Case 6.—*Erysipelatous Anthrax.*

J. W., aged 27, a willer of Persian wool, was at work on April 28th, 1899, when he noticed a small pimple on the front aspect of his left shoulder; it did not alter much for several days following. On May 1st he had some tinny salmon, and did not feel well afterwards. Next day he vomited and was poorly, felt cold, and could not sleep; the spot on the shoulder was itchy and more swollen.

On the third day it was worse and blistered, but not painful. He was seen by Dr. Angus, of Bingley. The pulse was very feeble, and temperature 100° F.

On the fourth day in the morning he stated that he had passed a good night, had no pain or appreciation of his serious condition, but felt as if he could get up and go to his work. He had a fresh and healthy complexion, without any distressful look. The pulse could not be counted at the wrists; over the heart it was 118; the temperature in the mouth was 99.5°, in the rectum 101.4°. On the anterior aspect of the left shoulder was an irregular-shaped blister about 2 inches in diameter, which partly exposed a raw surface. The skin around this—6 inches in one direction and 5 inches in another—was of a flesh-red colour, which did not disappear on pressure. Beyond this the skin was of a bright red rose colour, which disappeared on pressure. The oedema extended around the shoulder over the left arm, across the neck to the right side of the face, the submaxillary glands and side of the chest, much more on the right side of the body than on the left, probably from not being able to lie on his left side. The glands in the axilla and neck were enlarged, but not painful on pressure. During the afternoon, when Dr. Angus again visited him, he was dressed and downstairs, sitting in front of the fire, although he was pulseless at the wrists. At 9 P.M. he had slept well since the doctor's previous visit, and did not feel ill; the tongue was moist, the appetite moderate, and there was no cough. The pulse over the heart was 107; the temperature in the mouth was 98.6°, and in the rectum 99.4°. The respirations were 22. The mind was clear; but the heart sounds were more feeble. Much clear straw-coloured serum flowed from the vesicles. There was no apparent eschar. He died at 11 P.M. on May 5th.

Examination of Body Thirty-Six Hours after Death.—Rigidity of the limbs was well-marked. The discoloration of decomposition on all parts of the body was such as is more usually seen a fortnight after death. There was much dark purple discoloration of the skin over the anterior part of the neck and the upper part of the chest with much oedema and emphysema. The anterior aspect of the left shoulder was stripped of epidermis as if it had been blistered, and the exposed skin was of a flesh-red colour excepting an irregular patch over and 3 inches across in different directions, which was black and gangrenous. The oedema extended all over the chest and abdomen; the superficial veins of the body and limbs were sharply defined, and were of a dark purple colour; the ends of the fingers were a dark-blue colour; the toes were natural. On section of the skin over the chest much clear fluid escaped. Air was present in the cellular tissue beneath the sternum; the left lung was extensively adherent to the side (old). The right side of the chest contained about a pint of serum. Within the external layer of the pericardium were several infarcts of blood varying from one-third of an inch to 1 inch across. The heart appeared to be natural; it contained fluid blood, and the internal surface was deeply stained; the aortic and pulmonary valves were of a dark chocolate colour; the lining of the large vessels was of a bright cherry colour. Several patches of extravasated blood were present beneath the external coat of the stomach, the bowels, and the mesentery; one of these on the ileum was 2½ inches in length, and extended all round the bowels. The spleen was soft. The liver and kidneys were congested owing to the fluid state of the blood. The brain appeared to be free from disease.

Capillary tubes charged with serum taken from the body were sent for examination to a well-known clinical laboratory, the report from which did not confirm the diagnosis of anthrax (examination not early enough). Cultivations on gelatine and agar-agar with serum from similarly charged tubes were tried, with a negative result. The contents of three other tubes were given to a guinea-pig, which was found dead seventy-three hours afterwards. In fluids from this, anthrax bacilli were very abundant.

TREATMENT.

It is evident that the treatment generally adopted in localised anthrax lesions by excision, cautery, or caustics is not suitable for the diffused inflammatory form. In Case 2, which recovered, chinolol was given by the mouth (gr. i every three hours), by the lungs (nebulizer, 4 per cent.), and by daily injections into the cellular tissue at several points. When the skin of the eyelids was much swollen and hard, incisions were made to relieve tension and prevent sloughing; afterwards chinolol lotion was applied. Perhaps the most promising method of treatment is the intravenous injection of non-toxic germicides.

A CASE OF MULTIPLE MALIGNANT PUSTULES
(ANTHRAX).

By R. LAW FORD KNAGGS, M.C., F.R.C.S.,
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MALIGNANT pustule, or external anthrax, is nearly always single. The following case, in which three, and perhaps four, were present, is therefore of special interest. The careful record of the facts is due to Mr. F. Talbot, M.B., the acting casualty officer.

The treatment by excision of the pustule is nearly always

followed by rapid disappearance of all serious symptoms and by prompt convalescence. This result may be counted upon if the bacilli have not penetrated the lymphatics and been carried beyond the local disease. Infection of the resulting wound by bacilli from the sore which is being excised cannot be a really serious danger. The writer has seen many pustules excised, but never once any recurrence in the wounds.

G. A., aged 20, a groom, was sent up to the Leeds General Infirmary on September 7th, 1900, by a medical man because of the suspicious appearance of four sores upon his forearms. The sores had a very strong resemblance to anthrax pustules, but there were no vesicles around the central eschars, and the surrounding zones of inflammation were very limited. The patient was not suffering from any marked constitutional disturbance, though he stated he had felt somewhat ill since the appearance of the first sore, and one day his temperature had been 104°. The conditions present on the 7th were not sufficiently clear to justify a certain diagnosis, but the man was warned and told to present himself daily for inspection. The next day (September 8th) the largest of the sores had put on a very serious aspect, and he was at once admitted. He then gave the following information, which he had withheld on September 7th, although he knew that anthrax was suspected.

On August 30th he took part in a *post-mortem* examination on a cow said to have died of anthrax. He received a small wound near the web of the thumb of the left hand on its posterior surface. This apparently healed. On September 3rd a small pimple appeared just below the bend of the left elbow. This gradually grew to the condition presently to be described. On September 6th another pimple appeared on the ulnar side of the right forearm, and on September 7th another at the bend of the right elbow. When admitted on September 8th the sores presented the following appearances. That at the bend of the left elbow was an ulcer 1 inch in diameter, somewhat circular in shape, and with a base composed of dark-brown or black sloughing tissue. Surrounding the ulcer was a ring of yellow swollen and oedematous skin upon which were several large and irregular blisters. There was a considerable area of surrounding cellulitis, and the lymphatic trunks upon the inner side of the arm were much inflamed. The epitrochlear and axillary glands were enlarged. The sore on the ulnar side of the right forearm was about the size of a sixpence. It showed a central black eschar and a small zone of surrounding inflammation. There were no very evident vesicles. That at the bend of the right elbow was smaller. Its centre was yellow and had not yet become an eschar. It was not unlike a vaccination pock about the eighth day. Here also the surrounding inflammatory zone was very slight. The original wound on the left hand looked like a small copy of the second sore, and as if the disease at that centre had aborted. The other three sores were actively progressing. Though the patient's temperature was 102.4°, his general condition was good. Anthrax bacilli were demonstrated in the exudation taken from the largest sore.

The same night the patient was anaesthetised, and all four sores were widely excised by Mr. Talbot. All the tissues down to the deep fascia were removed, and pure carbolic acid was applied to the wounds. The temperature at once began to fall, and was normal on the evening of September 10th. The wounds quickly healed, the large one being assisted by skin grafts. The patient left the hospital on September 29th.

A CASE OF ANTHRAX WITH EXTENSIVE
MENINGEAL HÆMORRHAGE.

By JOSEPH C. STURDY, L.R.C.P. & S. EDIN.,
Bradford.

F. B., aged 33, a wooll sorter, while at work on March 5th, was seized with shivering, pains all over, and slight nausea. On the following day the temperature was 102°, and pulse 110. The tongue was furred; breathing was normal; and the pains in the limbs were as before. He appeared to be suffering from influenza. On March 7th the temperature was 99°, and the pulse 98. The pains were relieved, and there were no chest symptoms.

On March 8th the patient found "a lump" on his neck. When visited his temperature was 99°, and the pulse 108, and very weak. The swelling was on the right side of the neck, 3 inches above the clavicle, and 1 inch behind the outer border of the sterno-cleido-mastoid muscle. It was the size of a sixpence, and raised ½ inch above the surrounding skin. The edge was vesicular, and of a greyish colour. There was no inflammatory area round it, nor was there any induration or oedema in the tissues. The glands were not enlarged. Recognising that it was a case of anthrax, with the help of Dr. Sergeant the swelling was excised, leaving a wound 2½ by 1½ inches; this was swabbed with a spirituous solution of carbolic acid (1 in 10), some of which was also injected into the surrounding tissues.

On the following morning (March 9th) the patient said that he had passed a good night, and was free from pain. The temperature was 99°, and the pulse 98. About 1 P.M. he suddenly became blind, complained of pain in his head, vomited, and in half an hour was unconscious and very restless. At 5.30 P.M. the temperature in the axilla was 99.7°; in the rectum 102.2°. He was so violent—requiring two persons on

each side of the bed to restrain him—that the pulse could not be counted. There was no œdema or inflammation about the wound. The hands and feet were cold, the ends of the fingers were of a dark blue colour; the blood appeared to be stagnating in his limbs. The pupils were widely dilated, and there was left divergent strabismus. He continued unconscious, tossing about the bed until shortly before his death at 11 o'clock the same evening. Capillary tubes charged with blood taken from the ear at 5.30 P.M., when cultivated on gelatine, developed the bacillus anthracis abundantly.

On examination of the body forty-five hours after death there was much dark discoloration of the skin over and above the clavicle on the right side. The veins were very noticeable on both arms and sides of the chest. The finger nails were a dark colour, but the toes were natural in appearance. On opening the chest fluid was found in both pleural spaces. The pericardium contained an ounce and a-half of serum. The heart muscle was dark-coloured, and contained no clots. The valves were normal. The liver, kidneys, and spleen were engorged, and heavier than usual. On removing the calvarium and dura mater the brain was covered with blood effused between the arachnoid and pia mater, extending also round to the base but not into the ventricles. The brain appeared natural. Anthrax bacilli were numerous in the pleural and peritoneal fluids.

THE DANGER OF ANTHRAX FROM THE MANIPULATION OF HORSEHAIR, AND ITS PREVENTION.

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MODE OF INFECTION.

SOME time ago, as certifying factory surgeon, I had to report on a fatal case of anthrax, and while making my investigation I was deeply interested in the diagnosis, the genesis, and the prophylaxis of that dreaded disease. The notification of anthrax is obligatory, but on reviewing the literature on the subject, I was convinced that some cases, especially of the so-called internal type, were never recognised.

History.—I. C., aged 24, who had always enjoyed good health, was employed as a duster or cleaner in a showroom of a cabinetmaker's warehouse. On the morning of September 13th, 1900, she had a distinct rigor, and for 48 hours suffered from general *malaise*, headache, and vomiting. This was followed by swelling of the left cheek and the development of a boil or pimple below the malar bone. The forewoman assured me that she had observed this pimple three days before the girl had the rigor. On September 17th the swelling, which was now hard, brawny, and intensely painful, had increased to an alarming extent. On September 20th she complained of intense pain in the epigastrium and abdomen, and next morning she was removed to Belvidere Hospital, where she died three hours after admission, on the tenth day of her illness.

Progress.—(For the following notes I am indebted to Dr. J. C. McClure, Senior Assistant, Belvidere Hospital). Since the onset of her illness, the patient had suffered from sickness, vomiting, and ever-increasing pain. On admission the girl was collapsed; temperature normal; pulse practically uncountable; and respirations sighing. The pustule on the left cheek had increased in size till now it measured $2\frac{1}{2}$ inches across. Scrapings of the pustule during life showed typical anthrax bacilli.

Post-mortem Examination.—Within 24 hours after death a post-mortem examination was made, and cultures of anthrax bacilli were obtained from pericardial fluid, ascitic fluid, spleen, and heart muscle. Malignant pustules of large size were found in the stomach, while numerous smaller ones were found in the intestines. It is interesting to note in connection with the presence of these pustules in the stomach and intestines that her brother voluntarily stated that the patient was in the habit of chewing hair.

This direct inoculation of the mucous membrane was a new phase of the disease, so unlike that produced by the digestion of infected meat that I was led to make further inquiry. The nature of the woman's work when sweeping the floor and dusting the furniture caused the air to be impregnated not only with dust, but also with small pieces of hair, and the forewoman declared that she had frequently seen such bits of hair adhering to the lips and angles of the mouth of the deceased, and that these were nipped by her incisors. This, I think, explains the brother's statement.

When endeavouring to trace the source of the infection I was permitted, through the courtesy of the employers, to examine their workroom journal, and learned that from September 1st consignments of hair had been received on the following dates: September 3rd, 7th, 8th, and 10th; but as

to the original source of the hair I could get no information. The period of incubation in anthrax cannot be definitely stated, for it varies under certain conditions; the bacillus acts much more quickly than the dried spore, and in the form of inoculation it depends entirely on the receptive condition of the abraded surface. Bearing in mind then that the eschar was first noticed on the woman's cheek on September 9th, we may safely assume that the bale received on September 3rd was the one which carried the poison. All the hair received on the dates mentioned had been supplied by one firm, at whose factory I learned that two of their employees had suffered from anthrax. One woman had died suddenly on September 4th, and on bacteriological examination of her blood it was found to teem with anthrax bacilli. The other case recovered.

Owing to the veterinary regulations of our public slaughterhouses, the dangers from anthrax in native hair—which is chiefly used in this factory—are almost precluded, and in nearly every case the source of infection has been traced to Chinese, Russian, or Siberian hair.

About August 24th this firm had received a consignment of hair from Russia, which had been sent in bales, uncovered, and bound together with cords. To carry these into the factory the carter hoisted them on his shoulder, while the next to actually handle this hair was the unfortunate woman. Both were apparently infected about the same time. The life of the carter was saved by an operation on September 8th, but the poor woman, whose wretched habits and environment had greatly reduced her vitality, succumbed on September 4th. After being prepared, this suspected bale was mixed with other hair and despatched on September 3rd to the cabinetmaker's workshop; but it still carried with it the living and virulent germs, and I. C. was the next victim. It has now been used in stuffing mattresses, and unless these germs be finally annihilated—say by some beneficent fire—they may go forth once more to slaughter the innocent. No animal plague is so widespread, no disease is more far-reaching and dangerous in its results, and no disease is in its etiology so true to the physical condition of germ-laden dust.

In 1878-9 Dr. Russell, in a report to the Local Government Board, described 9 cases of illness, 5 of which were fatal, in horsehair factories in Glasgow. These were definitely ascertained by bacteriological examination to be due to anthrax, and in all these cases the infection was conveyed by Russian hair. The danger arising from the dust and dirt of foreign hair is so great that many persons not actually connected with these factories have been infected with the disease. Dr. Kübler, in his report on this disease to the German Imperial Health Office, states that between 1834 and 1888 two women had died of the disease who had mended the clothes of their husbands who were engaged in horsehair factories; that the mother of a workwoman had died of malignant pustule on the neck from having worn the scarf of her daughter, who had worn it round her neck at work in a hair factory; that a man engaged in using, as a manure, dust from a horsehair factory, developed a pustule on the arm; that in 1897 a man died at Nuremberg of internal anthrax who had associated much with brushworkers, and had regularly taken his meals with them, but had never been in a horsehair factory; that cases of anthrax had occurred among cattle in the neighbourhood of horsehair factories, and on such farms as had used hair refuse as manure. In his last report on anthrax, the Medical Inspector of Factories states that "the number of cases reported in 1899 is double that of 1898, and is due very largely to special incidence on the horsehair industry, which has not been observed in previous years." He also states that in the previous years cases had occurred which had not been reported. Certainly it is the case that the bacilli are sometimes so numerous in the poisoned blood as to interfere with the motions of the red corpuscles, and to prevent their forming rouleaux, and even give rise to hæmorrhages; but it is a curious fact that in the gastric or pneumonic variety of the malady no large development of these organisms seems to occur till just before or just after death. Further, it has been observed in the pustular form of the affection that while bacilli may be present in the serum of the vesicle, they may be entirely absent from the blood taken at its base. It may be assumed, then, that an early