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MIGRATION OF COCCINELLIDS TO THEIR HIBERNATION QUARTERS

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The aggregation-habit has long been known in Coccinellids. And besides a vast number of purely descriptive reports also some papers appeared trying to explain this feature. Although many interesting ideas have arisen, no explanation quite satisfying has been given, as mentioned also by Bodenheimer (1943) and Williams (1958).

This migration and aggregation behaviour seems to be most outstanding in two Coccinellids: *Hippodamia convergens* Guer. and *Semiadalia undecimnotata* Schneid. On the basis of four years' observation of the latter mentioned species, the hibernation quarters of which were found for the first time in Europe (and are analogous to those in Central Asia recorded by Dobzhansky [1925]), I can conceive at least in a rough outline the mechanism of this interesting feature.

In the midsummer the internal and external factors result in changing the physiological condition (Hodek, Čerkasov 1958, 1960) and the behaviour of the Coccinellids. After living solitary and being attracted to certain places only for food, the beetles do not feed any longer and move in late July and early August already to the hibernation quarters, where they are swarming. Obviously the completion of the accumulation of appropriate reserves of fat and glycogen make the migration instinct operative. In colder years when this process is retarded also the migration to the winter quarters is delayed. The beetles of both sexes move to their hibernacula gradually so that the coming takes usually two or three weeks, taking place only on warm sunny days, mostly in the afternoons.

As quarters such places are chosen as crevices in or at the bases of projecting formations, situated mostly in the top area of a hill or mountain. No hibernation quarters of *Semiadalia undecimnotata* have been found till now in the plains. It seems to be obvious that two factors participate in directing the beetles; the most outstanding is the manifestation of an instinct, similar to that of the swarming pairing ants (Chapman 1954) or other insects, i. e. to seek conspicuous isolated features in the landscape and to swarm round them. When the temperature has fallen, they stop their activity and aggregate somewhere in a crevice of this formation. But, on the other hand, perhaps also the air-currents will be of some importance, although, indeed, nothing is known as to their influence in this respect.

The fact that the same places have been selected every year has been explained through the orientation of the coming beetles to the bodies of the Coccinellids having died during the previous hibernation season. We do not accept this explanation because of having ascertained that the beetles have taken aim at an other artificially built formation if this one was more outstanding than the one previously used. It is, on the other hand, very probable that those coming later are attracted chemotactically to the former inhabitants, having arrived there several days before. Thigmotaxis cooperates with the chemotaxis in leading the beetles into aggregations and enables the hiding in crevices, cracks, fissures etc.

At present, making use of isotopes will naturally help to elucidate some unsolved problems, as e. g. the distance of migrations to the hibernation places and similar ones. It is, however, to be feared that other questions which are not very suitable for an experimental approach will remain unsolved for a long time yet.

LITERATURE

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AN HYPOTHESIS ON THE MIGRATION OF THE SPINY COTTON BOLL WORM *EARIAS INSULANA* IN ISRAEL

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Manuskript nicht eingelangt

ABSTRACT

The notorious cotton pest, the spiny boll worm, *Earias insulana*, is distributed all over the African continent. It extends further north into southern Europa, and eastward into western Asia, Arabia and India. Although this species is indigenous to Israel, and it is capable to survive the winter there, nevertheless, flocks of this moth from out of the country invade Israel from time to time, and reinforce the local population. This hypothesis is based upon 1. The discrepancies in the occurrence of heavy infestation in different sections of the country, and which is variable every year. 2. Upon trapping in semi desert areas such as Eilat. The writer believes that the invasion of this species into Israel may take place in two routes. 1. From Egypt through northern Sinai—to the Coastal Plain. 2. From the western coast of the Red Sea through the Gulf of Akkaba to the Jordan Valley. These invasions being from different sources, may be independent in the time of their occurrence hence the discrepancies in the localization of the heavy infestation.

MIGRATION OF FLYING DIPTERA

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Manuskript nicht eingelangt

ABSTRACT

Five other topics selected for symposia at this congress have a direct bearing on this subject. First, insect acoustics. The very limited range of wing-beat frequency found in insects of a given species and similar physiological condition and the fact that most migrations, or at least most that man observes, are carried out in close order, suggest that resonance between individuals may be an important factor in migration. Second, the chemistry of insects is relevant in that facts, the most favourable energy source for migration, are the chief fuel in most primitive and large insects, while carbohydrates apparently take this role in the Diptera. Third, the host-seeking behaviour of mosquitos and some other blood-sucking insects seems initially to involve an anemopositive response conditioned by olfactory stimuli. Medium to long-range translocations may result from this before a blood meal is obtained. Fourth, blood protozoa of wild animals transmitted by insects depend on the travel of the insect between one animal and another, or on repetitive consummation of host-seeking behaviour. The translocations which result depend on the distances between hosts, that is on population density. Fifth, insect life in large towns, recent consideration of a mosquito problem in Edmonton suggests that the host seeking behaviour described above may operate on a macro scale to draw numbers of mosquitos into a large town. Recent data on the magnitude of the migrations of Diptera and recent work on behaviour and its interactions with weather in bringing these migrations about and directing them is reviewed.