# Ecthyma Contagiosum of Sheep and Goats.

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This disease in sheep and goats has only recently been brought to our notice, although it must have been known in South Africa for a considerable length of time under the name of "vuilbek." It is also likely that the name "simple aphtha or thrush," said to be more common in lambs and kids than in older animals, is the same disease. Perhaps also the disease "sore mouth," "malignant aphtha," or "stomatitis of Angora kids" has to be grouped under this name since in true "vuilbek" the eruption can also break out in the mucous membranes of the mouth. In 1920 Zeller gave a comprehensive publication "Ueber Pocken bei Ziegen Süd-West Afrika's." Sigwart, a Government veterinarian in Otjiwarango, forwarded to Zeller in 1914 material preserved in 50 per cent. glycerine, that he had collected from goats, and transmission experiments were made in Berlin that proved successful both in goats and sheep. In November, 1921, Aynaud of Chartres made his first communication on the "chancre du mouton," which he identified with the "ecthyma contagieux des lèvres," mentioned by Moussu, and followed it up with a complete description in 1923. Meanwhile in 1922, the disease was also reported from Greece by Blanc, Melanidi, and Caminopteres under the title "Recherches expérimentales sur une maladie eruptive de la chévre observée en Grèce." These three publications practically exhaust the subject, and but little can be added.

We propose to accept the name *Ecthyma contagiosum*. We had occasion to observe it several times, but a particularly good occasion offered itself in July, 1926, when it appeared amongst lambs of our stables. Since then it disappeared and reappeared several times both in sheep and goats, but to a lesser extent in the latter animals.

We repeated the transmission experiments successfully and were able to confirm the data given by the above-mentioned authors in practically all the points which we investigated.

Since, however, no publication has appeared as far as we know from observations made in the Union itself, we propose to describe our observations and bring them into relation with those published.

## The Natural Disease.

It is rarely that the disease appears in a sporadic form, attacking only one individual at a time. Most commonly it appears in a number of sheep at the same time, or in close succession. This was particularly the case in our observations when a number of sheep packed together in one box showed the disease simultaneously, apparently having been infected from a common source. Subsequently to this, we have seen it spreading through the premises and then finally disappearing to reoccur at a later period, when more or less the same observations would be made.

It is particularly the lambs that are subject to the infection, but we have also seen some older sheep suffering from it. The remarkable fact, however, was established that only a portion of our sheep concontracted the disease, although all must have been exposed to the infection repeatedly. This would indicate that under natural conditions the disease is more widespread than we know at the present time and that the older sheep have passed through it at one time or another and were immune when they arrived at our station. Our transmission experiments were made on young sheep, but from the publications mentioned, it follows that older sheep can successfully be infected, thus proving that it is not the age that provides the protection.

*Symptoms.*—The disease consists in an eruption of the skin just around the mouth, on both upper and lower lips. This eruption consists of wart-like protuberances covered with a crust or scab, which when removed may leave a bleeding, elevated surface. These crust-covered warts may be single, or there may be several, separated one from the other, placed in the vicinity of one another or distributed over various places. They are either in the outer surface of the lip or on the margin of the lip, and even in the mucosa covering the inside of the lip. We have also seen them spreading from the lip on to the neighbouring skin, a distance away from the rima oris, on the nose, in particular in the neighbourhood of the commissurae. When they are spread over a larger surface, the mouth takes a peculiar appearance and the affection can be recognized from the distance. The crusts are usually brown, in the older stages they are fairly easily removed, but when still young, they leave usually a bleeding surface. In the mature stage they fall off and when the process has healed underneath, no scar is formed.

Aynaud states that the eruption can take place in the mucosa of the mouth itself, the buccal membrane of lips, cheek, and gingiva and on the tongue itself. In this case, much salivation is present and a foetid odour is noted to emanate from the mouth and the animals stop feeding. We have not met such cases, but there is no reason to assume that it does not occur in South Africa, and the disease described as aphtha and stomatitis in Angora kids may represent such a form.

On closer examination of the mouth of the sheep, one can occasionally detect the initial stages of the eruption, of which the crusts are only the final stage. We then notice a papilla-like raising of the skin or mucosa, the presence of small vesicles and small pustules. The sequence of the various stages is, however, best studied in sheep in which the disease has been artificially transmitted by cutaneous inoculation.

In the earlier stages, or where the crusts and scabs are extensively developed, a swelling of the lips can be observed, sometimes salivation can be noticed. Sheep affected with the disease show no fever, although such is observed in inoculated sheep after fairly extensive scarification. Likewise we did not notice that sheep showed inappetence or anorexia or that their temperaments were in the slightest affected.

Whilst the mouth is the predilection seat of the affection, it is not the only place in which the eruption can be seen. We have noticed it to occur on the udder of a goat appearing simultaneously with the eruption on the mouth. In this case it is likely that the virus which attached itself primarily to the mouth was transmitted to the udder by licking.

The disease lasts about ten to fourteen days and complete recovery takes place.

We have not seen any mortality or any secondary complication that could be connected with the primary disease. According to Aynaud, such complications do occur in France, and particularly in that form in which eruptions are appearing on the mucosa of the mouth itself. Broncho-pneumonia and abscesses in the lungs represent these complications.

### The Artificially Transmitted Disease.

Transmission succeeds easily by scarification of the skin and rubbing into it an emulsion of the crusts. The most suitable place, both in lambs and kids is the upper portion of the inside of the thigh and the posterior abdomen, which in lambs is free of hair or wool, and in kids only sparsely haired. We accepted the methods similar in use for the production of vaccinia in calves and succeeded in this way to obtain large quantities of virulent material. If at the same time parts of the skin are shaved, sufficient scratches will result, in which isolated eruptions will occur most suitable for the study of their evolution. After about twenty-four to forty-eight hours, there appears a red circle that increases in redness and in circumference within the next day. The centre of the area is raised to form a papilla and sometimes within a small vesicle is formed that soon goes over into a pustula. This pustula in the beginning is glistening, but soon becomes turbid, is raised and extends into the circumference. It is fairly sharply delineated. It disappears and in its place a crust is formed that increases in size, but in the course of time contracts and dries gradually out and crumbles up until it loosens and falls off. The whole period may last a fortnight, rarely more. However, not all the papillae, vesicles, and pimples appear simultaneously. During the first portion of the fortnight, almost every day fresh papillae, vesicles and pustules can appear, so that the various stages may be present at the same time.

The same phenomenon can also be observed in the naturally contracted disease on the lips of some sheep, in which for a time almost daily new eruptions occur, until the lips are wholly covered with crusts. When, however, the first crusts have reached what may be called maturity, the successive eruptions come to an end.

The evolution of the eruptions in the scratches arranged in parallel lines by a forklike scarifier is not so clear, but the various stages can be distinguished all the same. After a day or two, the circumference of the striae begins to redden and into the striae a clear liquid exudates that changes into a transparent yellowish crust. The walls of the striae are raised and in several places on the walls vesicles appear, most of which soon burst and give rise to new crusts of a similar appearance as those described. The longitudinal infiltrated area is now deliminating itself most markedly and forms a distinct flat elevation in which at some places white pustules appear covered with a thin, transparent, glistening cuticle. These pustules coalesce and the whole protuberance has the appearance of a superficial collection of pus. It is succeeded by the formation of a brown scab that covers the whole surface, but soon cracks, and fissures break it up in various directions. The infiltrated area swells, more liquid seems to exude into the scarified places, so that the formation becomes soft and is easily rubbed off. Accordingly defects in the crusts,

oozing, bleeding sores appear, that all dry up together into a brown eschar, along the original scarification wounds. Finally the scab so formed begins to peal off and piece by piece disappears, leaving a clean surface, in which the striae remain where deeply drawn, or disappear entirely when the surface has only been slightly scratched. The process of scab formation is about the tenth day in its maximum and in about three weeks it has healed out. Swelling of the skin is sometimes very marked and throws it into wrinkles and folds. The lamb shows a distinct fever during this period, of a remittent type that increases from day to day until it has reached a maximum with the formation of pustules when it gradually returns to normal. This fever, however, was only seen in lambs in which extensive scarification was carried out for the mass production of virus. When only a limited number of scratches was made, no fever was observed.

We have not seen any mortality even in lambs very heavily infected nor any secondary complication. All healed out in due time.

### Histological.

The pathology of the eruption has been studied by Zeller and Aynaud. In its typical stage of a vesicle or pustule, the details of changes are seen in the Malpighian layer of the epidermis and resemble to some extent that found in vaccinia. Later white corpuscles invade the eruption and their surroundings, and the process becomes that of a suppurating dermatitis with hypertrophy of the papillae during the acute process.

### Susceptibility of Various Animals.

As already stated, we met with the natural disease both in sheep and goats and particularly in lambs and kids. We had no difficulty in transmitting the disease from natural cases of lambs to kids and vice versa, and we have seen no difference in the clinical picture produced after subinoculations through a series of generations. Experiments to transmit the disease to calves have in our experiments not given conclusive results. The eruptions on the scarified surface of the abdomen, similarly carried out as in vaccinia production, have given abortive results. Zeller was not able to produce an eruption in calves, whereas Aynaud succeeded.

The smaller laboratory animals were not tested, but according to the French, German, and Greek authors, they all proved refractory. Also the dog, the horse and the pig proved refractory in the experiments of Aynaud.

### The Nature of the Virus.

According to Aynaud, the virus is filterable, but results are obtained with great difficulty. He succeeded, however, with fresh lymph, strongly diluted and he used the Berkefeld candle V. and Chamberland L. 1 and L. 1 bis. Also Blanc and his co-workers succeeded. They used the candle L. 2. Zeller did not succeed in all his experiments with filtrates passed through Berkefeld filters V. 5 cm. and 20 cm. long and Nordtmeyer Berkefeld filter 15 cm. long. He had, however, in one-third of his experiments positive results, but suggests nevertheless the possibility of accidental infection. Our experiments were carried out with Seitz asbestos filter and Chamberland filter. We used fresh virus which was diluted with physiological water after the emulsion had been shaken for twenty-four hours in a shaking apparatus. The filtrate was rubbed into the

scarified skin after it had been proved by culture not to contain any culturable organisms. Our experiments gave negative results, but in view of the failures obtained by other authors, we do not consider them to be conclusive. If we mention them, it is only to show that the filtration is apparently connected with difficulties.

### The Resistance of the Virus.

In conformity with all other observers, we have found that virus is easily conserved in glycerine. We conserved the scabs in a 50 per cent. solution of glycerine for weeks and months. The infectivity is also preserved in the dry crusts. Positive results were obtained by us with powdered crusts that had been conserved for fourteen months. This longevity of the virus explains the fact that e.g., in our institute cases, the disease occurred at long intervals and in the same stables where we observed the original outbreak. Apparently the dry crusts that fall off maintain the infection in the boxes and mangers from which sheep may become infected. Aynaud and Zeller have carried out a series of experiments and have studied the virulency under various conditions from which it would appear that *Ecthyma contagiosum* has in most respects the same characteristics as that of *Vaccinia variola.*

### The Nature of the Disease.

*Ecthyma contagiosum* belongs to the group of eruptive infections of the nature of the variola in the different animals. Zeller, indeed, described it under the name of " Pocken der Ziegen." It is, however, evident that it cannot be identified with sheep pox. Its occurrence in the Union of South Africa where up to the present sheep pox has never been observed, excludes *a priori* such a possibility. Moreover, although individual eruptions, at certain stages, resemble pocks even in detail, the disease with its accompanying symptoms is different. We find *Ecthyma contagiosum* under natural conditions limited to the mouth and exceptionally to the udder; we do not find general eruptions on the wool and hairless localities and the high fever which is stated to accompany pox is absent. Cross immunity experiments were carried out by the Greek workers. They showed that pox immune sheep could be infected with Ecthyma and vice versa. The fact that the eruptions are almost always noted on the mouth and nose, and only occasionally on the udder, shows that the infection is a localized one due to the direct infection of the places mentioned. The lips are the places where small superficial scratches frequently do occur, in which the virus finds an opportunity to grow and develop. The infection of the udder is probably nothing else but an artificial transmission from the mouth. It has been stated before that during the first ten days, new pustular eruptions can break out alongside older ones, indicating that immunity does establish itself only after some time has elapsed, and accordingly during this period, transmission can take place from the mouth to other places which are rubbed with the nose or licked. Such a place is the udder.

### Economic Importance of the Disease.

This does not seem to be very great. Farmers have never sought our advice in this respect. The disease has, however, from a differential point of view some importance. It has been mistaken

for the catarrhal fever in sheep at the time when this disease was present and particularly in sheep that had previously been inoculated with the Blue Tongue Vaccine.

### Treatment and Prevention.

Treatment does not seem to be necessary. All our cases healed promptly without any interference on our part.

Prevention has never been asked for since it is a benign disease. However, the facts of its inoculability and the subsequent localization of the eruption would make it possible to vaccinate against the disease. Indeed Aynaud in France has introduced such a vaccination and under the peculiar conditions under which the disease is met in France, it would appear that such a vaccination serves its purpose.

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### Literature.

*Zeller, Dr. H.* "Ueber Pocken bei Ziegen Südwest Afrika." Arbeiten aus dem Reich gesundheitsamte. 25. Band. 1920, page 501.

*Blanc, Georges; Melanide, C.; Caminopteres, T.* "Recherches expérimentales sur une maladie éruptive de la chèvre observée en Grèce." Annales de l' Institut Pasteur. Tome trente sixieme, 1922, page 614.

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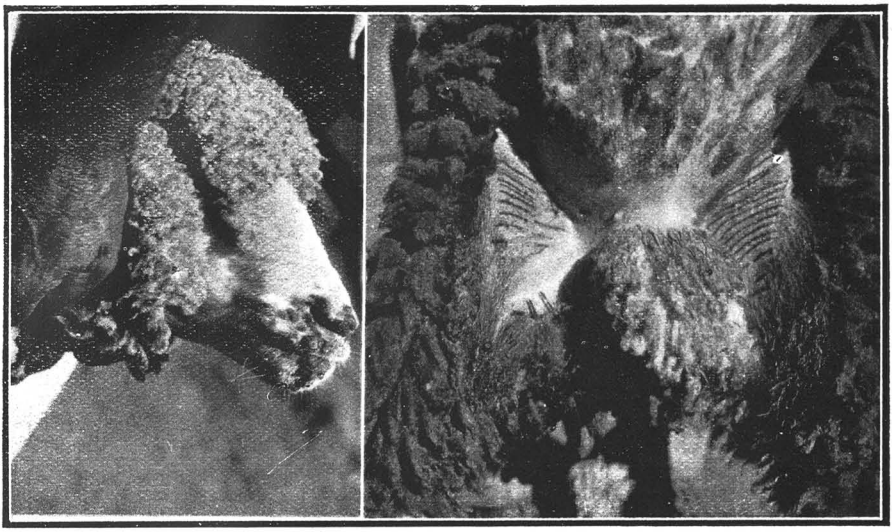
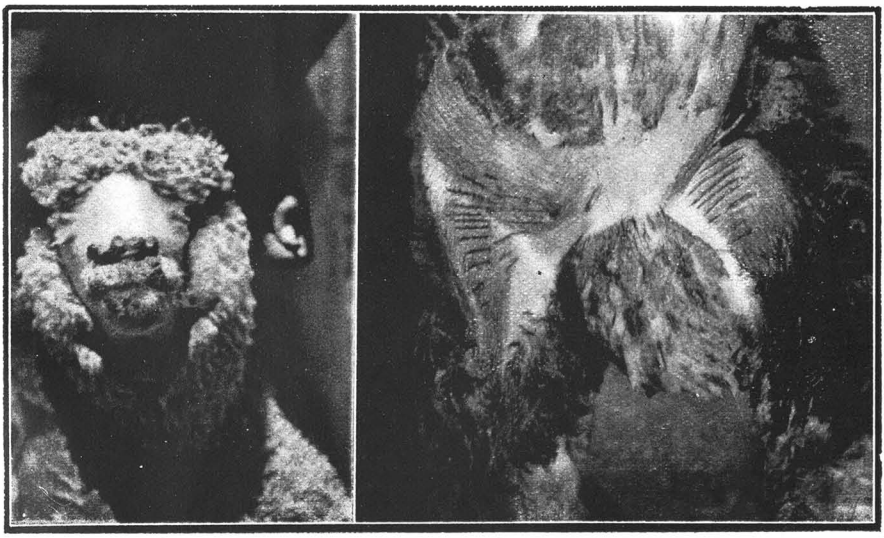
*Ecthyma contagiosum in Sheep.*

PLATE I.



Vuilbek. Ecthyma after scarification.



Vuilbek. Ecthyma after scarification.

*Ecthyma Contagiosum.*] [*A. Theiler.*