

remaining five eggs, however, the mitosis had proceeded and in three of them the polar body had been formed. These five eggs thus exhibited signs of activation although no sperm had yet entered the vitellus.

Only nineteen eggs were observed in which there was an unchanged sperm within the vitellus. The infrequency of the observations connotes the brevity of this state. Most (fifteen) of these eggs showed signs of activation, including one in which the second polar body was visible. In the remaining four eggs sperm entry probably occurred just before the eggs were obtained for study; but some delay of activation is here indicated.

In 226 eggs the head of the penetrating sperm showed distinct changes, and in the majority (173) the second polar body had been formed. Some eggs (47), however, had chromosomes still in the telophase condition. In this series also there were indications both of early activation (one egg) and delayed activation (five eggs).

Finally, 124 eggs were observed showing the early stages of formation of the male pronucleus. The larger proportion (77) of these showed also the early female pronucleus; but the remainder (47) carried egg chromosomes still in the form seen after polar body formation.

Another group of immature rats was killed at a later stage, between 16 and 26 hr. after ovulation. Among these were 57 animals which yielded 228 eggs showing the various stages involved in the reappearance of the chromosomes and the formation and division of the first segmentation spindle. In none of these eggs was there any indication of a lack of correspondence between the male and female elements.

From these observations the following conclusions are drawn. There is a fairly close correlation between the male and female elements in the early phase of fertilization of the rat's egg. While the sperm is in the perivitelline space, the egg chromosomes are nearly always in metaphase. After the sperm has entered the vitellus, but before it has undergone perceptible change, the egg chromosomes are mostly seen in anaphase or telophase. The mitosis evidently proceeds very shortly after sperm entry. Soon the sperm head shows changes in form, and by the time these have become distinct the polar body is abstricted. Nearly always the early form of the male pronucleus appears before the female (47 eggs had only the male pronucleus; only one egg had solely the female pronucleus).

Activation of the egg may occur before the sperm has entered the vitellus, though the sperm head may possibly have broken the continuity of the vitelline surface. On the other hand, activation may occasionally be a little delayed. For these reasons the correlation seen in the early stage of fertilization is incomplete. Later, however, a closer correspondence is observed and is especially evident at the stages immediately preceding segmentation. Apparently a co-ordinating influence in the egg becomes effective in the course of fertilization.

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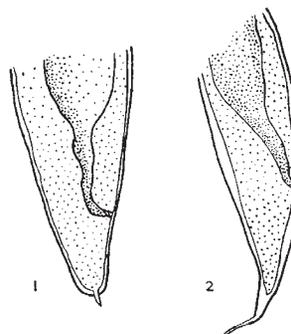
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### A New Species of *Nematodirus* in Sheep

OUTBREAKS of parasitic disease in lambs have occurred in the north of England during June and July 1951. Deaths have been associated with the presence of large numbers of nematodes of the genus *Nematodirus*. We are grateful to Mr. W. Lyle Stewart, who sent us the contents of the intestines of five lambs which had been sent to him for examination. About two million worms were received, and the collection was remarkable not only because of the large numbers but also because more than 90 per cent of the worms belonged to the genus *Nematodirus*. Examination showed that there were no *N. spathiger*, a large number of *N. filicollis* and a large number of a third species of *Nematodirus*. This last species cannot be referred to any known member of the genus, and it is proposed to name it *Nematodirus battus*. The description is as follows.

*Nematodirus battus* n.sp. Body attenuated anteriorly. Mouth surrounded by six papillæ. Cephalic cuticle dilated. *Male*: Length 10–13 mm., maximum diameter 0.12–0.13 mm. Bursa with two large lateral lobes; dorsal lobe small. Ventro-ventral and latero-ventral close and parallel; laterals arise from a common trunk, diverging in the distal half; postero-lateral and medio-lateral not parallel; externo-dorsal arises close to the base of the dorsal ray, which is doubled and has bidigitate extremities. Spicules filiform, 0.85–0.95 mm. long; tips united by a membrane; end bluntly pointed. Gubernaculum absent. *Female*: Length 17–22 mm., maximum diameter 0.16–0.22 mm.; vulva in the posterior third of the body. Tail pointed. Eggs large, 195  $\mu$   $\times$  95  $\mu$ . Host: *Ovis aries*. Location: small intestine.

This species can be distinguished from others of the genus by the fact that the tail of the female is not truncate but finely pointed, and that the bursa of the male has the medio- and postero-laterals divergent and not parallel.



(1) *N. filicollis*, tail of female; (2) *N. battus*, tail of female

A more detailed description will be given elsewhere; but the above description is provided to enable observations to be made during the present outbreak. This species can be most rapidly separated from *N. filicollis* and *N. spathiger* by examination of the tails of female worms (see Figs. 1 and 2), and it is hoped that other workers may contribute information on the distribution and biology of this worm.

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