

# On an Infectious Foot Disease in Sheep.

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## I.

IN May, 1910, we received from J. P. Meyer, Esquire, of Rietvlei, near Johannesburg, two feet of a sheep, with the information that he had been experiencing a lot of lameness among his sheep, which in some instances became so serious that he had to kill the affected animals.

The two specimens were referred to as No. 1 (coming from a case which had been in existence for a year) and No. 2 (from a case of a month's duration) respectively. Mr. Meyer stated that the disease commenced above the hoof and finally invaded the hoof itself.

The specimens were examined, and the following notes were taken:—

*Specimen No. 1* showed pronounced deformation in length and growth of the horn of the foot, probably due to an affection of the matrix. The matrix of the coronary band showed ulcers and a thick growth of fibrous tissue. It was apparently a sequel to case No. 2.

*Specimen No. 2.*—The skin of the coronary band was covered with a blood-stained, dry crustation, and free from hairs; the matrix of the coronary band was thickened and tumified. The deformation of the horn was just commencing.

The microscopical examination proved the absence of the necrosis bacillus which was suspected to be present, but bacteria of different species were noted.

The cases were diagnosed as an inflammation of the skin, probably of an infectious nature. No definite opinion could be given as to the cause of the disease itself, although it was expected that some micro-organisms would be responsible for the inflammatory process.

In order to trace these organisms, fresh cases would be required, so that the necessary experiments could be undertaken with living material.

Accordingly, Mr. Meyer was asked by us to send a living sheep to the Laboratory, to which request he willingly complied, and forwarded us an affected sheep, which arrived here on 25th July, 1910. The description of the case was as follows:—

*Sheep, Persian, numbered 2763.*—Lame on near front leg. There was an ulcerating wound in the coronary band, and on pressure a white pus appeared on several places in and on the border of the wound. The horn below the ulcer was loose, and it was found that the ulcer penetrated into the matrix of the lateral hoof wall, reaching almost as far as the sole. On the coronary band of the off hind foot was also an ulcerating wound, limited to the coronary band, and about the size of a sixpence. It was covered with a crust, on the margin of which pus escaped on pressure. Accordingly, we probably had to deal with the same affection on both places, a first and initial one on the off hind foot, and an advanced one on the near front foot.

## II.

This sheep was kept under observation, and, with the exception of an aseptic bandage, no treatment was applied. The object was to find out whether the affection as observed on the Persian sheep could be transmitted to other sheep by inoculation, and, if such proved to be the case, whether any specific organism could be found which, when inoculated into healthy sheep, would produce the same lesions.

On the 12th of July, 1910, two sheep, Pérsian (one not numbered, the other marked with red paint), were scarified superficially on the coronary band of the near fore foot with pus collected from an ulcer on sheep No. 2763.

Persian sheep Nos. 2234 and 2168 were scarified between the claws of the near hind foot, and the same material was placed on the superficial wound. All the feet were then bandaged with an aseptic linen bandage in order to prevent any outside contamination.

Two days later the examination of the feet revealed the presence of a swelling, hot and painful. There was a crust on the place of operation on the "red paint" sheep and on Sheep No. 2234. In the unnumbered sheep and sheep No. 2168 the place of operation was tumified, and on pressure small drops of pus escaped on several places where the scarification had been made.

On the 14th of July, 1910, the "red paint" sheep and sheep No. 2234 showed a wound with a superficial necrosis; the "no number" sheep and sheep No. 2168 were discharging pus on pressure.

On the 15th of July, 1910, sheep No. 2234 had a superficial ulcer between the claws, about the size of a sixpence in circumference, with a yellow deposit on its surface.

*Sheep No. 2168.*—The place of operation was much swollen and very painful, and on pressure pus escaped at several places.

*"No number" sheep.*—The wound between the claw reached about the size of a sixpence in circumference, and was discharging pus very freely.

*"Red paint" sheep.*—The place was much swollen and painful, and on pressure pus and blood escaped.

In the course of the following days all the wounds sloughed the skin, and an open ulcer appeared, discharging pus.

In order to prove the infectiousness of the discharged pus in the wounds of the foot for other parts of the skin, it was decided to smear the pus on to scarified wounds on the forehead. Each sheep was treated with its own pus. In the course of the next few days the same symptoms were noted on the head, viz., a painful swelling, first with blisters of the surroundings and redness, painful when touched, and the formation of pus, which on pressure escaped, and finally sloughing off the skin on the seat of operation as far as the inflammation had formed an abscess.

There was accordingly no doubt that the cause of the ulcerating wound was due to a virus which propagated when transplanted into the skin. It remained to isolate the organism to obtain it in a pure state, and then again to transplant it in order to produce the same lesions as described beforehand.

## III.

*The micro-organism.*—When the pus of the original sheep (but particularly that of the inoculated one) was spread out in a smear preparation and stained in the usual way, a small bacterium could be

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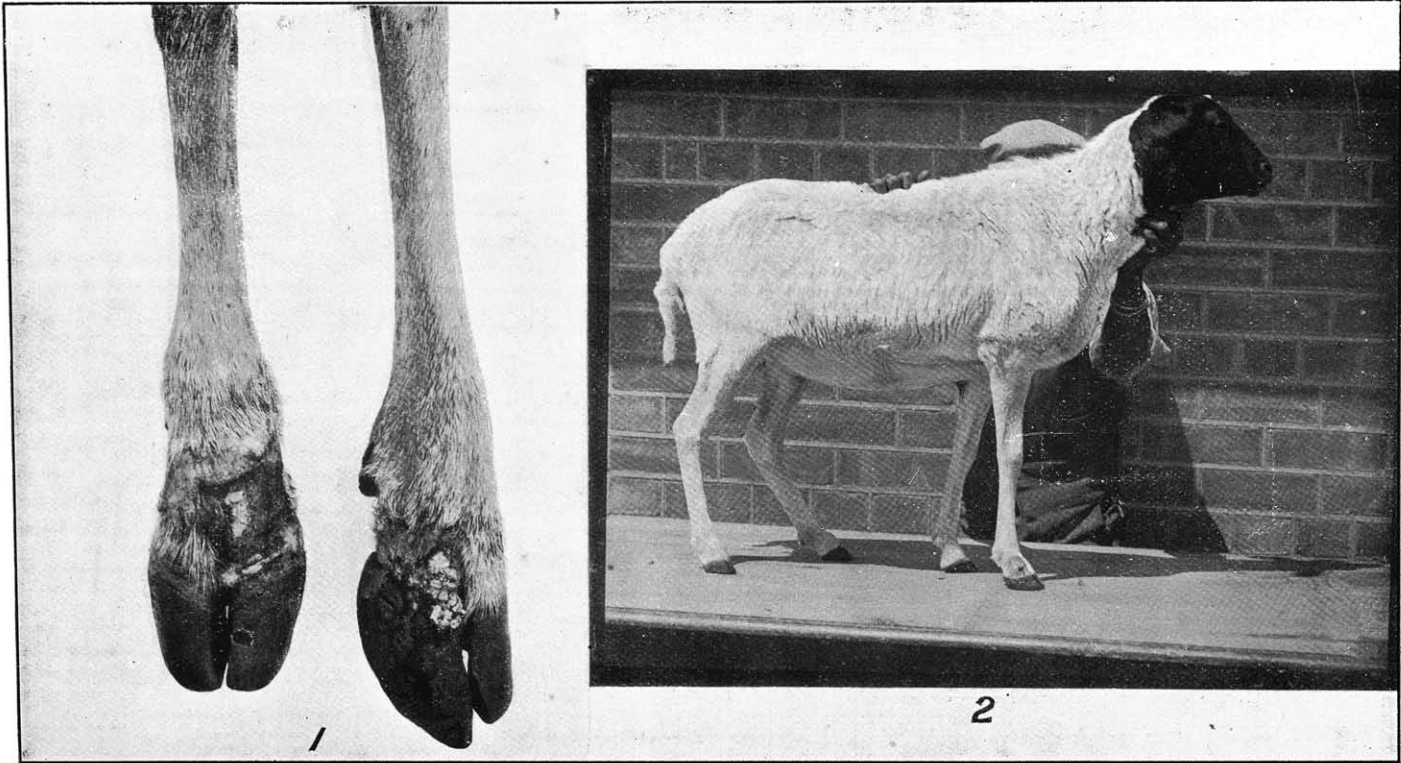


Photo No. 1.—Photograph of the two feet forwarded by Mr. J. Meyer. (Right side) Specimen No. 1. (Left side) Specimen No. 2.

Photo No. 2.—“Red Paint” Sheep.

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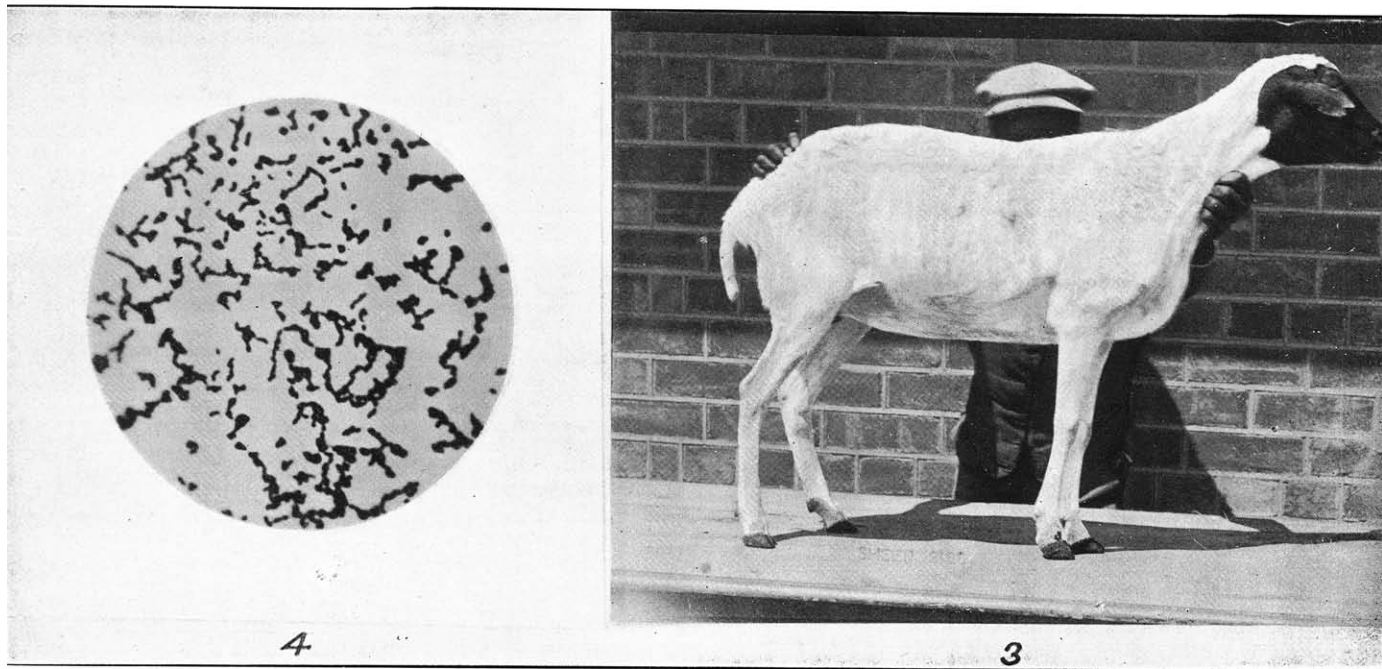


Photo No. 3.—Sheep No. 2168.  
Photo No. 4.—Micro-organism of the disease (from a pure culture).

seen to be present in great numbers, but there were also other bacteria present, viz., cocci. When the *Gram* method was applied the small bacterium took the black stain, and by this means its size and numbers could easily be traced. Pus of the inoculated sheep was spread on the slanting surface of a Martin Agar tube, when, after a day or two, transparent droplets appeared, growing not larger in size than about that of a pin's head. The droplet was transplanted on to a new tube of slanting agar, and, by means of the condensed water present, spread all over the surface; over this a thin, transparent film grew, but never developed into any thick layer; it remained practically stationary after it had grown into the film. The film consisted of a dense aggregation of very fine droplets. When this culture was examined under the microscope it proved to consist of the above-described bacterium in a pure state.

Transplantations were made on different media, but there was no improvement in the growth observed in the originally used Bouillon-Martin-Agar.

In order to obtain sufficient culture material for inoculation purposes, bouillon was added to the slanting agar containing the growth, which was then detached and developed freely in the liquid. The emulsion was then applied to the scarified surface on the skin of the coronary band, similar to the original transplantation; but out of four sheep only one developed a typical ulcer. It is very likely that the material in emulsion form was not viscid enough to adhere in the wound. Accordingly it was decided to inject a few drops of the culture emulsion into the skin of the forehead of the sheep. The place of injection was shaved and disinfected, as was done in the case of a control sheep, which was, however, not injected. On the place of the injection a swelling appeared in the inoculated sheep with an inflammation of the skin, the swelling rising above the surroundings and reaching about the size of a hazel nut. The swelling burst in the course of the next few days, and a sanguilent pus escaped when slight pressure was applied. Then an ulcer developed, discharging pus, which gradually healed up.

The microscopical examination again revealed the presence of the typical bacterium abounding in pure culture. The control sheep did not show any reaction. Thus it appears that the bacterium is responsible for the formation of this ulcerating disease, which, accordingly, need not necessarily be limited to the coronary band of the foot, although that part represents possibly the seat of predilection, probably because wounds frequently occur there.

#### IV.

A disease of sheep known as "Foot-rot" is sometimes very frequently met with in rainy weather on wet places. It must also be due to some organism which, under the above-mentioned conditions, finds its best chance to enter into the skin of the foot and to develop there. It remains yet to be seen whether the bacterium just described is also responsible for that affection.

#### V.

*Treatment.*—The foot evil described does not require any specific treatment, except one which applies to all ulcerating wounds, viz., thorough cleaning of the wound, preferably by means of warm water and a disinfectant, such as carbolic acid, 3 per cent.; Pearson's antiseptic, 3 per cent., etc., and a dressing of the wound by means of a disinfecting and astringent ointment.