

"Medical and Surgical Reports," Boston City Hospital, 1896-99, p. 226.) The distinction between the intestinal and pulmonary forms of anthrax is not easily made, and doubtless the two may often be confounded with other acute diseases affecting these organs, unless the anthrax bacillus is identified by microscopical examination, or the disease be reproduced by inoculation in animals. The diagnosis of intestinal anthrax may be quite impossible, owing to the rapidity of its progress and the similarity of its symptoms to those of other gastro-intestinal diseases, especially to those of ptomaine poisoning. The course of intestinal anthrax is almost uniformly fatal, and Bell states that no case demonstrated during life to be intestinal anthrax has recovered.

Treatment of this variety of the disease should consist of rapidly acting evacuates, followed by the administration of internal antiseptics (germicides), with supporting measures according to the conditions present; but the nature of the lesion and the rapid progress of the disease would preclude the hope of benefit from any available means of internal medication.

**Pulmonary Anthrax, Wool-Sorter's Disease, Anthracosis.**—This form of the disease may be acquired by inhalation of the dust from any of the products of diseased animals. Thus it has been observed among those employed in the handling or manufacture of animal hairs and woollen rags; among wool sorters, rag pickers, and those concerned in the further manipulations of these articles into woven textures; and to some extent among paper-makers. Dr. Bell says: "The sorting of wools and hairs is unhealthy in proportion to the contamination they produce in the air inspired by the workmen. First, the dust and fine short hairs, acting mechanically, excite chronic diseases of the lungs, such as bronchitis and phthisis. Second, dust from dried and decomposing animal matter produces a low form of septic pneumonia. Third, the virus arising from the blood and discharges of animals that have died from anthrax acts specifically on the lungs."

Pulmonary anthrax is peculiarly a human complication. It is not often observed as a coincident condition in either cutaneous or intestinal infection. "From the paramount dignity, in the human economy, of the organ invaded, and the specific tendency in anthrax to the development of oedematous conditions in the tissues invaded, it is not surprising that pulmonary invasion leads to a most acute and generally fatal manifestation of anthrax, recovery occurring but seldom."\*

The general duration of the pulmonary invasion before the fatal termination is from two to five days. The bacilli are often present in the sputum.

**PATHOLOGY.**—The pathology of malignant pustule consists of the series of changes which follow inoculation with anthrax through either the skin, the alimentary canal, or the lungs. These changes are somewhat different, according to the particular circumstances of the individual case. When the virus is introduced through a scratch or abrasion of the skin, the period of incubation, or the space of time before the local symptoms of anthrax appear, may vary from a few hours to three days; in rare cases a somewhat longer time may elapse.

The course of the disease may be divided into three stages. The first or prodromal stage is that of incubation (period of latency). During this period the patient presents no marked symptoms of any serious disturbance. There are localized burning and itching at the seat of infection, which are generally thought to be due to the bite of an insect, such as a flea, which the spot closely resembles. After a period of incubation lasting from a few hours to three days (rarely longer) the local symptoms suddenly change. The second stage, that of eruption, now ensues, in which a small papule is seen at the seat of the previous irritation. This rapidly increases in height and in circumference, and generally presents a spot of dark discoloration at its summit. The itching and burning increase, and within a few hours a vesicle

\* Billings in "Twentieth Century Practice of Medicine."

appears at the seat of discoloration in the papule. The vesicle now rests upon an indurated base, and contains a small amount of a serous, frequently bloody fluid. The surrounding skin swells so as to form a slight elevation around the vesicle, which now exhibits the peculiar appearances to which it owes its name of "malignant pustule," although this is not an accurate definition of the pathological condition at the seat of the local disease. The vesicle soon ruptures spontaneously, or is ruptured by the scratching of the patient, and reveals a dark red base, which quickly dries, forming a livid or brownish crust. This is the commencement of the central gangrene or necrosis of tissue commonly observed in the carbuncle of anthrax. The crust becomes gradually larger, until it sometimes reaches a diameter of from 1 to 3 cm., and the swelling and tension of the surrounding skin become more extensive. A line of new-formed vesicles becomes developed around the margin of the crust, and these vesicles contain a yellowish or brown fluid content.

The crust now gradually becomes free from pain and tenderness, and a doughy or boggy infiltration is felt for some distance in the tissues around the primary sore. The local condition, however, has no diagnostic value as an indication of the infection of the general system. In rare instances the local symptoms become less serious, the swelling subsides, the slough separates and is thrown off, and the ulcer heals by granulation. In such cases the chief danger is from septicæmia arising from the absorption of gangrenous matter. When general infection occurs the swelling increases and becomes doughy, the lymph channels are detected as reddened lines of induration, the glands become swollen, and burning heat is felt in the part, which gradually becomes very painful and later is the seat of a feeling of stiffness and numbness. The veins are often seen as dark-colored channels, and are sometimes plugged by thrombosis.

The foregoing appearances are caused by the local multiplication of the bacilli of anthrax in the part which is the seat of the primary infection. On the second or third day the germs may be found in the central part of the carbuncle and in scattered groups in the rete Malpighii. At times large interwoven masses of germs are found in the tissues at this early period, and may be observed to spread into the neighboring parts by extension beneath the epidermis. In a carbuncle extirpated by Bardeleben on the twelfth day, which measured 5 cm. in diameter, the bacilli were present in such enormous numbers that the tissues were everywhere crowded with them; they even filled the spaces between neighboring cells and obscured the normal structures of the part. In a carbuncle examined by Wagner the bacilli were so abundant as to hide the normal tissues. The centre of the pustule is generally the seat of hemorrhage, and the effused blood is prone to undergo putrefactive changes. This accident is also frequently observed in the oedematous tissue immediately surrounding the pustule. From this centre of the disease general infection of the body (third stage) may now quickly take place, some cases requiring but a few hours (*cas foudroyants*), while others occupy from three to four, sometimes eight to ten, days for general poisoning of the system.

A second form of the disease is the "oedema carbunculosum seu malignum," "Milzbrandoedem." This is observed in cases in which inoculation occurs in parts covered with thin delicate skin, such as the eyelids, axilla, and occasionally the extremities. In these cases the local sore, the pustule, is not formed, there is no crust, no central gangrene, nor an eruption of vesicles, but a rosy, bluish, or even livid swelling appears at the seat of primary infection, and rapidly spreads in all directions. Generally the spot where the inoculation occurred may be seen as a dark point more or less elevated above the surface, but sometimes there is no visible point of origin. The swelling is frequently enormous, so that the arm may be three or four times its normal size, or the eyes may be entirely closed by large effusions of translucent

fluid in the tissues. Like the previously described local manifestations of anthrax, this malignant oedema may subside spontaneously without causing destruction of the tissues, and the part may be restored to its former condition. There is generally abundant desquamation of epidermis after the disappearance of the oedema. At times the swelling is so enormous that the skin becomes gangrenous to a greater or less extent, and often the oedematous area is the seat of vesicles or blebs which are filled with a bloody serum, and at the base of which is generally found a slough comprising the entire thickness of the skin. When the neck or eyelids are the seat of extensive oedema and sloughing, the loss of tissue may be so great as to lay bare the great vessels or other important structures, and death may ensue from hemorrhage or from some other accident not belonging to the course of anthrax.

General infection may occur when the primary lesion is seated in the intestinal tract, as well as when the inoculation has taken place on the external surface, and the character of the disease is not essentially different. The primary affection has received the name of "anthrax intestinalis seu abdominalis," or "mycosis intestinalis," and is described by Buhl, Waldeyer, E. Wagner, and others. These cases generally run a most alarming, pernicious (*foudroyant*) course, and it is chiefly by examination of the intestine that the identity of the disease has been established. This form of anthrax is generally induced by eating the uncooked or insufficiently cooked flesh of infected animals (*e.g.*, sausages, sandwiches of raw meat, etc.).

General infection of the system corresponds to that period in the development and multiplication of the bacilli in which they have penetrated beyond the seat of primary infection, have reached, by means of the blood channels or other paths, the internal organs, and have commenced to multiply in these structures. The bacilli are probably carried by the blood corpuscles, which often contain them in considerable numbers. The disease progresses much more rapidly in the intestinal form, probably from the sudden liberation of larger numbers of bacilli, which enter the circulation from many points at once.

The anatomical appearances in anthrax are those dependent upon a multiplication of the bacillary organisms in the body, and there is hardly a structure or a tissue in the dead body in which they may not be found in great abundance. They form thrombi in the capillaries, the lymphatic channels and glands; the brain, kidneys, and intestinal glands are found more or less crowded with them. The most striking changes are hemorrhages in the tissues, varying in amount from mere points to large extravasations. Oedematous exudations and serous effusions in the various cavities, and serous infiltration in various organs, frequently ensue. The visceral organs are generally found in a normal condition, with the exception of the spleen, which is usually enlarged and softened in structure, and contains enormous collections of bacilli. There is a marked increase in the number of white corpuscles, and death is quickly followed by strongly developed rigor mortis.

In general appearances the clinical picture of fatal anthrax closely resembles that of virulent blood-poisoning. As a rule, cases of malignant pustule terminate fatally in from three to seven days, though in cases of special virulence death may occur within a few hours.

The GENERAL SYMPTOMS of anthrax are usually the following: Chilliness, or a well-marked rigor, faintness, pains in the limbs, loss of appetite, sometimes severe distress in the region of the stomach, colic, meteorism, vomiting, and diarrhoea, frequently accompanied by bloody stools. There is excessive thirst. The patient retains consciousness to the end, unless coma should supervene shortly before death. Frequently there is great agony and distressing anxiety; the patient begs for relief in the most piteous manner, and feels that dissolution must soon ensue. In other cases there is stupor from the first, or the patient becomes delirious, or sinks into

a deep coma, or the body may be convulsed by clonic cramps or continuous trismus or tetanic contractions. Occasionally there are harassing cough and dyspnoea, with bloody expectoration. There may be frequent hemorrhages in the tissues or from the mucous membranes, and sometimes secondary pustules are formed which are similar in all general characters to the primary lesion. Usually there is considerable elevation of the body temperature at the period of invasion of anthrax, the thermometer often registering 40° C. (104° F.), or higher, for some days, when there is a sudden fall to a temperature at or below normal, frequently as low as 36° C. (97° F.). The pulse is generally accelerated, and increases in frequency until death. The action of the heart is often feeble, and the sounds are hardly audible. Death usually occurs from collapse and general cyanosis.

Cases of intestinal anthrax are generally more virulent than the ordinary ones of malignant pustule, and they result fatally sooner than those in which the infection takes place from the external surface. The effects seem to depend upon the mechanical action of enormous masses of germs within the body, and upon the destruction of large portions of tissue by the growth and multiplication of the bacilli, together with the added action of the specific toxin produced by these organisms, which may be supposed to be more rapidly disseminated from this origin than when the initial lesion is situated upon the cutaneous surface.\*

The progress of anthrax when acquired by inhalation is variable, but usually the course of the disease is rapid, and tends toward a fatal termination. The symptoms are often unimportant or insignificant until near the end. In some cases the invasion of anthrax is followed by sudden collapse with speedy death of the patient, as from shock; but generally there is more or less reaction, followed by collapse and death, without the signs of any inflammatory lesion in the lungs. When the patient survives a sufficient time for inflammatory processes to develop in the lungs, the risk from the anthrax poison is reduced. The duration of pulmonary anthrax varies from one to ten days. A large proportion succumb to the disease within the first four days.

The bacilli may or may not be found in the blood, but if the disease is really anthrax, the subcutaneous injection of the blood in a mouse will certainly prove fatal.

The specific action of the bacillus upon the body of its host, aside from its presence in enormous numbers, has been sought in the morphological character of the organism; the germ belongs to the aerobic class of organisms, and is a greedy consumer of oxygen; and it has been thought that the great prostration of the system, and the signs of the destructive action of the disease, as well as its rapid progress, may be due to the fact that it depletes the red blood cells of their supply of oxygen, and thus induces a sudden collapse of the vital powers. This view is supported by the appearances presented by the disease in grave cases, in which there is cyanosis to a marked degree, and the patient dies with all the appearances of asphyxia. In this respect the organism of anthrax produces in the animal system an effect similar to that of certain poisons of the cyanide group, in which death is uniformly associated with asphyxia.

In cases in which the disease progresses slowly, the secondary toxins formed by the bacilli are probably the cause of the fever and other constitutional disturbances.†

The dissemination of the bacilli through the system is chiefly by way of the lymphatic channels and the glands. Only after passing these physiological barriers can they obtain entrance into the general circulation and pass to all parts of the body. Therefore they would not be detected by microscopical examination of the blood, as an

\* See a very interesting account of "Charbon" by Larrey in his "Memoirs," vol. I., p. 59, an abstract of which, by Mr. H. G. Howse, appears in The Lancet, December 23, 1890, p. 1720.

† "We may further take it as certain that micro-organisms cause disease almost entirely by virtue of certain toxic substances which they produce."—Prof. J. A. Lindsay, Lecture at Queens College, Belfast, November 20, 1899; Lancet, December 20, 1899, p. 1799.

aid to diagnosis, until a period when the condition of the patient is beyond relief.

After entrance into the general circulation, the organisms of the disease invade every tissue and organ in enormous numbers. Bacterial embolism is common; the heart muscle is invariably swollen and anemic, and at times the seat of petechial hemorrhages. The same appearance with more or less ecchymosis may be observed beneath the endocardium, pleura, and pericardium, as well as in the substance of the lungs. The same condition may also exist in respect to the vessels and serous membranes around and within the brain.

DIAGNOSIS.—The diagnosis of anthrax is often very far from easy. Dr. Bell says: "The slightest illness occurring in those exposed to infection from anthrax should be looked upon with suspicion until the possibility of its being anthrax has been negatived. Often it is impossible to make an early diagnosis, as the symptoms may resemble those of ordinary illness. The progress of the disease is frequently not characterized by alarming indications until near the end of life, hence not infrequently it is unrecognized until the patient is cold, livid, almost pulseless, and dying."

The occupation of the patient may afford a valuable clue, or at least awaken a suspicion of the disease in a given case. Under such circumstances, a papule upon any exposed surface of the body would excite a suspicion of the disease, though a positive diagnosis might at this time be impossible. When the disease has advanced to the vesicular stage with serous exudation, there would be less uncertainty as to its nature. Implication of the lymphatic channels and swelling and tenderness of the neighboring glands would add weight to the probable diagnosis, though all these symptoms may be associated with other infectious diseases. The most certain method is that of taking a drop from the contents of the pustule or vesicle, and subjecting it to microscopic examination. If the case is one of anthrax, this fluid will be seen to contain the bacillus. This at once establishes the character of the disease in distinction from simple non-specific carbuncle and furuncle. In doubtful cases the liquid may be subjected to cultivation in a moist chamber, when a definite result may be obtained within a few hours. Or the experimental inoculation of guinea-pigs and rabbits or other animals susceptible to the disease may be carried out; and if anthrax develops in them, there will then be no doubt in regard to the nature of the disease; but a negative result does not entirely exclude malignant pustule.

In districts in which malignant pustule is known to prevail, the surgeon would suspect this disease in the early stages of simple carbuncle, or of furuncle, and in the stings of wasps and other insects. Malignant pustule also resembles the early stages of erysipelas to some extent. Boils or furuncles are frequently very similar in their early stages to the first appearances of anthrax. In certain tissues they also often commence by the development of a vesicle at the seat of irritation. In furuncle, however, there is not so extensive inflammation in the vicinity, and the central gangrene, the crust, the wreath of vesicles, and the febrile action are absent; these symptoms belong exclusively to anthrax. The ordinary simple carbuncle is very painful, the carbuncle of anthrax, on the contrary, is only slightly sensitive. Bites of insects generally show a small yellowish point, which is not observed in anthrax. Erysipelas, especially when accompanied by serous effusions (bullæ), resembles the malignant œdema of anthrax to some extent, but in erysipelas the chill and fever usually precede the eruption of the disease, while in anthrax these occur simultaneously.

In glanders the carbuncles are smaller, generally multiple, and accompanied by intense febrile reaction.

Cases of intestinal anthrax, mycosis intestinalis, may be very difficult of diagnosis. The symptoms often resemble those of poisoning by arsenic or phosphorus, though the appearances due to anthrax are frequently more suddenly developed and advance more rapidly to

a fatal termination than in cases of poisoning by these substances. Often the patient is dead within a very few hours.

PROGNOSIS.—The prognosis in anthrax is always very grave, and statistics prove that more than seventy-five per cent. of persons attacked die from the disease. Extensive eruption and multiple pustules render the prospect of recovery less favorable. In children and in feeble persons the disease is almost always fatal. Pregnant women are especially liable to abortion from the invasion of anthrax.

The prognosis in cutaneous anthrax bears a direct relation to the promptness and thoroughness with which the local lesion is treated. If the seat of the primary invasion be destroyed by efficient cauterization or complete excision before the bacilli have entered the lymph channels or gained access to the blood-vessels, a fatal result need seldom be apprehended.

When general infection of the system has occurred, the result is uniformly fatal. It is stated that but two cases of general anthrax are thus far known to have survived the disease (Leube and Massing).

Fagge states: "Hitherto, so far as I am aware, no instance of recovery from the intestinal form of anthrax has been recorded. In pulmonary anthrax the spleen is less subject to enlargement and softening than in any other form of the disease. The appearance of any illness of however trifling nature in a person exposed to the infection of anthrax should lead to a very guarded prognosis until such time as the disease may prove to be some other ailment. The greater number of cases of anthrax are fatal within four days from the appearance of the first symptoms. Pronounced febrile reaction with chill and a temperature above 102.5° F. would be a possible sign of successful resistance to the entrance of the bacilli into the general circulation, and the localization of the disease to the seat of invasion. No recorded case in which the presence of the bacilli in the blood has been proved has recovered."

PROPHYLAXIS.—As the diseased or dead body of an animal or a human being, and the substances emanating from the same, form the source of danger from anthrax, it is evidently important that these substances should receive special attention. The excreta or discharges of any kind from those sick with the disease should be carefully disinfected and burned, and the bodies of animals or human beings dying from the disease should be immediately wrapped in some efficient disinfectant and cremated. No post-mortem examination should be allowed, as thereby the opportunity for further infection is largely increased. The physician should warn the attendants, in cases of anthrax, of the danger of infection from the discharges of the patient. No person having a wound or abrasion on an exposed part of the body should take any part in the care of the patient, or touch anything which has been in contact with or near him. All bandages, dressings, etc., should be immediately burned. Especial attention should be given to the exclusion of flies and mosquitos, which have been proved to be the active carriers of various contagia. Unnecessary persons and all visitors should be rigorously excluded.

The inoculation of the vaccines and toxins of anthrax is an efficient preventive of the disease in animals. Antitoxins may be curative, but no antitoxin is at present known which may be of service when the disease has passed its earliest stage. The blood serum from an immune animal, if injected subcutaneously into a susceptible animal, will afford a certain degree of protection against subsequent infection with anthrax. The following statement is from *Sajou's Annual* for 1898:

"A sheep was immunized until it could bear the injection of seven agar cultures with but slight elevation of temperature. A lamb was immunized likewise to the highest degree, and blood was taken from the carotid to obtain serum. With the serum of the sheep it was actually possible to save from death a rabbit in which an extremely virulent culture of anthrax was injected either

after or simultaneously with the serum. Evident therapeutic results were obtained with this serum in animals that had received the anthrax bacilli previous to the injection of serum. These results permit us to hope that anthrax in man and the domestic animals may sometime be treated by sero-therapy."

It is further stated that "French skins, since Pasteurian inoculation has been employed among the French flocks, have been found rarely to cause anthrax."\*

Billings says: "Preventive inoculation seems an unjustifiable attempt in anthrax; that is, it is impossible."

Bell makes the following statement: "No efficient system in relation to the spread of anthrax has been yet possible. To accomplish this end there should be a careful separation of the infected wools, hair, hides, rags, etc., at their source, often in distant countries. This is manifestly very difficult to accomplish." In the subsequent handling of the materials during the processes of preparation and manufacture, every effort should be made to protect the workers from the dust arising from such materials, which should be removed by air draught and burned. Sterilization of all suspected substances by steam under moderate pressure has been found useful in the treatment of other infected substances, and would doubtless provide efficient protection against the disease. The vapor of formalin would probably be destructive to the germs of anthrax, and possesses the special advantage that the texture of the suspected materials is not injured by the process.

Fagge says: "The system of prophylaxis by inoculation of anthrax virus attenuated by transmission through suitable animals promises important results, and its study indicates a close analogy to the relation of cowpox to smallpox."

TREATMENT.—No treatment thus far known is of any avail in malignant pustule, unless it is employed at an early stage in the disease. The complete destruction of the pustule as soon as its nature can be recognized is the only measure upon which reliance can be placed. If this is not practicable by thorough excision, the carbuncle should be divided by deep incisions, and powerful caustics should be thoroughly applied (carbolic acid, nitric acid, chloride of zinc, bichloride of mercury, or the hot iron). This mode of treatment should be employed even when the disease has existed three or four days, as it has the power of destroying large numbers of bacilli, and may thus be supposed to modify the virulence of the disease, and possibly to allow of recovery in some cases which otherwise would end fatally. The resulting wounds should be treated in accordance with ordinary surgical rules. Internally, the treatment should embrace wine, champagne, coffee; and if signs of failure of the heart appear, carbonate of ammonia, camphor, etc., should be added.† If the disease has been induced by the use of infected meat, a prompt emetic should be administered, followed by a cathartic, for the purpose of removing the germs, as thoroughly as possible, from the alimentary canal before general infection of the system occurs. The only medicine which can be looked upon as in any sense a specific is quinine, of which 1 to 2 gm. should be prescribed in twenty-four hours, and it may be advantageously combined with carbolic acid, 1 gm. per day.

Carbolic acid, in a two to five per-cent. solution, may be injected into the diseased tissues in the amount of 1 gm. per day.

Strubell‡ reports a most interesting case of recovery from anthrax. The patient was a tanner, in whom the

\*The total mortality from anthrax among inoculated animals, including that from the inoculations, was 0.94 per cent. for sheep and 0.54 per cent. for cattle. The animal loss before protective inoculation was practised is said to have been about 10 per cent. for sheep and 5 per cent. for cattle. ("Immunity and Serum-Therapy," 1895, p. 95.)

†Ipecacuanha locally and internally has also been highly recommended, and reports of recovery from its use have been published. Nucleinic acid has also yielded promising results in the hands of Vaughan.

‡Münchener med. Wochenschrift, 1898, No. 48, p. 1526.

point of inoculation was the end of the nose. Owing to the seat of the lesion on the nose,—both it and the face generally being enormously swollen,—and to the serious general condition of the patient, operative treatment was not considered advisable. Treatment by subcutaneous injection of carbolic acid in three-per-cent. solution was commenced in and around the seat of the lesion, and into the enormously swollen and œdematous tissues in the neighborhood. Thirty Pravaz syringefuls were injected daily, thus introducing 0.9 gm. pure carbolic acid daily into the tissues. The same solution was also injected into the arm for its general effect, and the lesion was kept covered with very hot poultices, as were the parts around the seat of the disease. Stimulants and hot baths were also employed. For some days there was no apparent change in the condition of the patient, but afterward gradual improvement could be observed. The gangrene did not extend, and the œdema of the face and eyelids became less. The swelling of the neck, however, became more marked, and the number of injections was accordingly increased to thirty-six per day. By the end of three weeks, under this most energetic treatment and constant watchfulness, further extension of the disease was prevented. Only one small gland at the angle of the jaw suppurred. A ragged slough with fragments of adherent tissue was separated from the enormously enlarged and gangrenous nose, leaving a granulating surface, which quickly healed without leaving a visible scar. The bacilli of anthrax were readily found in the exudation from the primary lesion, but cultures from the blood never showed the organisms. The duration of the illness was between five and six weeks. The location of the primary lesion on the nose has not been previously reported, and this region is not adapted for the operative treatment of the disease. During eighteen days this patient received more than four hundred syringefuls of three-per-cent. solution of carbolic acid, but developed no symptoms of any toxic action from the drug. The urine was at times faintly tinged.

The poultice is supposed to act by elevating the temperature of the tissues to a depth of 1 to 2 cm. to such a degree as to render them unsuited for the growth of the anthrax bacillus, which cannot flourish at a temperature much above that of the human body. Thus, on external surfaces it is theoretically possible to exert an inhibitory influence upon the growth of the anthrax bacillus by the constant application of heat. The temperature of the poultice should not be less than 120° to 130° F., and the applications should be renewed at sufficiently frequent intervals to maintain nearly this degree of heat in the tissues at and around the lesion.

Scharnowski treated a series of twenty-eight cases of anthrax by subcutaneous injection of carbolic acid, with recovery in all cases. As much as 0.7 gm. per day has been reported as thus injected at one time without toxic symptoms. In anthrax it seems as if there were an increased toleration of carbolic acid.\*

The constant use of ipecacuanha after excision of the local lesion, both by the mouth and by application to the seat of the pustule, has been followed by gratifying results in many cases.

In cases in which the limbs are the seat of extensive œdema or of gangrene, deep incisions should be made to allow the evacuation of the abnormal products, and antiseptic dressings should be rigidly adhered to until granulations have formed.

Increased familiarity with anthrax shows a striking similarity to other diseases dependent upon the introduction into the animal system of a specific organism of bacterial character, and the probable production of a specific toxin as the result of the physiological activity of the bacterial germ. From the results obtained in the study

\*In speaking of the use of carbonate of creosote in pneumonia, a compound similar in many ways to carbolic acid, Dr. Andrew H. Smith says: "The occasional smoky urine does not imply disintegration of blood corpuscles, as at one time supposed, but is the result of a harmless chemical reaction, and may be disregarded."—Medical News, December 16, 1896, p. 781.