regards as a facultative parasite on the echinoid, *Echinocyamus pusillus*, and a third, *Tetrakentron synaptæ* Cuénot, is a parasite on the tentacles of the holothurian *Leptosynapta galliennei*.

Thus it is not unusual for a tardigrade to be associated with another invertebrate animal, and it may be suggested that *E. sigismundi* is a facultative commensal of the common mussel.

It may be useful here to point out that *E. sigismundi*, the only marine tardigrade so far to be reported as a member of the British intertidal fauna, is easily recognizable by being about 0·2 mm. long and having five to eleven claws (usually eight) on each of its four pairs of legs.

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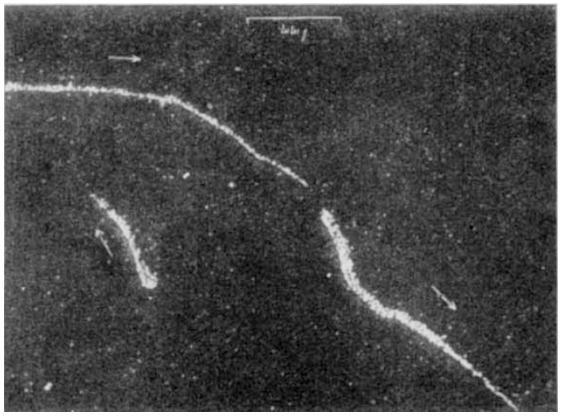
Odour Trails of *Acanthomyops fuliginosus*

SINCE Bethe's[1] original work on the polarization of the scent trails of the ant *Acanthomyops niger*, numerous theories have been put forward to explain the phenomenon. The majority, particularly those of Wasmann[2], Forel[3] and Brun[4], resulted from work on *Acanthomyops fuliginosus*, a species which in Nature, unlike *A. niger*, forms long columns of workers going to and fro between nest and food. Polarization in these trails was claimed to arise from the individual pieces of the trail. According to Wasmann[2], these were the footprints of the workers, which would have a direction implicit in them, like a human footprint.

In a comparative study of the orientation capabilities of both *A. niger* and *A. fuliginosus*, the existence and shape of the scent trail has been demonstrated in the latter. The workers used were carrying larvæ into the nest from a pile placed in the centre of a circular glass arena, 1 ft. across. Very quickly a worker will learn the way to and from the larvæ and soon settles down to follow roughly the same course in the two directions. If the glass over which it is running is dusted with lycopodium powder, this adheres to the scent trail and throws it into relief.



Part of an odour trail of *Acanthomyops fuliginosus* (dusted with lycopodium powder). The arrows show the direction of running

The result can be photographed, showing a trail split up into dashes of about 4 mm. long, shaped so that they have the appearance of a drop of fluid extruded and drawn out in the direction of running, as will be seen on the accompanying photograph. It can also be seen without 'development' if the glass is held at an angle to the light. The form of the track varies with the individual and sometimes the dashes may be up to 8 cm. long. It is of interest that Brun[4] considered that scent trail-laying only took place when the workers were carrying food.

The ability to lay such a trail is under the control of the ant. In the first journeys over the cleaned glass, pieces of trail are laid while returning to the nest and the remainder of the distance covered by random movement. As familiarity increases, the trails are completed and new whole ones laid down, mainly while carrying the larvæ. The result after about ten journeys is a tangle of trails over the most favoured route. This confusion would clearly preclude any polarization based on the shape of the dashes, a criticism of Bethe's theory[1] which Wasmann put forward. Certainly a worker on its journey to the larvæ may, in the preliminary random search for the beginning of the trail, strike the trail midway and turn nestwards instead of towards the larvæ. Further, the trail is not followed in all its minute detail; but the ant runs with one antenna palpitating along the track. There is no sign of the antennæ being used as callipers to sense the 'odour form' of the trail, as Forel[3] postulated. This agrees with Chauvin's[5] findings of non-polarization of the trail in this ant and with his explanation that Bethe's results[1] of confusion, when sections of the trail are reversed, were due to the interruption of the trail rather than its inversion, since after the reversal the ends of the sections no longer coincided with the ends of the other parts of the trail. However, Macgregor[6] has supposed the spots forming the odour trail in *Myrmica ruginodis* to be orientated, since they appear to be interpreted by the individual in this way. The chemical constitution of the trail is under investigation. It seems likely that it is an anal secretion.

Despite Bethe's results[1], no similar trail has been demonstrated in *A. niger*. Indeed, from its behaviour under normal and experimental conditions, it is clear that this ant depends upon visual means of orientation. However, on one occasion when a worker was apparently disorientated, it showed the usual excitement behaviour by backing slowly in a close circle, jerking up and down with its abdomen vibrating, and at the same time a small amount of material was deposited. This, coupled with the stages of the journey during which the trail is laid by *A. fuliginosus*, suggests the possibility that the deposition of the scent trail may depend on excitation of the ant by the presence of food or larvæ and, from a by-product of heightened excitation *A. niger*, it has become the main method of orientation in *A. fuliginosus*.

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