

AN UNDESCRIBED DISEASE AMONG HARES.

By T. S. P. STRANGEWAYS, M.A., Huddersfield Lecturer on Special Pathology in the University of Cambridge.

DURING the last few years an outbreak of what seems to be a hitherto undescribed disease has occurred among the hares on certain of the north-west Lancashire estates.

The disease was first noticed on Lord Derby's estate at Treales. A year or two afterwards it appeared on the Lytham estates, and it has since spread over a considerable portion of these. There is good reason to think that the disease was imported to the Lytham estates from Treales by an exchange of bucks that took place a year or two after the disease first broke out and before the keepers realised its infective nature. There have been a few cases of the disease on neighbouring estates, but it has not spread on these to any extent at present. On the Lytham estates the disease is very prevalent; in some parts 75 per cent. of all hares are diseased, and at a big shoot a week or two ago 25 per cent. of the hares killed were found to be affected.

Tradition speaks of a disease resembling the present outbreak occurring on one of the estates adjoining that of Lord Derby's about twenty years ago, but we have not yet been able to confirm this rumour.

Hares affected show characteristic signs; they become thin and weak, and an animal suffering from the disease in a severe form can easily be recognised, as it runs weakly and straddles its hind legs in a peculiar way.

The lesions caused by the disease are also marked and characteristic. In typical and moderately severe cases a mass of granulation tissue usually forms around the external genitals. This is considerably raised above the surface of the surrounding parts and is often ulcerated. As a rule the anus seems to escape, though in some cases it is involved. In the buck, the penis, and in the doe, the interior of the vagina are healthy, the changes being confined to the skin covering and surrounding these regions. The nose and lips are also frequently attacked by the disease, but the appearance of the lesion is somewhat different. In early stages a small scab forms, usually on the upper lip, but at times on the lower, the thick hair covering these parts evidently helping in this scab formation. The lesion slowly spreads, until in many instances a considerable portion of the nose and lips is involved. As the condition becomes more severe ulceration takes place and the scab is replaced by a mass of soft red granulation tissue. This ulceration continues to spread and eat away the surrounding and deeper tissues, so that in advanced cases the animal presents a most pitiful sight. In spite of these pronounced and severe changes the lesion remains confined to the lips and nose, and, while the animal is living under normal conditions, does not seem to extend to other parts of the face. The mucous membranes of the mouth and nose are not involved even in serious cases.

We have examined the internal organs of a great number of hares killed on the estate, and in all cases these have been found healthy except that in a few instances the testicles or ovaries had undergone

a caseous change. Besides the lesions above mentioned, there is always in advanced cases great wasting of all muscles and absence of fat.

The changes described above may be found either around the external genitals or on the nose and lips; in many cases, however, they are found in both situations.

Animals kept in captivity suffer more severely than those living under normal conditions. This seems due to the greater liability to injury of the lesions. Experimentally it is found that if the lesion is injured it begins to increase in size and to spread rapidly. The invasion of the deeper tissues then becomes more pronounced than under circumstances where injury has not occurred, and soon reaches the bony parts. The bone is laid bare and death follows with the usual wasting and weakness.

On examination after death interesting changes are observed which we have not yet found in animals that have not been thus injured. These changes are the formation of small abscesses, containing inspissated pus, in various organs. In one instance the lungs, in another the liver, in another the diaphragm and peritoneum were affected, and in another case all the muscles of the body, including the heart, were riddled with small abscesses about the size of No. 14 shot.

The disease may terminate in either death or recovery. Death occurs in a large number of instances, dead animals being frequently picked up by the keepers. These are always extremely wasted, and have doubtless died from exhaustion. On the other hand, recovery is also possible, and animals are often killed with the lesions healing or absent, the only sign being in some cases the thin and weak condition of the animal. In one hare under observation at Cambridge complete recovery has taken place. On the other hand, there is no doubt that the disease may last a long time without terminating either in recovery or death, the lesions appearing to remain stationary.

A large number of the animals, both living and dead, suffering from the disease were sent to us at Cambridge, from which a number of observations have been made to determine the cause of the disease and also the means by which it spreads. In all cases examined we have found a diplococcus present in the inflamed parts. This diplococcus grows readily on all ordinary media and in broth. It stains readily with methylene blue and retains the stain by Gram's method. Sections prepared from the diseased tissues show well-marked inflammatory changes. The blood-vessels and capillaries are dilated, and there is a distinct infiltration of the tissues with leucocytes. When the granulation tissue has formed, beautiful loops of new blood-vessels are seen. Diplococci are also found, but are not numerous.

Sections of the small abscesses referred to above show the usual inflammatory changes in their walls, and numerous diplococci can be demonstrated. In order to determine how the disease is spread, we have made a number of experiments; these are not yet complete, but the following observations serve to indicate its infective nature.

Into cages in which some of the diseased animals are kept, rabbits and guinea-pigs were introduced, in order to see if the disease could be transmitted to animals living in close contact with those diseased. For some days no result followed, but eventually several of the animals developed typical lesions on the nose and lips. These

animals got rapidly thin and weak, and some have died. A diplococcus was recovered from the lesions. There can be no doubt, therefore, that the disease may be transmitted from one animal to another if living in close contact.

Into a cage in which a hare had been previously kept, a rabbit about to have young was placed. Three of the litter developed typical lesions shortly after birth, one showing a scab on the top of the head between the ears, and the other a scab around the right eye. Both these young rabbits died from exhaustion in the same thin and wasted condition as the other animals. From the lesions a diplococcus was recovered.

The third young rabbit is still alive, but gradually becoming weaker. The mother, although free from the disease at first, is now suffering from it, two of her mammary glands being affected, and her condition such that death must shortly occur.

Several of the rabbits, hares, and guinea-pigs were inoculated by rubbing an abraded surface on the skin with the material taken from the ulcerating scabs, and in a certain number of cases a typical lesion followed. Infective material inoculated in the conjunctiva of the eye led to inflammation of the conjunctiva; this after a few days subsided, but was followed by the formation of a typical scab around the eyelid.

A rabbit inoculated with the same material on the vagina developed signs of the disease.

Intraperitoneal injections of this organism into rabbits and guinea-pigs were made, and death followed within a few days, the blood and the peritoneal exudate containing large numbers of the diplococci.

The peritoneal exudate from an animal thus treated injected into another rabbit caused death within a day or two, and the same organism was recovered from the blood and peritoneum. The peritoneal exudate of this animal again injected killed a full-grown rabbit within a few hours.

The inoculation of the animal with organisms grown on artificial media has also proved successful, but is much more difficult, apparently from the decrease of virulence on culture. In two instances, however, typical lesions developed.

With regard to the origin of the disease, we are inclined to think that it is due to the diplococcus referred to above, but refrain from expressing a decided opinion till we have had further opportunities for studying the disease. In any disease of the skin it is desirable to be very cautious before describing a micrococcus as the cause, these organisms being so plentiful under normal conditions. We have, however, been unable to find any other organisms constantly present in the lesions.

The question naturally arises as to whether the disease is due to the bacillus of necrosis which causes lesions similar to those described above in a number of animals, especially in rabbits. We have naturally sought for this organism, but so far have failed to find it in any case. This preliminary note is published with a view of calling attention to the disease, and especially to ask for information with regard to the past or present outbreaks; and we shall be glad if any reader in a position to give such information will communicate with us at the Pathological Laboratory, Cambridge.