

SOME TROPIC REACTIONS OF *MEGILLA MACULATA*  
DE G. AND NOTES ON THE HYDROTROPISM OF  
CERTAIN MOSQUITOES.

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This ladybird, which is the only species in New Jersey hibernating in sufficient numbers to be considered a colony, lends itself readily to experimentation, and the colonies containing as a rule about a thousand individuals may be found in different localities usually under a piece of bark or a mass of dried leaves.

This colonial hibernation is the result of various reactions to tropic stimuli. First the question arises as to just why they congregate in large numbers and this may be explained by chemotropism. All Coccinellidæ emit peculiar odors and as the colony increases, so does the odor, thereby making the chemotropic stimuli stronger and more effective. Mr. Edward K. Carnes in bulletin No. 5, Vol. I, of the California State Commission of Horticulture, writes that he has located colonies of *Hippodamia convergens* in that state simply by the odor alone. Here, however, the individuals in a colony number two and a half millions or more.

A lowering of the temperature as winter approaches with a corresponding decrease in the food supply undoubtedly renders them exceedingly susceptible to chemotropic stimuli. With *Megilla maculata*, there is no evidence at present that anemotropism plays any part in the selection of the hibernating quarter. Once in their place of hibernation, they become positively thigmotropic and negatively phototropic. Two hundred individuals were removed from a colony and placed in a glass breeding cage, one end of which was constructed so that they could if they desired act positively photo- and thigmotropic and the other end so that they could act only negatively phototropic and positively thigmotropic. Every one selected the dark end. This happened on both sunshiny and cloudy days. During all operations the temperature of the entire cage was uniform as indicated by thermometric tests. During the above experiment the temperature was gradually lowered in eight hours from 70° F. to 36° F.

At a temperature of 54° F. they remained as before. At a temperature of 64° F. about one third became positively phototropic and negatively geotropic, and their activity undoubtedly

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made them susceptible to chemotropic stimuli from a food viewpoint.

At a temperature of 70° F, about one-half were active and at 75° F, all were active. When the temperature was suddenly lowered as from 75° to 36° F, all became dormant at once and exhibited no tropic reactions. By at once I mean within ten or twelve minutes. Without doubt thermotropism plays an important if not the most important part in deciding just what reactions are to occur. A gradual lowering of the temperature such as would naturally result in the beetles acting phototropically and thigmotropically while a sudden drop resulted in what might be called immediate partial hibernation. Of course with a soft bodied insect this would have resulted in death. When the temperature of the air was 42° F., that of their natural hibernation place was 54° F. which indicates an effort to secure optimum conditions.

After emerging from winter quarters, the females of *Culex pipiens* are at first positively chemotropic. After having fed they become positively hydrotropic and deposit their eggs on the surface of water. While in hibernation during which time they may be fairly active, depending on the temperature of their hibernation quarters, they are strongly negatively hydrotropic. Food and water placed within easy reach of hibernating specimens were always avoided, even when the temperature of their surroundings was 75° or 80° F.

*Aedes sollicitans* and *Aedes cantator* are also positively hydrotropic but not to the extent of most other mosquitoes. With these species eggs are deposited in damp depressions and not on the surface of the water. Sterile females of both of these species are strongly negatively hydrotropic and fly long distances away from salt marshes where they breed. However this migratory habit, or at least the direction they take, is undoubtedly influenced by anemotropism inasmuch as they allow themselves to be carried by strong breezes and will fly inward against light breezes. Sterile females of *Aedes taeniorhynchus*, which has a similar life history to *sollicitans* are to a certain extent negatively hydrotropic.

*Aedes salinarius*, another salt marsh form is as strongly positively hydrotropic as *Culex pipiens*, in fact its hydrotropic reactions are similar to those of *pipiens*, as is its life history.

At different periods during a mosquito's life, its hydrotropic reactions are overshadowed by responses to chemotropic and phototropic stimuli and in some cases, negative hydrotropism might be mistaken for positive chemotropism. In the cases of the sterile females of *Aedes sollicitans*, chemotropism plays very little if any part in explaining their migratory habit. If it did the migrations would not be so extensive or cover the long distances they do.

Negative hydrotropism seems to be more prevalent among the salt marsh than other forms, in fact other species are negatively hydrotropic only for short periods and the females responding to such stimuli are not barren. For some reason the sterility of *sollicitans* seems to render it exceedingly susceptible to negative hydrotropic stimuli.

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#### ANNUAL MEETING OF THE BRITISH COLUMBIA BRANCH.

The annual meeting of the British Columbia Entomological Society took place on January 9th, 1913, in Victoria. A morning, afternoon and evening programme was arranged. From 18 to 27 members were present during the day. A varied programme was rendered which included several reports from districts in the Province, viz., the Victoria District, the Lower Mainland, the Okanagan and the Kootenay.

An interesting lecture was given on the use of Carbon Bisulphide as a fumigant under coastal conditions by Mr. W. H. Lyne, Assistant Inspector of Fruit Pests. Mr. W. H. Brittain followed with a paper prepared on the important subject of Beneficial Insects, bringing the notice of the members forcibly to the fact that applied parasitic entomology was well to the forefront of present day economic entomology. He gave a number of interesting records which had taken place during the past few years in this especial connection.

Mr. G. O. Day, F. E. S., Duncans, presented a paper on *Xanthia pulchella* Smith, and offered a few systematic notes on its