

THE ECOLOGY OF LICE ON SHEEP

III. DIFFERENCES BETWEEN THE BIOLOGY OF *LINOGNATHUS PEDALIS* (OSBORNE) AND *L. OVILLUS* (NEUMANN)

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Summary

Linognathus pedalis, which is found on the legs of sheep where the temperature near the skin can fluctuate greatly, was able to survive prolonged exposure to cool temperatures, whereas *L. ovillus*, which is found particularly on the face, and to a lesser extent on the body, could not. *L. pedalis* is more sedentary, congregates into clusters, and is most numerous on the parts of the leg covered with hair, whereas *L. ovillus* disperses, never forms clusters, and its populations are usually densest in the region of mergence between hair and wool on the face.

I. INTRODUCTION

Two species of blood-sucking lice of the genus *Linognathus*, the foot louse, *L. pedalis* (Osborne), and the face louse, *L. ovillus* (Neumann), are found on sheep in temperate zones. Although they are found on different parts of the body of the sheep, infestations show many similarities. Both species of lice are associated with the parts of the body covered with hair rather than those covered with wool. Their numbers increase during the winter to reach a maximum in the spring when they may decline rapidly (Scott 1950; Murray 1955), and in heavy infestations dense masses of lice may be found in the wool surrounding the predilection site. Furthermore, a detailed study of the influence of temperature and humidity on oviposition and egg development of *L. pedalis* indicated that the microclimates which are favourable for reproduction of these two species are similar (Murray 1960).

The studies reported in this paper were undertaken to determine whether there are differences in the biology of these species which are likely to influence their ecology.

II. DISTRIBUTION OF *L. PEDALIS* AND *L. OVILLUS* ON SHEEP

(a) *L. pedalis*

An examination of about 60 Border Leicester rams, which were all heavily infested with *L. pedalis*, showed that lice were most numerous from just below the fetlock to the knee or hock of the leg. On nearly half the sheep the lice had spread above the hock, onto the scrotum and the belly. On these parts they were present in one or two discrete clusters and few or none were found between the clusters. All stages of the lice were found in the clusters, and about 200 were present in one which

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was about 1 in. in diameter. Clusters of lice were also found on the legs of other sheep which were lightly infested. Frequently even in light infestations more than one egg was attached to a hair or wool fibre.

(b) *L. ovillus*

L. ovillus is confined to the face and the fleece which borders the face during the summer. As the numbers increase during the winter months so does the density of the lice in the wool surrounding the face, particularly on the cheeks and ventral aspect of the neck, and a few may be found scattered over the body. By spring the number of lice may have increased, so that in heavy infestations they appear as a swarm on the facial areas, and many lice of all stages may be found scattered over the body (Murray 1955). Such swarms usually become apparent first on the cheeks where the fleece has been removed during wiggging.*

Additional observations extending over two years have shown that similar variations in the seasonal abundance of *L. ovillus* occur on infested wethers, ewes, and rams. Lice may be found also on the hair and wool of the upper parts of the legs where their numbers increase as they do on the face, but few were found below the knees or hocks. Heavy infestations were seen on the hind part of the sheep particularly in the areas shorn during crutching.†

Lice were found to be scattered throughout the wool surrounding the face, frequently as single females surrounded by eggs, or as small groups of low density. As the number of lice on and around the face increased so did the density of lice in these groups, which eventually merged. The density of lice was frequently greater at the margin of the hair and wool surrounding the face, than on the face. Only in heavy infestations was more than one egg found attached to a fibre.

III. SURVIVAL OF *L. PEDALIS* AND *L. OVILLUS* AT LOW TEMPERATURES

Female *L. pedalis* were removed from sheep, divided into groups of 20–35 lice which were exposed to 2, 10, 15, and 22°C at 33, 54, 75, 92, and 100% R.H., and examined at regular intervals to determine the mortality. Nearly all the lice died by the 17th day at 2°C, and 50% died in 10–12 days at all humidities. At 10°C the majority of the lice died by the 11th day at 33 and 54% R.H., and 50% by the 7th day, whereas at 75, 92, and 100% R.H. most of the lice died by the 13th day, and 50% within 10–11 days. Similar results were obtained at 15°C, but at 22°C few lice survived longer than 7 days, and 50% died within 5 days.

In another experiment the mortalities of five groups of about 50 female *L. pedalis* and of a group of 50 female *L. ovillus* exposed to 12°C at 75% R.H. were compared.

* It is a common practice to remove the wool from around the eyes of sheep midway between annual shearings. This is known as "wiggging" and is carried out to prevent sheep becoming blinded by the long wool. On the property where these investigations were carried out, wiggging took place in late autumn.

† It is the practice to shear the wool of the escutcheon, buttocks, and tail region of sheep at least once, sometimes twice, between annual shearings, because this wool becomes fouled with faeces and urine and attracts blowflies. This procedure is called "crutching" and is frequently done at the same time as "wiggging", as on the property where these investigations were carried out.

Under these conditions both species of lice were inactive. Figure 1 shows that 50% of *L. ovillus* died within 3 days and that all lice died by the 5th day, whereas it was 7 days before 50% and 14 days before 100% of *L. pedalis* died. In another group of 30 female *L. ovillus* exposed to 12°C, 50% died within 3–4 days, and all died by the 6th day.

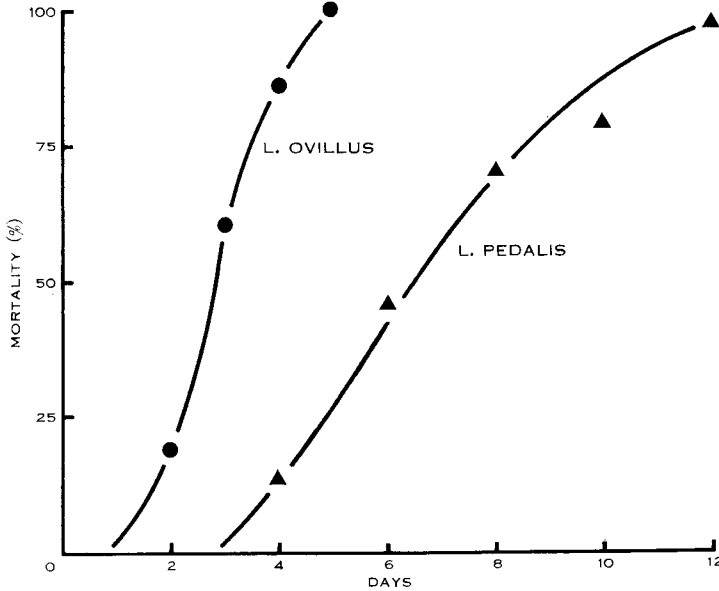


Fig. 1.—Mortality curves of *L. pedalis* and *L. ovillus* when exposed to 12°C at 75% R.H.

IV. DISCUSSION

There was a considerable difference in the ability of the two species of lice to survive off the sheep. The majority of *L. ovillus* females were dead within 4 days at 12°C. This louse is found on the face and body of sheep where the temperature next to the skin is usually 35–40°C. At 12°C, 50% of *L. pedalis* died within 7 days, and at 2 and 10°C it was within 7 and 10 days respectively. At 15–22°C no lice survived longer than 13 days, although Scott (1950) reported the maximum length of survival of *L. pedalis* at 18–20°C and 50% R.H. to be 18 days. The skin temperature of the legs of sheep can drop to nearly that of the atmosphere for considerable periods in cold weather (Murray 1960), so the ability of *L. pedalis* to survive low temperatures for several days without feeding would appear to be an adaptation to survive these fluctuations in the temperature of its habitat.

The behaviour of these two species of lice on sheep differed. *L. pedalis* formed discrete dense clusters as does *Haematopinus eurysternus* (Nitzsh) on cattle (Craufurd-Benson 1941; Matthysee 1946). In each cluster were present all stages of the life cycle, and several eggs were attached to a single hair. The lice were found frequently above the hocks and on the scrotum in heavy infestations, and usually none was found in the wool between the clusters. *L. ovillus* was never observed to form dense

clusters but dispersed throughout the wool. The pockets of lice in wool around the face were less dense and appeared to be formed fortuitously rather than to the lice being gregarious as were *L. pedalis*.

Thus, *L. pedalis*, which is found in a habitat where the microclimate is subject to great fluctuations, is able to survive longer exposure to low temperatures than *L. ovillus*, which is found in a habitat where the microclimate is relatively constant. *L. pedalis* is more sedentary and congregates into dense clusters, whereas *L. ovillus* disperses. Finally, the greatest density of *L. pedalis* is in the hair whereas that of *L. ovillus* is usually in the margin of the hair and wool. There are therefore major differences in the biology of *L. pedalis* and *L. ovillus*, and consequently it is to be expected that their ecology will differ considerably even though their microclimatic requirements for reproduction are similar.

V. ACKNOWLEDGMENT

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