A NOTE ON THE HIBERNATION OF *MICRASPIS SEDECIM-PUNCTATA* L. (VAR. 12-*PUNCTATA* L.), (COL. COCC.), AT ROTHAMSTED EXPERIMENTAL STATION

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Introduction.

The presence of a large aggregation of the Ladybird *Micraspis sedecim-punctata* L. (var. 12-*punctata* L.) was brought to my notice on 6th November, 1935, by Miss M. D. Glynne of this station. Fairly regular observations on the beetles were kept during the winter and spring until dispersal occurred. By the time regular observations were commenced the numbers had reached a maximum, but Miss Glynne states that gamekeepers on the estate had noticed them, although not in quite such large numbers, about a fortnight before this time. Thus it would appear that the beetles did not come to the place of hibernation in one swarm.

Situation.

The aggregation occurred chiefly on one of a pair of old black (tarred) gateposts from which the gate had been removed, in the south-east corner of a field called Pastures at Rothamsted Experimental Station (25 miles north of London). On the south and east of the post is a wood and on the north and west a large field of kale and a small strip of sugar beet. Plate 1a shows the distribution of the beetles on the apical portion of the south face of the post which harboured most of them. By examining a photograph of the south face of the post under a binocular microscope it was computed that some 3–4000 were present on this side of the post, on the east face only about 120 were present, on the north about 265 and on the west about 200. Only 3 were present on the flat top of the post. Attached to the gatepost and running west is a fence of wire netting. Many thousands of beetles were present in the grass at the foot of the post and along the base of the fence for about 15 feet. Again most of the beetles were found on the south side of the fence, the grass stems frequently being completely covered from base to apex. On the other gatepost 33 beetles were present, again mostly on the south side. Another pair of gateposts 20 yards away was examined, but not a single beetle was found. The prevailing winds fluctuated between N.E. and N.W.

As the beetles were collected into variously sized groups, it is of interest to analyse the factors governing the position of the groups. The post is a rough one and has six holes bored completely through it from north to south. No beetles were found in the holes until 22nd January, 1936. Fitted against the other gatepost, on which only a few beetles were collected, is a flat iron bar, no beetles were found between this bar and the post until 27th January, 1936. Thus it would appear that the beetles did not collect in places where they would be assured of protection from inclement weather. Two factors at least appear to cause the formation of groups.

(*a*) The presence of an obstacle in the path of the beetles as they move up the post causes them to stop and so form a group beneath it. This is well illustrated in plate 1b, where four groups apparently formed in such a manner may be seen on the post and on its sloping support immediately below the top

strand of wire. The top edge of the post also seems to act as an obstacle, since in spite of the large numbers of beetles aggregated immediately below it, plate 1a, only 3 were present on the flat top when the photograph was taken.

(*b*) Some beetles remain stationary in crevices and so form obstacles below which other beetles collect, one such group is seen in the lower part of plate 1a.

The beetles were not orientated in any special way, heads pointed in all directions.

It would be interesting to determine why the beetles should aggregate so definitely on one out of four neighbouring gateposts. So far, no reason can be seen why this should be so, but the posts will be examined in the autumn of 1936 in the hope of throwing some light on this problem. On 28th March about 200 individuals were transferred to a post in a fence near the laboratory. This post is fairly new and tarred, its base being covered with stones and nettles. An examination on 30th March showed that the beetles had all dispersed, not one being found although the stones were removed during the examination. Evidently the situation was unfavourable and dispersal occurred more than a month before normal.

Sex Proportion.

Three samples of 50 were sexed on 18th February. The percentage of females present was 40, 38 and 32. Their ovaries were not developed.

Fluctuations in Numbers on the South Face of the Post.

According to the reports of gamekeepers the beetles increased in number between the end of October and beginning of November. It is not known when aggregation commenced, but some notes kindly given to me by Mr. C. T. Gimingham suggest that the species commences to aggregate towards the end of September. As so many beetles were present it was not practicable to obtain a numerical estimation of the fluctuations in numbers from time to time, but no large reduction in numbers occurred until the end of December, a further reduction occurred early in January. These reductions were coincident with two falls of snow. In the first case an inch of snow lay on the ground for four days and this was increased to two inches on the fifth day, in the second case two inches of snow lay for three days. The number of beetles was now reduced to just over 400, and it was decided to obtain counts of the beetles present from time to time and attempt to correlate these with weather conditions. The figures obtained, and shown graphically in fig. 1, must not be taken as representing the numbers of beetles in hibernation but rather as a rough expression of their varying activity during hibernation. During favourable conditions the beetles climbed upwards on the post and neighbouring stems of grass, but did not seem to move outwards from the base of the post to any appreciable degree. During inclement weather they apparently dropped to the ground and sheltered in the grass below. Thus hibernation for these insects does not consist of a period of complete dormancy.

An analysis of fig. 1 shows that the number of beetles present depends on temperature chiefly, there being a general correlation between the two. There are, however, certain times when a decrease in numbers is shown in spite of an increase in temperature or *vice versa*. One such instance is between 29th February and 2nd March, when in spite of an increase in temperature between these dates a reduction in numbers occurred. This reduction was probably due to a half-inch fall of snow of short duration on 1st March. On

14th March the highest number of beetles on the post was found during the period under discussion, but the temperature recorded was low. 11th March was the hottest day of the year to that date, and the temperatures of the succeeding days up to 14th March were not low enough to cause the beetles to drop off nor yet hot enough for much activity, and so it is possible that the numbers remained fairly constant until the temperature dropped still further. Sunshine and rain do not seem to have any appreciable effect. No predators were observed feeding on the beetles.

Dispersion.

Towards the end of April the numbers of beetles on the post were greatly reduced. One cause would seem to be a slight change in habit of the beetles, quite large numbers having now moved away from the grass at the foot of the post and were to be found singly and in groups of various sizes up to a distance of three feet from the post. All these were to be found in the grass and not one on the muddy track passing between the gateposts. On 24th April the greatest activity to date was recorded, this day was also the hottest day of the year so far. On account of the change in habit referred to above the number recorded on the post for this day is not comparable with those recorded before 9th April. The following is taken from my notes recorded on the spot. "Some, very definitely not all, of the beetles are running about around and over their own group, seemingly not passing to other groups, others are running up and down or along grass or straw stems. The beetles are essentially following the example of the Duke of York who marched his men up the hill

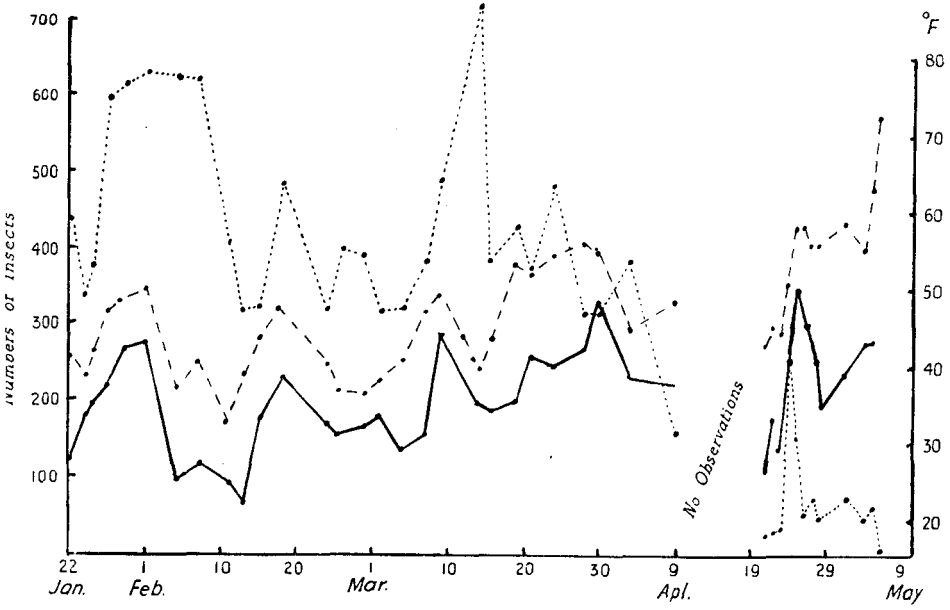
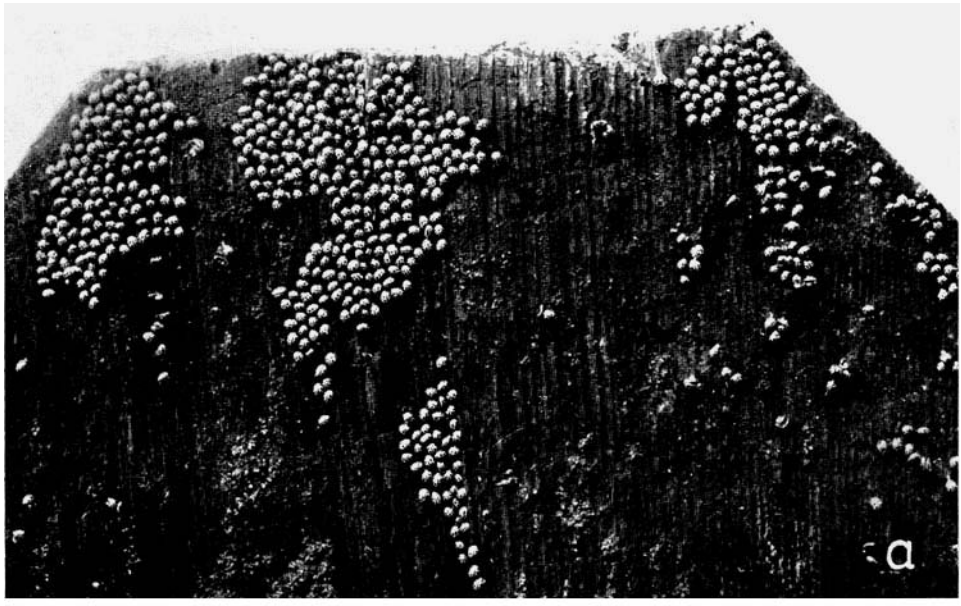
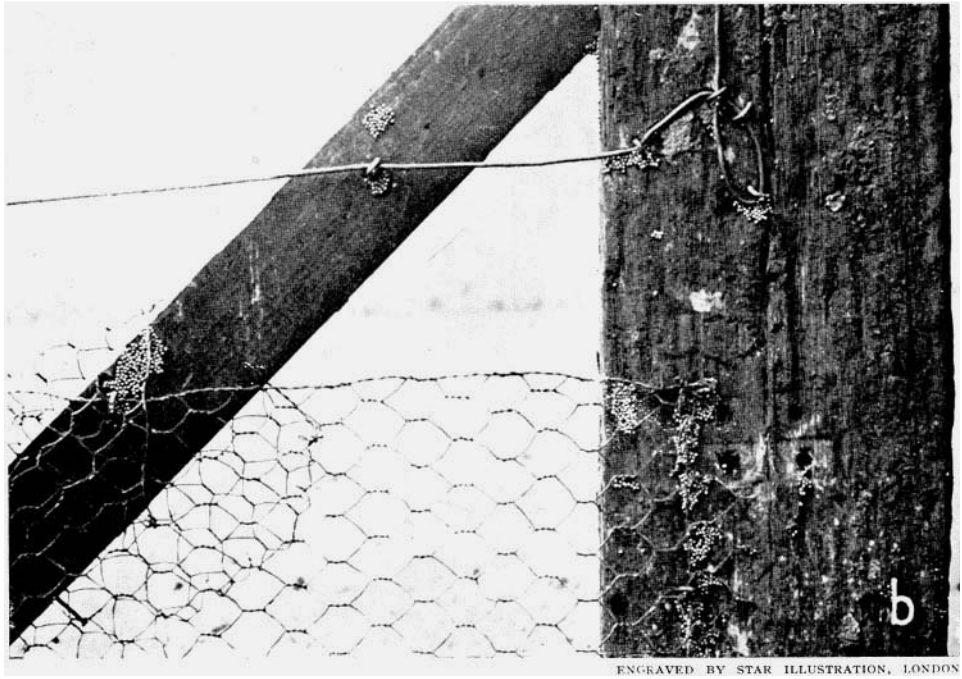


Fig. 1.—The relation between temperature and the numbers of insects on the south face of the post,

. . . . . numbers of insects,
– – – – – max. temp. of previous day,
———— min. temp. of same day.





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Ladybirds hibernating on a post.

and then down again. The activity may be a prelude to dispersal, but the beetles are definitely not dispersing now. Several were thrown up into the air and a few took to flight and were promptly blown into the wood by the prevailing westerly breeze. Along the track at the bottom of Pastures two beetles were found floating with numerous flea-beetles in water in cart-tracks about 40 yards from the post. Whether these came from the post under observation or not is uncertain, they might have flown away and dropped there during a calm period or else have been blown there from another unknown group."

Dispersion actually occurred on 6th May, a day on which the temperature, 72° F., rose much higher than on any previous day during the year. Unfortunately I was away on this day and so actual details of the manner of dispersal, *i.e.* massed or individual flights, walking, etc., were not obtained.

Another large aggregation was known to be situated in an apiary by New Zealand field. Dispersal of this aggregation also occurred on 6th May. Dr. H. L. A. Tarr of this department was at the apiary at 3.30 p.m. (G.M.T.) and states that the number of insects present was greatly reduced by this time. Thus it would appear that the majority left earlier. On 7th May only about one-twentieth to one-hundredth of the beetles were left of the aggregation on Pastures. On 11th May numerous adults were found on flowers of dandelion, buttercup, dog's mercury and greater stitchwort.

The following notes have been kindly supplied by Mr. C. T. Gimingham:

" On 4th or 5th May, 1935, my son drew my attention to great numbers of *Micraspis* on the herbage and lower part of the hedge on the east boundary of ' Long Hoos ' near the gate into ' Sawyers ' [on Rothamsted Farm]. It appeared that the insects had just emerged from hibernation somewhere at the base of the hedge; they were swarming on the herbage and on the twigs and branches of the hedge, some twigs and dead stems being completely covered by them. They were densely congregated over about 2–3 ft. of the hedge, and in smaller numbers for perhaps 2 ft. on either side; many were moving about actively, but we saw none take flight. There must have been some thousands collected together.

" A few days previously, my son had seen a similar swarm near Bower Heath in the east hedge of the road from Bower Heath to the Lower Luton Road [also in Harpenden]. In this instance, the insects were less densely congregated but were spread over a greater area. I did not see them myself but had specimens for identification.

" Finally, about the third week of September 1935 (I regret that I have not the exact date; it was not earlier than the 15th nor later than the 25th) I found a small assemblage of the same species at the base of the trunk of a tree in the east hedge of ' Great Harpenden.' A pile of dry grass and other herbage had been placed against the tree and the insects were collected close together behind this, mostly on the wood. It is difficult to estimate numbers, but there were certainly several hundreds on the trunk besides many in the pile of grass. They did not move except where disturbed. This evidently did not prove a suitable spot for hibernation for about a month later all were gone."

I am indebted to Dr. C. B. Williams for helpful suggestions and to Mr. C. T. Gimingham for the details of his own observations.

PLATE 1.

Micraspis sedecimpunctata in hibernation on the south face of a post.