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INSECT ENEMIES OF THE LANDSNAIL *THEBA PISANA* IN ISRAEL

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ABSTRACT

Cases of predation and parasitism in populations of the landsnail *Theba pisana* Muller (Pulmonata: Helicidae) by *Sarcophaga sp.* (Diptera: Caliphoridae), *Ablattaria arenaria* Kraatz (Coleopera: Silphidae), *Carabus impressus* Klug (Coleoptera: Carabidae), *Messor semirufus ebeninus* Forel (Hymenoptera: Formi- cidae), are described from Israel,

KEY WORDS: Gastropoda, Pulmonata, *Theba pisana,* Snail-killing insects, *Sacrophaga, Ablattaria arenaria, Carabus impressus, Messor semirufus.*

The landsnail *Theba pisana* (Muller) (Pulmonata: Helicidae) is common along the Mediterranean coast of Israel, causing damage to field crops (Avidov & Harpaz, 1969). Populations of the snail were studied in two plots, separated 2.5 km from each other, located in Gan Rave (Central Coastal Plain). The research plots were visited monthly, from June 1974 to June 1976, and in November 1976, January 1977 and June 1977.

Specimens of *T. pisana* parasitized by *Sarcophaga* sp. were found only in 1975. The epiphragms of the snails containing pupae or their skins only, were dark brown and not calcareous, loosely attached to the substrate. A small foramen could be observed at the edge of the epiphragm. As only females emerged in the sample collected, the flies could be determined (by Dr. L. Knutson, Beltsville Agricultural Research Center, Beltsville, Maryland) to genus only as *Sarcophaga* sp. (Calliphoridae). Insect predators (Carabidae and Formicidae) were identified by Prof. Y. Kugler.

It is possible that *Sarcophaga* sp. collected in this study is identical with *S. pumila* Meigen observed by Harpaz & Oseri (1961) in Gan-Soreq, a few kilometers from the research plots. However, *S. pumila* is known to be a scavenger (Y. Kugler, personal communication). The foramen at the edge of the calcareous epiphragm of the snail means that the snail is attacked by the dipteran while being in the state of aestivation. Therefore this species of *Sarcophaga* is assumed to be more parasite than scavenger.

A few shells containing the pupae of the flies occurred in June 1975. From the next month and on, the attacked shells were recorded, with an error caused by dropping of some of these shells that were loosely attached to the vegetation. The

ratios of the snails parasited found from July to October 1975 (both plots pooled together) were 38/11,768 (0.32%), 78/8,530 (0.91%), 1/2,942 (0.03%) and 2/3,079 (0.03%), respectively. Of a total of 26,319 snails inspected during July-October 1975, 0.45% (118) were parasitized. Later, no attacked shells were found in the monthly samples collected during November 1975 – June 1976 and in November 1976, January 1977 and June 1977. It is a much lower rate than that reported by Harpaz and Oseri (1961), which was more than 20%. In addition, the phenomenon occurred only once, in summer 1975.

During the study the incidence of predation (or parasitism) by other insect species was very low. I came across a case of predation of *T. pisana* by a larva of *Ablattaria arenaria* Kraatz once, in December 1974. During preliminary observations in November-December 1971 three cases were encountered. No adult beetles were found, though Harpaz and Oseri (1961) described them active during February-May. A possible reason in the differences in the findings is that Harpaz & Oseri found *A. arenaria* particularly active in heavy uncultivated soil, and not in sandy and sandstone soil and sand dunes.

Predation by insects was rare and sporadic. In November 1974 an adult *Carabus impressus* Klug was observed to consume *T. pisana* snail, a phenomenon reported before by Mienis (1980) (2 cases only). Carabidae were informed by Wild and Lawson (1937) and Stephenson and Knutson (1966) to consume snails.

Cases of live *T. pisana* snails being carried by *Messor semirufus ebeninus* Forel have been recorded twice: in August 1972 and in January 1975. Ants are listed as snails predators by Wild and Lawson (1937).

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