its prey, *Lithobius* seeks a soft spot by prodding with the poison claws; grips firmly with the 2nd maxillæ (sometimes assisted by the poison claws) and gnaws with the mandibles, the muscles of which can be observed through the integument of the head. I have often observed one *Lithobius* snatch at a dead fly being eaten by another centipede. If the attempted robbery proves unsuccessful, the robber may give the other a sharp, but not fatal, nip with the poison claws (maxillipeds) to make it drop its prey. Occasionally two centipedes are to be seen feeding on the same insect.

*Lithobius* can survive several hours immersion in water. At first it struggles violently, sometimes swimming (like *Nereis*) by a series of rapid flexions; but its motions soon become sluggish. Centipedes become darker when placed in dry surroundings than in a damp environment. This colour change is not affected by light, adrenaline, etc.; it also occurs in dead centipedes and is probably a physical change in the integument.

In conclusion, it can be stated that, except the eyes, which do not appear to be of much importance, the sense organs of *Lithobius forficatus* are in the form of hairs, or groups of hairs, each fitting into a cup in the cuticle, and connected with nerve fibres. In consequence, the behaviour of the animal is (with the exception of negative phototaxis which occurs even when the eyes are covered) chiefly governed by reactions to thigmotactic stimuli.

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## Hatching of the Egg of *Ixodes ricinus* L.

THE mechanism of hatching in the sheep tick does not seem to have been previously described. When freely laid, the eggs are oval, but deposition in crevices results in a certain amount of flattening. Examination of the egg under the microscope reveals that the brown colour is due to a thin semi-transparent shell, covering the brown internal mass. Each egg is surrounded by a gelatinous secretion produced by Gené's organ. Immediately after oviposition, the individual egg weighs 0·00006 gm.

The pre-oviposition period varies with the season and with the individual, but usually lasts 15–22 days[1]. Prior to hatching, the larva shows very little activity, and the density of the internal contents precludes any detailed observations upon it. Twenty-one to thirty days after oviposition, at 60° F., and a relative humidity of 80, the eggs show an extensive white area of an abbreviated dumb-bell shape, surrounded by the yolk. During the forty-eight hours before emergence, the body of the arachnid comes to fill the egg more completely; the yolky contents of the gut become apparent, with small interspersed fat globules. Occasionally rhythmic movements of the head are obvious. It is suggested that at this period the larva swallows the amniotic fluid in much the same way as insects do[2]. When this fluid is added to the fatty contents of the gut, the fat globules run together to form large droplets.

At this stage the larva is enclosed in a membrane, the first or 'embryonic' cuticle, which surrounds each limb in an unsegmented sac; but in view of its smallness the limbs are very much crumpled. The head is flexed ventrally and is not visible from the dorsal aspect. Viewed ventrally, the appendages are closely apposed to one another and to the body generally.

Within twenty-four hours of hatching, the outward form of the egg is changed, becoming longer and thinner. Air enters the egg shell and occasionally some air may be swallowed by the larva. This, however, is not constant and seems to play no essential part in the process of hatching. The enclosed larva extends the posterior part of the body and ruptures the egg shell longitudinally. It is believed that this rupture of the egg shell follows a distinct line of weakness, as similar cleavages have been obtained by the treatment of newly deposited eggs with dilute and concentrated acids.

No air appears to be swallowed after hatching. The posterior end of the body invariably emerges first and the anterior portion of the body may be retained for some hours within the egg shell. Ultimately, by slow movements of the legs, the entire body comes out of the shell and the larva crawls some distance from the remains. At this stage the head is still reflexed, of a very pale almost transparent character, and the legs but lightly sclerotized. The tick remains quiescent with its legs drawn closely to the side and head reflexed for 7–10 days at 60° F. and relative humidity of 80 per cent.

A fuller report on this investigation will be presented elsewhere.

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[1] MacLeod, J., *Parasitology*, **27**, 489 (1935).
[2] Sikes, E. K., and Wigglesworth, V. B., *Quart. J. Micr. Sci.*, **74**, 165 (1931).

## Control of Foot Rot (*Phoma* sp.) of Flax

WITH regard to the reference[1] made to the use of 'New Improved Ceresan' for the prevention of foot rot (*Phoma* sp.) of flax, further experimental work has given the following results. Seed with a moisture content below 10 per cent and treated with this disinfectant at the rate of 12 oz. per cwt. showed an adverse effect of the treatment on germination when kept for 18 weeks in hundredweight lots under ordinary storage conditions. Tests made with seeds on porous dishes placed on damp sand showed that the germination of treated seeds was 75 per cent as compared with 95 per cent in the case of the untreated. This adverse effect was also apparent when seeds were sown in soil in the greenhouse. No effect on germination was observed when the seed had been stored for 8 weeks. Seed from the same lot as the above but treated with 'Arasan' at the rate of 12 oz. per cwt. and stored for 18 weeks under similar conditions showed no reduction in germination.

When seed having a moisture content of 14 per cent was treated with 'New Improved Ceresan' at the rate of 12 oz. per cwt. and tests made within 14 days, it was found that the germination was reduced from 65 per cent in the untreated seed to 46 per cent in the treated. It should also be stated that in the case of the treated sample an additional 23 per cent of the seeds showed abnormal growth on germinating. The damage caused by treating damp seed has also been demonstrated by sowing seed in soil.

It would therefore appear to be inadvisable to treat flax seed with 'New Improved Ceresan' if the