any shed, stable, building or other place, it shall not be lawful to remove from such shed, stable, building or other place, the milk of any cow which is affected with or suspected of anthrax.

**REMOVAL OF MANURE AND OTHER THINGS.**

6. It shall not be lawful for any person to send or carry, or cause to be sent or carried, on a railway, canal, river, or inland navigation, or in a coasting vessel, or on a highway or thoroughfare, any dung, fodder, or litter that has been in any place in contact with or used about a diseased or suspected animal, except with a license of the local authority for the district in which such place is situate, on a certificate of an inspector of the local authority certifying that the thing moved has been, so far as practicable, disinfected.

**DISPOSAL OF CARCASSES.**

7. (1) The carcass of an animal which at the time of its death was affected with or suspected of anthrax, shall be disposed of by the local authority as follows:

(i) Either the local authority shall cause the carcass to be buried as soon as possible, *in its skin*, in some convenient or suitable place removed
from any dwelling house, and at such a distance from any well or water course as will preclude any risk of the contamination of the water therein, and at a depth of not less than six feet below the surface of the earth, having a layer of lime not less than one foot deep beneath, and a similar layer of lime above, the carcass;

(ii) Or the local authority may, if authorized by license of the Board, cause the carcass to be destroyed, under the inspection of the local authority, in the mode following: The carcass shall be disinfected and shall be taken in charge of an officer of the local authority to a horse slaughterer's or knacker's yard (these are places found in large cities where dead animals can be properly disposed of), approved for the purpose by the Board, or other place so approved, and shall be there destroyed by exposure to a high temperature, or by chemical agents.

(2) With the view to the execution of the foregoing provisions of this Article, the local authority may make such regulations as they think fit for prohibiting or regulating the removal of carcasses, or for securing the burial or destruction of the same.

(3) Before the carcass is removed for burial or destruction under this Article, it shall be covered with quick-lime. In no case shall the skin of the carcass be cut, nor shall anything be done to cause the effusion of blood.

(4) A local authority may cause or allow a carcass to be taken into the district of another local authority to be buried or destroyed, with the previous consent of that local authority, but not otherwise.

DIGGING UP.

8. It shall not be lawful for any person, except with the license of the Board or permission in writing of an inspector of the Board, to dig up or cause to be dug up, the carcass of any animal that has been buried.

DISINFECTION IN CASE OF ANTHRAX.

9. (1) The local authority shall, at their own expense, cause to be cleansed and disinfected in the mode provided by this Article.

(a) All those parts of any shed, stable, building, or other place in which a diseased or suspected animal has been kept or has died or been slaughtered;

(b) Every utensil, pen, hurdle, or other thing used for or about any diseased or suspected animal;

(c) Every van, cart, or other vehicle used for carrying any diseased or suspected animal on land otherwise than on a railway.

(2) The mode of the cleansing and disinfestation of such shed, stable, building, or other place, or the part thereof, shall be as follows:

(i) All those parts aforesaid of the shed, stable, building, or other place shall be swept out, and all litter, dung, or other thing that has been in contact with, or used about any diseased or suspected animal, shall be effectually removed therefrom; then

(ii) The floor and all other parts of the shed, stable, building, or other place, with which the diseased or suspected animal, or its dropings, or any discharge from the mouth or nostrils of the animal has come
in contact, shall be, so far as practicable, thoroughly washed or scrubbed with water; then

(iii) The same parts of the shed, stable, building, or other place shall be washed over with lime-wash made of freshly burned lime, and water, and containing in each gallon of lime-wash four ounces of chloride of lime, or half a pint of commercial (crude) carbolic acid, the lime-wash being prepared immediately before use;

(iv) Except that where any place as aforesaid is not capable of being so cleansed and disinfected, it shall be sufficient if such place be cleansed and disinfected so far as practicable.

(2) The mode of the cleansing and disinfection of such utensil, pen, hurdle, or other thing, and such van, cart, or other vehicle aforesaid, shall be as follows:

(i) Each utensil, pen, hurdle, or other thing, van, cart, or other vehicle, shall be thoroughly scraped, and all litter, dung, sawdust, or other thing, shall be effectually removed therefrom; then

(ii) It shall be thoroughly washed or scrubbed, or scoured with water; then

(iii) It shall be washed over with lime-wash made of freshly burnt lime, and water, and containing in each gallon of lime-wash four ounces of chloride of lime, or half a pint of commercial carbolic acid, the lime-wash being prepared immediately before use.

(4) All litter, dung, or other thing that has been removed from any such shed, stable, building, place, van, cart, or other vehicle as aforesaid, shall be forthwith burnt, or otherwise destroyed or disinfected to the satisfaction of an inspector of the local authority.

(5) The local authority may make such regulations as they think fit for the purpose of carrying out the provisions of this Article.

REGULATIONS OF LOCAL AUTHORITY AS TO MOVEMENT OF ANIMALS, FODDER, ETC.

11. A local authority may make such regulations as they think fit for the following purposes or any of them:

(a) For prohibiting or regulating the movement of any diseased or suspected animal into or out of any shed, stable, building, field, or other place, or any part thereof;

(b) For prohibiting or regulating the movement of any animal into or out of any shed, stable, field, building or other place, or any part thereof, in which there is or has been any diseased or suspected animal; and

(c) For regulating the removal out of any shed, stable, building, field, or other place, of any fodder, litter, or other thing, that has been in contact with, or used for or about any diseased or suspected animal;

But nothing in any such regulation shall authorize movement in contravention of any provision of any order of the Board for the time being in force; and a regulation under paragraph (b) of this Article shall operate so long only as an animal which in the judgment of the local au-
thority is diseased or suspected remains in the shed, stable, building, field, or other place, to which the regulation refers, and, in case of a shed, stable, building, or other like place, until the same has been cleansed and disinfected in accordance with this order.

By scrutinizing closely the above quoted Articles of this Anthrax Order, it will be seen that the main object aimed at, is to locate the diseased or suspected animal, or animals, at the very earliest possible moment; circumscribe the locally-infected area; destroy all contagion by the early and proper disposal of the carcass—should the animal or animals succumb to the disease—and the destruction and thorough disinfection of everything with which the animal has been in contact, either directly or indirectly; and the prevention of the spread of the disease. This, in short, is an epitome of the sanitary treatment of charbon; but on account of the many channels through which the contagion can be disseminated, and the importance of observing the most minute sanitary detail, it is absolutely impossible to obtain successful results unless the necessary measures are enforced by the strong arm of the law. Of course it is superfluous to remark, that our more intelligent citizens would be only too willing to adopt any measure that might be suggested with the hope of lessening the devastation brought about by this disease; but there are others, unfortunately, who through ignorance, indifference, or prejudice, may fail to appreciate the importance of such measures, and in consequence, their neglect is a menace to their neighbors, and, in fact, to the entire community in which they reside; and it is for this class that stringent legal measures are absolutely essential, if we wish to deal with charbon in an intelligent and thorough manner. We do not suggest that the law, as affecting anthrax in Great Britain, would be applicable, in its entirety, to the requirements of our State, but the articles quoted might serve to form the basis of a similar enactment, modified to suit our own surroundings and necessities.

A very pertinent question might here be asked: If it is considered necessary in other countries of the civilized world, to adopt, and rigidly enforce by law, such stringent sanitary measures for the control and eradication of charbon; is it
any wonder that the disease has spread with such alarming rapidity in our State, covering, during some seasons, vast areas, and destroying hundreds of our live stock of all kinds, when we consider for one moment, the manner in which the gem-laden charbonous carcasses, and their surroundings, have been left exposed, to become new centres from which the disease could again start?

Toward the latter part of June, 1899, Prof. W. R. Dodson, bacteriologist of the State Experiment Station, and the writer, visited a number of plantations on both sides of the Mississippi river, beginning in St. James parish and proceeding down as far as Plaquemines parish (see table). The writer also made a trip to the parish of Livingston; and, while with the Farmers' Institute corps in Southwest Louisiana, took advantage of the opportunity of obtaining information regarding charbon in that section. The purpose of this tour was to learn, as far as practicable, the history of the various outbreaks existing; as well as those in previous years; the methods of disposing of the charbonous carcasses in '99, likewise those adopted in previous outbreaks; the treatment that was being practiced, especially preventive inoculation, and with what success; the unusual prevalence or otherwise, of the various gad-flies, or horse-flies (Tabanidae), and any information that could be gained that would give any clue to the present being connected with previous epizootics; or the spread of the disease, with, possible, insanitary methods in vogue during its existence in 1899, or in previous years.

The table inserted in the fore part of this bulletin will show the main facts gathered relative to some of the points we have just mentioned; but, as it only refers to the conditions which existed on the places cited, up to the date of our visit, the data does not afford any idea as to the extent of the disease throughout the State; nor, in fact, on the places themselves, as the malady had not then entirely expended itself.

The following report was kindly furnished by Charles A. Farwell, Esq., of the firm of Milliken & Farwell, of New Orleans, La., owners of the plantations mentioned:
Report of Charbon on Fairfield plantation, July 16, '99:

Mules were inoculated with Pasteur's lymph about the 26th of March.

On report of the first case of charbon in the parish, the mules were taken off the grass and not allowed to have anything green to eat. They were fed on Western oats and hay.

Three weeks after taking them off the pasture the first case of charbon appeared June 19th; a very acute case, and died on the morning of the 20th. Three days after, June 23rd, another mule was taken, and lived ten days. On June 29th, two more mules were taken; one died June 30th, and the other mule is still living July 16th. On July 6th, another mule was taken, and died the following day. The last case was July 13th; mule died at 12 o'clock the same day; this mule worked all day July 12th, and had no sign of charbon when put up in the stable that night.

This makes a total of five mules died of charbon on Fairfield plantation out of 61 mules on the place.

Report of Charbon on Bellechasse plantation, July 18, '99:

Date of first inoculation, May 20, 1899.
Date of second inoculation, May 30, 1899.
First case charbon, June 5, 1899; mule died June 6, 1899.
Second case charbon, June 27, 1899; mule died June 29, 1899.
Third case charbon, June 28, 1899; mule about well.
Total deaths from charbon, 2; number of mules on place, 60.

Report of Charbon on Waterford plantation, July 19, '99:

Date of first inoculation, June 4, 1899.
Date of second inoculation, June 13, 1899.
First case charbon, June 12, '99; mule recovered.
Second case charbon, June 12, '99; mule recovered.
Third case charbon, June 15, '99; mule recovered.
Fourth case charbon, June 23, '99; mule recovered.
Fifth case charbon, June 27, '99; mule died July 2, '99.
Sixth case charbon, July 4, '99; mule recovered.
Total deaths from charbon, 1; number mules on the place, 101.

Report of Charbon on Stanton plantation, July 18, '99:

Date of first inoculation, April 22, '99.
Date of second inoculation, May 9, '99.
First case charbon, May 15, '99; mule recovered.
Second case charbon, May 18, '99; mule recovered.
Fourth case charbon, June 11, '99; mule died June 17, '99.
Fifth case charbon, June 12, '99; mule died June 14, '99.
Sixth case charbon, June 13, '99; mule died July 3, '99.
Seventh case charbon, June 14, '99; mule died June 16, '99.
Eighth case charbon, June 16, '99; mule died June 16, '99.
Three cases charbon June 17, '99; mules recovered.
Two cases charbon June 18, '99; mules recovered.
Three cases charbon June 19, '99; mules recovered.
Two cases charbon June 27, '99; mules recovered.
One case charbon June 30, '99; mule recovered.
One case charbon July 1, '99; mule recovered.
One case charbon July 8, '99; mule recovered.
Total deaths from charbon, 6; total number cases, 21; number
mules on the place, 87.

Report of Charbon on Scarsdale plantation, July 28, '99:

Date of first inoculation, April 20, '99.
Date of second inoculation, May 2, '99.
First case charbon, July 1, '99; mule recovered.
Second case charbon, July 6, '99; mule recovered.
Third case charbon, July 12, '99; mule recovered.
Total deaths from charbon, 0; total number cases, 3; number
mules on the place, 59.

We are not at all sure that any of the above cases were char-
bon, although symptoms of the disease appeared. The
symptoms bore the same relation to charbon that varioloid
does to small-pox.

<table>
<thead>
<tr>
<th>Plantation</th>
<th>Cases</th>
<th>Deaths</th>
<th>No. Mules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairfield plantation</td>
<td>6</td>
<td>5</td>
<td>61</td>
</tr>
<tr>
<td>Belechase plantation</td>
<td>3</td>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>Waterford plantation</td>
<td>6</td>
<td>1</td>
<td>101</td>
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<tr>
<td>Stan ton plantation</td>
<td>21</td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td>Scarsdale plantation</td>
<td>3</td>
<td>0</td>
<td>59</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>39</strong></td>
<td><strong>14</strong></td>
<td><strong>368</strong></td>
</tr>
</tbody>
</table>

Average number mules taken sick .................................. 10.6
Average number mules died ........................................ 3.8
Average deaths mules sick ....................................... 35 0

As it would be somewhat difficult to tabulate the remain-
der of the information procured, it has been omitted from the
table, but the endeavor will be made to reproduce it as intel-
ligibly as possible.

After returning from the lower coast, the writer visited
Clio, on the Amite river, in the parish of Livingston. Many
wards in this parish had suffered very severely, and I had information that the point from which the disease had spread was at this place.

Clio was reached on July 3, 1899. The first death heard of in that locality was a work-bull (that died suddenly) owned by Mr. Sam'l S. Pennington, of Clio, which occurred about the 1st of June. Ten days later, this gentleman lost three work-oxen (manifesting external swellings), and later, a mule. He had a mare, a cow and an ox to recover. In 1894 he lost an ox, and in '95 another, the cause of death, in each case, being doubtful. The carcass of the mule was burnt, but the others were hauled out and left exposed. Horse flies were very bad. The feed used consisted of bought cracked-corn and cotton-seed meal (to the oxen). I was informed, however, by Mr. Joseph Ryan, Sr.—residing a short distance from Clio—that Mr. Pennington had been feeding rice-bran previous to the death of his bull, as he had purchased a sack of it from Mr. Pennington, his cattle taking sick shortly afterwards.

From four to six days after the death of Mr. Pennington’s bull, a cow died, about two miles from Clio, belonging to Mr. B. W. Tucker. This gentleman lost five head; all dying suddenly.

Mr. Joseph Ryan, Sr., stated that he had five cases, all cows, four of which recovered. Vaccination was adopted, and the external swellings were treated by hypodermic injection of a 5 per cent. solution of pure carbolic acid. It may be here stated, that Mr. Ryan was not aware of the necessity of preventing exposure of the animals until ten or twelve days after the second inoculation with the lymph. He had been feeding rice bran and “elevator feed.” He had never observed the grey horse-flies so bad. He is now of the opinion that there had been sporadic cases in previous years, having lost a steer in August, '97, with symptoms of charbon, the carcass having been burnt. Mr. Ryan stated, also, that the estimated loss from charbon in the Tenth ward, alone, this summer, up to that date, was over 200 head, chiefly of work-cattle.

Mr. Joseph L. Ryan, of Clio, lost four or five head of oxen, the first cases dying suddenly. Two of the carcasses
were left exposed, the others were burnt. He was feeding “elevator feed” and cracked corn.

Mr. R. L. Kimball, Clio, had six cases, all cattle. He lost three oxen, one bull, and one cow. The majority of them died suddenly. The bull and cow died on pasture. Flies were very bad. One whole carcass was burnt, and the bones of the others, but the carcasses had been previously left exposed. The oxen were fed “Missouri feed.”

Further evidence goes to show that the majority of the animals first affected died; that the disease gradually became less virulent; that the disappearance of the disease was about simultaneous with the disappearance of the flies; that the flies were extremely numerous just previous to the rains following a spell of drought; and, that during the first part of the epizootic, it was the custom to drag the carcasses out and leave them exposed on the surface of the ground. It was observed, also, that hogs died that had been feeding on the flesh of the dead animals.

Mr. C. D. Moore, Clio, stated that he had lived on the Amite river for the past seventeen years, and had not known of a case of true charbon. That the disease broke out in work-cattle fed on “cow-feed,” and attacked other animals which were fed the same foodstuff. He was of the opinion that the disease may have been introduced through the medium of infected feed. He was further of the opinion, that if the proper precautions had been taken on the first appearance of the disease, a great deal of the loss might have been prevented. He stated that vaccination had been successful after it was introduced, which was late, and was afterwards practiced generally. I was informed by him that charbon existed in Wards 3, 5, 6, 9 and 10 of the parish.

Mr. R. O. Pennington, Clio, mentioned that the following varieties of animals had died of the disease: Horses, mules, cattle, sheep, hogs, dogs and chickens, and that deer had been reported dying. The man, Little, who succumbed to charbon at the Charity Hospital in New Orleans, contracted the disease while skinning a cow at Magnolia; and that another, named Smiley, got inoculated in a similar manner, but was fortunate enough to recover.
After returning from Livingston parish, the writer joined the Farmers' Institute corps that was engaged in institute work in Southwest Louisiana, and while in that section, took advantage of the most reliable information obtainable relative to charbon.

While in Jennings, Calcasieu parish, I interviewed Mr. D. Derouen, who remembered the disease in New Iberia in 1848 on the prairies and along the marshes. He had been living in Calcasieu parish since 1855, and stated that charbon had been known on the coast, talked of for generations, and had been looked for during any favorable season. The carcasses had generally been permitted to remain on the surface of the ground. Charbon had not been so prevalent in the neighborhood of Jennings in '99, vaccination being now general in that section.

Judge P. J. Mouton, Lake Arthur, Vermilion parish, who was born in St. Landry parish in 1834, gave the following information: He stated that he had known charbon to exist all of his life. He had lived in the parish of Vermilion for the past twenty-six years, and had known of the existence of the disease in his section all that time. He said that cattle die on the sea marshes after the water goes down and leaves the grasses and land bare. He stated that the disease generally commenced on the marshes in Cameron parish after long drought. Judge Mouton's opinion, which is very much in accord with that formed as the result of modern scientific investigation, is: that charbon is due to a microbe, and that when animals get it by grazing on infected pastures, they die before anything can be done. That the external form is produced by flies that had been previously feeding on the blood of the charbonous carcasses, afterwards inoculating the healthy stock, and that the neglect to destroy or bury the carcasses, has been the chief cause of the continuance and spread of the disease.

With regard to the disposal of charbonous carcasses, the judge stated that, since he could recollect, it had been the custom to allow them to remain on the surface of the ground.
In glancing over the table and the other information obtained, the first thing that would attract the attention of the sanitarian, as being the most potent factor in keeping up the infection of charbon, in the different localities mentioned, and favoring its spread, would be the evidence of the apparent disregard of all sanitary rules with reference to the disposal of the anthrax carcasses. This may be more fully appreciated when it is stated that the blood of an animal recently dead of charbon is teeming with microscopic organisms, known as "anthrax bacilli," and which if allowed to escape, with the blood and other discharges, from the body, and exposed to the air, form spores and become the means of infecting other animals. In fact, knowing the danger of charbonous blood, it has been recommended by some authorities, that the nostrils and all the other natural openings of the body of the carcass should be plugged with some material which has been saturated with a strong solution of carbolic acid, or other powerful germicide, to prevent oozing of the blood therefrom. If, on the other hand, the carcass is permitted to remain intact, that is, the skin left whole, the natural openings plugged, as just described, and either burned or deeply buried with lime immediately after death, the chances of further infection from it would be reduced to a minimum.

The most dangerous element in the propagation of charbon is, in reality, the dead animal: for the reason that its blood and tissues are simply loaded with germs, and it becomes a distributing point from which the contagion can be scattered widely, through the medium of the blood, by numerous agencies, such as running water, carnivorous and omnivorous animals, carrion birds, the vegetation through infection with charbon spores, the feet of man, etc. If the charbonous cadaver, is such a pathological laboratory, so to speak, from which the disease can be sent out broadcast by so many carriers, there can be little wonder that epizootics occur, when we consider the number of plantation "bone-yards" containing the remains of anthrax carcasses that have been dragged out and left to perpetuate this plague.
FLIES.

At all the places visited it was observed that horse-flies, of various kinds, were or had been, exceedingly numerous. The majority of occupants remarked that they were more numerous, others that they were no worse than in previous years. We do not believe, however, that the difference which might exist in the numbers of these flies, taking one year with another, would have any very appreciable effect on the prevalence or spread of charbon. Horse-flies are always more or less numerous, and they are naturally blood-suckers. But, to play their part in the spread of charbon, they must first of all have access to some germ-laden charbonous blood. Given, therefore, the blood from one animal that has recently died of anthrax to suck and contaminate their mouth-parts with, they can carry the contagion and inoculate healthy stock over quite a wide area. Without a source, however, from which to procure the charbonous blood, the flies would be entirely innocuous, so far as this disease is concerned. In other words, they are only carriers or transmitters.

It is well recognized by authorities that flies are conveyors of this and some other germ diseases; and we have had personal observation of an increase in the number of cases simultaneous with increase in the number of these flies; and conversely, a diminution in the number of cases with a decrease in the quantity of flies.

There are two powerful factors which, in our opinion, could they be thoroughly controlled, would exert a most beneficent influence upon the existence and spread of charbon. These are the dead animal and the fly. It is possible by legislation to properly dispose of the first; it might be practicable to greatly diminish the numbers of the second. Allowed to exist together, they are bound to keep up their destructive work. Separate them, and the “spell is broken,” so to speak. And, the simplest way to break the connection is to burn the carcass, or dispose of it in some other effective sanitary way. But, the fly question, so long as there remain the sources from which the contagion can be obtained, is a very serious one, and calls for careful investigation with a view to the destruction, or, at
least, the reduction of these insects. The most important experiment so far made with this end in view, has been by the Russian entomologist, Prof. I. Porchinski, in Russia. He states that "water and arboreal plants are the chief conditions of the existence and multiplication of the Tabanidae (the family to which the gad- or horse-flies belong); where these conditions are absent no Tabanidae are observed." We quote the following from an article from the pen of this Russian scientist, which appeared in the report of the proceedings of the eleventh annual meeting of the Association of Economic Entomologists, published by the United States Department of Agriculture, as it bears very forcibly upon the subject at issue:

"Our extremely limited knowledge of the life and properties of the Tabanidae offered very little promise of discovering a convenient means for their destruction, when in the summer of 1898, while riding in a locality very rich in Tabanidae, I decided to take up the question. By observation I soon discovered certain habits of these insects which render their destruction a very simple matter. * * * * The Tabanidae about which I speak (it may be mentioned that about 150 species of this family of flies occur in North America) seem to experience a strong desire for water, which leads them to frequent places where it can be had. * * * * Careful observations have shown that such favorite places of the Tabanidae are distinguished by great humidity, and usually have one or more pools when such on higher places have already dried up. Such humid spots in the clearings amid the woods, and in the neighborhood of wide open roads in the woods are veritable nests of the Tabanidae. Hither they come from over a considerable area of the woods and thence they again fly away in all directions. If we watch such a pool we soon notice that both males and females of the Tabanidae come to it constantly, lower themselves quickly to the surface of the pool, and, taking some water with their proboscies, fly away again. The contact of the Tabanidae with the water does not present any danger for the insect, as only a part of the lower surface of its body touches the water, so that the Tabanus is not even wetted by the water, owing to the thick down on the lower surface of the
thorax and to the hair which covers its legs. The taking of water by the Tabanidae continues during the entire warm part of the day; but not infrequently I observed that, on some days especially, large multitudes of them came to the pool after 3 or 4 o'clock in the afternoon, flying to the water, not in swarms, but singly, from all directions. This habit of the Tabanidae appeared to me, in many respects, very important, especially in the matter of destroying these insects. It appeared to me that if the surface of the water were covered with a liquid which would wet the lower surface of the insect's body at the moment of its contact with the water, the insect would stick to the surface of the water, and thus perish. With this end in view I applied kerosene, a liquid which, on getting on the body of the Tabanus, spreads, like oil on paper, until it covers the whole body, including spiracles (breathing spores), and thus causes the destruction of the insect from suffocation, even in the case when it succeeds in tearing itself away from the surface of the pool. Kerosene fully justified all the hopes which I placed in it. By the third day of my experiments the "pool of death," as I called it, was covered with large floating islands of the corpses of the Tabanidae. These islands soon reached the shore, and, on the lowering of the water level by the heat, covered thickly the borders of the pool. * * * The application of this means of exterminating the Tabanidae may entirely free a locality from them, especially if the pools are prepared as soon as the insects appear, and are maintained until their disappearance. The habit of the Tabanidae of taking water in general, and particularly from stagnant pools, may have great importance in determining the part which they play in the matter of transmitting disease-producing principles directly into the blood of animals."

Dr. L. O. Howard, entomologist of the United States Department of Agriculture, in prefacing Prof. Porchinski's article, states that "The injury which these insects do by annoying livestock and reducing their condition, as well as by occasionally transmitting a case of anthrax or malignant pustule to human beings, is sufficiently great to make the matter of remedies of some slight importance." If Dr. Howard lived
in Louisiana during summer and witnessed the frequent cases of anthrax these flies transmit to animals, he would no doubt consider "the matter of remedies" of the utmost importance. It may be also mentioned that when Dr. Howard was experimenting in the summer of 1892 in the use of kerosene against the larvae of mosquitoes in the Catskill Mountains, he discovered, that among the insects captured by the kerosene on the surface of the small pool, upon which he was experimenting, were twenty-seven specimens of one of the commonest gad-flies of that region; which would go to confirm Porchinski's results.

We consider this a very important discovery, and which, if it could be carried out in those sections of the State which seem to be the most frequented by these flies, would be of immense value in lessening their numbers, and prove an important factor in checking the transmission of charbon, through this agency. The matter is well worthy of serious consideration and trial, where it is within the bounds of practicability.

FOOD MATERIALS.

It would be impossible to state positively that any of the cases of charbon were directly due to food materials contaminated with anthrax spores, for the reason that the opportunity did not present itself for bacteriological investigation. But, it is a recognized fact that foodstuffs raised on charbon-infected lands, or otherwise contaminated with germs, are capable of transmitting the disease. In countries where the *Tabanidae* (horse-flies) are not sufficiently numerous to be considered a factor of any importance, it is stated by an authority that "anthrax is almost invariably transmitted to the healthy animal through the medium of food or water containing the spores of the disease." There is scarcely any doubt in the minds of those who have suffered loss from charbon, and have had experience of the disease from year to year, that many animals contract the malady while grazing usually on "back pastures," in somewhat close proximity to woods or swamps, where it had been the custom to drag the charbon victims. Or, on headlands over which germ-laden discharges may have oozed from the cadaver on its way to the "bone-
yard.” But the possibility of conveying the disease through the medium of the concentrated foodstuffs, such as the cereal grains and their by-products, does not appear to have been so fully appreciated. Yet this is looked upon as one of the commonest modes of its transmission; and when conveyed in this way we generally find the cases to die suddenly (intestinal charbon).

In the Livingston outbreak, we find that the first case known, or heard of, in the section visited, was a work-bull that had been fed “elevator feed” and rice-bran (this being a sudden death), and that other animals fed the same material, in fact, purchased from the owner of the first fatal case, also contracted the disease. The connection in this case between the feed and the outbreak seemed so close that it even aroused suspicion in the people themselves, although they were not cognizant of the fact that charbon spores could be carried in this way. Some five years ago the writer was requested to investigate into the cause of the sudden death of a number of plantation mules. Microscopic examination of the blood revealed charbon organisms in abundance. Some feedstuff that had recently been purchased was suspected of being contaminated, and the further use of it suggested stopped. No more deaths occurred, but on again resuming this food, about two weeks afterwards—from the presumption that it might not be the cause—a second lot of animals died. After totally abandoning its further use, no more fatalities took place. The loss on this plantation was something over twenty head of fine “sugar mules.” It might be mentioned here, incidentally, that all the carcasses were cremated, as well as the manure and litter of the stables and lots; the stables, lots, etc., thoroughly disinfected, and no cases have since occurred on the place, notwithstanding the prevalence of the disease during the summers of 1898 and 1899. As before stated, it is not possible to assert, with positive certainty, that either of the cases cited resulted from the food being contaminated with charbon germs, not having established proof by bacteriological test; but, knowing that spores are carried through the medium of feedstuffs, the circumstantial evidence in both instances was exceedingly strong.
It must not be understood that there is a connection between charbon and any particular foodstuff. Contamination is purely accidental. But there is always the possibility of danger in feeding any material, either grains, their by-products, or forage, that has been raised on a charbon-infected area.

PREVENTIVE INOCULATION.

From personal experience with preventive inoculation, as well as that of others, we are strongly inclined to the opinion that, when the lymph is absolutely reliable, the process of inoculation carried out under rigid antiseptic conditions, and the necessary precautions stringently observed, this system of producing temporary immunity against fatal attacks of charbon gives gratifying results. Records from several of the continental European countries prove this to be the case; and we are not without substantial proof in our own State. But there are a number of conditions which militate against the best results being obtained with a material so susceptible to contamination and deterioration (as is the case with all vaccines and serums) when it becomes a commercial commodity, and placed, oftentimes, in the hands of the laity who are not familiar with even the first principles of asepsis or antisepsis. During the past two summers, when vaccination was so extensively practiced, it was not uncommon to find syringes and needles being used that had never been thoroughly disinfected, and no attention whatever paid to having the skin at the point of puncture rendered aseptic. And, in some parts of the State, we have come across "vaccinators" with not only foul instruments, but carrying the bottle of vaccine in their vest pockets, for days and probably weeks at a time, that had been exposed to infection from the atmosphere each time the stopper was withdrawn, which might have been half a dozen or more times. Another point observed, was, that sufficient care was often not exercised in preventing exposure of the animals, even when flies were extremely numerous, and the contagion most virulent, between the first and second inoculations, and for the necessary time after the administration of the second lymph. We have even heard it
remarked, but cannot authenticate it, that in some instances, lymph for the prevention of an entirely different disease was employed. If any such cases did happen, we believe it must have been due to the similarity in the names, charbon and symptomatic charbon lymphs. Symptomatic charbon is commonly known as "black-leg;" is caused by an entirely different organism, and is confined almost exclusively to young cattle. All such conditions, as those enumerated, and perhaps others, militate against the success of preventive inoculation; shake the confidence of many in its virtue, and deprive others of the benefits that might be derived from it when used at the proper time, and in the manner suggested by those familiar with it, and with germ life and germicides.

We are forced to the opinion that gratifying results would follow preventive inoculation, provided (1) the lymph when used was thoroughly reliable; (2) the operation performed early in the season; (3) the syringe and needles, and the skin, where the puncture is to be made, carefully disinfected, and (4) that the animal be not exposed to infection, either from flies, or from grazing on suspected pastures, during the interval between the first and second, or for the prescribed time (some twelve or fourteen days) after the administration of the second lymph. On the other hand, if all the necessary precautions are not observed, in dealing with such a dangerous and fatal disease, it is impossible to expect anything short of failure, or, at most, indifferent success.

There is a point which has been raised by some to the effect that, as the anthrax vaccine contains, or should do so, the living bacilli in attenuated form, they will, after getting into the body of the animal, become revivified; pass out with the kidney and bowel evacuations, and thereby produce fresh centres of the disease. Personally, we have not had any experience of that sort, nor have we heard of any untoward results of this character occurring, in animals vaccinated by us, in subsequent years. Relative to this point, we quote the following from the work on bacteriology by Dr. A. C. Abbott, of the University of Pennsylvania: "Investigations of these attenuations shows them to possess all the characteristics of enfeebled anthrax bacillus; they grow slowly and less vigor-
ously when transplanted; they do not form spores while under a high temperature; and microscopically they present evidences of degeneration. When introduced beneath the skin of animals they disseminate but slightly beyond the site of inoculation, and do not, as a rule, cause the general septicæmìa that occurs in susceptible animals after inoculation with normal cultures of this organism. * * * There should be practically no noticeable effect, causing either rise of body temperature or constitutional or other symptoms (this is after the first injection). After a period of about two weeks the second vaccine is injected, this may or may not cause disturbance. In the event of it doing so, the symptoms are rarely alarming, and, if the vaccines have been properly prepared and tested before use, they disappear within a short time after the injection. In the large majority of cases sheep, bovines, horses, and mules may be safely protected against anthrax by the careful practice of this method."

PERMANENT INFECTION.

The question of permanently eradicating infection from the charbonous sections of the State, is one which is by no means easy to answer. No one has any idea as to how long some portions of Louisiana have been infected with the spores of this disease; they may, and probably have been, infected for centuries. And, when we take into consideration the fresh infection that has been added during the long list of years the disease has been in existence, the prospect of ever getting entirely rid of it seems anything but encouraging. And, to add to the difficulty of the problem, we are informed that Koch has shown that "the bacillus anthracis can vegetate outside the body of animals under conditions actually occurring in nature," and by other authorities; that the virus of charbon is both endogenous and exogenous; it can vegetate and multiply in the body of the victim, and can also grow and increase outside of it. And, that the bacillus will readily develop in many vegetable infusions. Such nutritive fluids it finds in swamps and in pools of stagnant water, in which dead plants are macerating, especially when vegetable acids are neutralized by the alka-
line constituents of the soil. And, that the secret of the persistence of the disease is the fact that the bacillus anthracis is not limited to a parasitic mode of life in the animal body, but can vegetate on the proper refuse, even where no animals exist. It is a plant indigenous to the soil of certain localities, passing but occasionally and accidentally into the body of animals. This statement with regard to the life-history of the charbon germ, will afford some conception of the immensity of the task of endeavoring to exterminate the infection from those regions of the State in which it has existed, and added to, during each successive outbreak, for such a length of time. Yet, notwithstanding this fact, we believe, that by the institution of a few simple but stringent sanitary measures, enforced by law, its unlimited extension, and the disastrous losses that have hitherto been occasioned by it, can be very extensively minimized. It should be borne in mind that charbon, especially amongst livestock, is not a disease that can be successfully combated by therapeutic measures, but one that has to be controlled by sanitary science. And, if it is impracticable, or impossible, to get rid of the infection, already existing, it is possible, and practicable, to check further infection being produced, by the proper sanitary disposal of all charbonous animals, besides other sanitary detail, and by a regular system of vaccination with thoroughly reliable material, and under strict antiseptic conditions, to immunize against fatal attacks of the disease. But a partial or half-hearted effort in this direction will prove a failure. United effort is absolutely essential to insure successful results. And to obtain these, the strictest measures should be adopted, and they should have legislation behind them to insure their proper carrying out.

SUMMARY AND CONCLUSIONS.

Charbon is caused by a specific micro-organism, the Bacillus anthracis, found in large number in the blood of all animals dying from the disease.

The germ belongs to the spore-bearing variety, which renders it more difficult to control owing to the spores being
very resistant to destructive influences, and that it is capable of vegetating outside of the animal body.

All varieties of domestic, as well as our common wild animals, are susceptible to the disease, either by infection through the alimentary tract, or externally by the skin.

The human subject can easily become inoculated through abrasions of the skin by handling, and particularly skinning charbonous carcasses.

Certain sections of the State have been infected with charbon for a time antedating the recollection of the oldest inhabitants.

The infection has been augmented, from time to time, by neglect of carefully destroying the germ-laden carcasses.

The disease usually precedes rains subsequent to protracted spells of drought.

Gad- or horse-flies (Tabanidae) carry the contagion from charbonous carcasses, or, in some instances, from living animals suffering from charbon, and inoculate healthy stock.

Horse-flies are generally numerous about the time that charbon occurs, and hence favor the wider spread of the disease.

The spores of charbon can be conveyed through the medium of food-materials raised on infected lands.

Animals grazing over infected pastures can contract the disease.

The disease can be introduced from foreign countries through importation of hides or wool of animals that have died from charbon.

Charbon may be introduced in fertilizers containing the tissues of charbonous carcasses, if not subjected to sufficiently high temperature to destroy the spores.

The contagion may be disseminated by running water, by carnivorous and omnivorous animals, by buzzards and carrion crows, by the feet of man, etc.

The numbers of the various horse-flies may be reduced
by the application of kerosene to pools and humid spots in woods, etc., which these insects frequent.

Preventive inoculation, when carried out with good vaccine, under careful antiseptic precautions, has, if not entirely prevented the disease, lessened the number of fatalities.

Total eradication of charbon contagion, from sections long infected, is improbable in the near future.

The disease cannot be successfully combated by curative agents, but only by strict sanitary measures.

The best known means for preventing the spread of charbon, are:

1. The proper disposition of the bodies of all animals that die of the disease, by burning or deeply burying, previously keeping the skin whole, and preventing blood or other discharges from the natural openings, as the nostrils, mouth, rectum, etc. This will destroy the contagion in the carcasses, and deprive the different transmitting agencies of the source from which the disease can be spread.

2. The thorough destruction by burning, or powerful disinfection, manure, litter, and everything else that has been in contact with the diseased or dead animal.

3. Preventing the overflow of lands used for pasture or for growing hay or other forage crops. Or, by the draining of lands used for pasture, or for the production of hay or other food crops, in case there is stagnant water, or in case the land has an impervious subsoil.

4. Preventive inoculation with reliable material early in the season; using, during the operation, strict antiseptic care; and carefully following instructions with regard to the use of the vaccine or lymph, and the care of the animal until immunity is established.

5. Uniformity of effort in the carrying out of strict sanitary measures, which, to accomplish the best results, should be enforced by State law.

The skinning of charbonous carcasses is very much to be deprecated, and should be strictly prohibited by law, as such a practice is not only dangerous to the operator, but the hides
are a fruitful means of spreading anthrax through the infected blood they contain, and which the tanning process does not render innocuous. Almost every year there are records of deaths among employees of tanneries throughout the country resulting from inoculation while handling such hides.

Relative to preventive vaccine, it is of the utmost importance that it should be fresh and reliable, and that all those handling it, whether dealers in it, or stock owners, should follow carefully the instructions (which generally accompany the material) necessary for its preservation and reliability. If this is not done, the vaccine will deteriorate; may become infected, and, in fact, be rendered useless or even dangerous.
# Tabulated Data Relative to Charbon Obtained by W. R. Dobson and W. H. Dalrymple

<table>
<thead>
<tr>
<th>NAME</th>
<th>DEER</th>
<th>WHERE 1ST CASE OCCURRED</th>
<th>DISPOSITION OF CASES - 1899</th>
<th>METHODS OF DISINFECTION</th>
<th>CHARACTER OF FOOD</th>
<th>OBSERVATION AS TO DATES OF OUTBREAK</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wagonwood property (St. James Parish)</td>
<td>1</td>
<td>Yes</td>
<td>Animal found on levee</td>
<td>Buried to back woods and left exposed</td>
<td>Caves not disinfect</td>
<td>Very apparent at time of outbreak</td>
<td>Rice been to cattle</td>
</tr>
<tr>
<td>Montauk Bay (St. James Parish)</td>
<td>1</td>
<td>Yes</td>
<td>Dragged to back woods</td>
<td>Caves not disinfect</td>
<td>Rice been to cattle</td>
<td>Sept 27, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Bonner's property (St. John Parish)</td>
<td>8</td>
<td>Yes</td>
<td>Cattle on back woods pasture</td>
<td>Buried and bein dipsed in pasture</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Perkins above Carrolton (St. John Parish)</td>
<td>7</td>
<td>Yes</td>
<td>Back pasture near woods</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>E. Longe, above Carrolton (Jefferson Parish)</td>
<td>8</td>
<td>No</td>
<td>Back pasture, near woods</td>
<td>Buried (a)</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Southern University Farm Station (Jefferson Parish)</td>
<td>2</td>
<td>Yes</td>
<td>Back pasture</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Mr. L. Johnson, near Kenner (St. John Parish)</td>
<td>1</td>
<td>Yes</td>
<td>Back pasture on levee</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Mrs. L. Johnson, near Kenner (St. John Parish)</td>
<td>1</td>
<td>Yes</td>
<td>Buried on back pasture</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Mr. Stewart, Kenner (St. John Parish)</td>
<td>2</td>
<td>Yes</td>
<td>Buried on front levee</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Live Oak plantation (St. John Parish)</td>
<td>15</td>
<td>Yes</td>
<td>Buried</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Aver de plantation (St. John Parish)</td>
<td>5</td>
<td>Yes</td>
<td>Mosquito found on levee</td>
<td>Buried (a)</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Fairchild plantation (St. Bernard Parish)</td>
<td>6</td>
<td>Yes</td>
<td>Mosquito found on levee</td>
<td>Buried (a)</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Olivier plantation (St. Bernard Parish)</td>
<td>22</td>
<td>Yes</td>
<td>Mosquito found on levee</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Po de plantation (St. Bernard Parish)</td>
<td>8</td>
<td>Yes</td>
<td>Buried</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>J. T. Daufuskie (New Orleans Parish)</td>
<td>1</td>
<td>No</td>
<td>Buried (a)</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Bellard plantation (Plaquemines Parish)</td>
<td>9</td>
<td>No</td>
<td>Buried</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
<tr>
<td>Star plantation (Plaquemines Parish)</td>
<td>7</td>
<td>No</td>
<td>Buried</td>
<td>Buried</td>
<td>Rice been to cattle</td>
<td>Sept 4, 1899</td>
<td>No previous outbreak</td>
</tr>
</tbody>
</table>

*Remarks*: The note that died and received only the first lymph.
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and A. & M. COLLEGE.

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