BIOLOGICAL DATA ON *Apanteles* cerialis Nixon (Hymenoptera: Brachidae), A Parasite of *Boarmia (Ascotis) selenaria* Schiff. (Lepidoptera: Geometridae) M. Wysoki and Y. Izhar

*Apanteles cerialis* Nixon, a thelytokous braconid parasitoid of *Boarmia (Ascotis) selenaria* Schiff., attacks young caterpillars (preferably 2-5 days old) of this pest in avocado plantations of Israel. At 27±1°C, oviposition rate is 2.04 progeny per day and 18.3 progeny over the entire life span. The development time of preimaginal stages is 16.1 and 15.2 days at 25° and 30°C, respectively, and increases to 37.3 days at 17°C. The pupal stage averages 4.4 days at 30°C and 13.5 days at 17°C. The average longevity of adults is 24.2 and 7.9 days at 30° and 17°C, respectively. In avocado orchards *A. cerialis* appeared in considerable numbers in late summer and autumn; it was slightly hyperparasitized by the ichneumonid wasp *Stictopisthus* sp. (1 and 2% of the samples at one site).

**KEY WORDS:** Apanteles cerialis; Boarmia (Ascotis) selenaria; Stictopisthus sp.; biological control; avocado.

**INTRODUCTION**

*Apanteles cerialis* Nixon (Hymenoptera: Braconidae) is a parasitoid of *Boarmia (Ascotis) selenaria* Schiff. (Lepidoptera: Geometridae). The host is an important pest of various crops, such as coffee in East Africa, tea in Taiwan, India and Russia, peanuts in Madagascar, citrus in Sicily and South Africa, teak trees in Burma, mulberry in Japan, alfalfa in Hungary, as well as apples, pecans and avocados in Israel. See Wysoki *et al.* (9) and Wysoki and Izhar (7) for pertinent references.

In Israel, an outbreak of the pest in avocado plantations was caused by drift from aerial sprays in adjacent cotton fields, which had upset the biological equilibrium. Since insect pest control in avocado plantations in Israel is based exclusively on biological control, a method of control using *Bacillus thuringiensis* Berliner was developed (3).
and research on natural enemies was begun. In a survey of the natural enemies of *B. selenaria*, the most abundant was a new species of parasitic wasp described by Nixon in 1976 (4) as *A. cerialis*.

The type material, collected in Italy (from an unknown host), is different from the series collected in Israel. The identity of this series, sent by us to G.E.J. Nixon (British Museum), is doubtful because the propodeal areolation is sharper and the first tergite narrower than in the type material, but allowing for the fact that the shape of the first tergite is not always reliable in *Apanteles*, Nixon nevertheless labeled the series as *cerialis* (4).

The wasps lay their eggs into the young caterpillars of *B. selenaria*. The parasite larvae leave the caterpillars just before pupation and immediately begin to spin their cocoons. These cocoons remain attached to the leaves after wasp emergence.

The biology and reproduction of *Apanteles cerialis* were studied under laboratory conditions at Bet Dagan during the years 1976-1978.

**MATERIALS AND METHODS**

A laboratory culture was originally obtained from *A. cerialis* pupae collected in avocado orchards of western Galilee, which were infested with *B. selenaria*. The host caterpillars were reared on avocado leaves and partially on an artificial diet, consisting of a modification of that of Shorey and Hale (5). Mass breeding of the wasps was done on caterpillars fed on an artificial diet.

An experiment to determine fecundity was carried out at 27 ± 1°C and 60% R.H. Six newly hatched *A. cerialis* females were introduced separately into individual boxes (10 x 10 x 10 cm) with 20 2-3-day-old caterpillars of *B. selenaria*. Surviving wasps were transferred daily to a new box with newly reared *B. selenaria* caterpillars until the last wasp had died. The wasps were fed honey and water. Emergence of the larvae of *A. cerialis* from *B. selenaria* caterpillars was monitored daily.

An experiment to determine the age at which host caterpillars were attacked was conducted under the same conditions, and caterpillars of different ages (from 1 to 13 days) were exposed to five *A. cerialis* females for 24 hours and then removed. The emergence of the parasite larvae in each group was monitored daily.

An experiment to determine the duration of pre-imaginal stages (eggs and larvae) was carried out at constant temperatures of 17°, 22°, 25° and 30°C (all ±1°C). Twenty females of *A. cerialis* for each temperature were held for one day with 30 2-3-day-old *B. selenaria* caterpillars. After one day of oviposition the wasps were removed and the host caterpillars were left at the same temperatures. The pupae of the parasite were also held under the same conditions, and the duration of this stage and the percentage of emergence were examined. For these experiments, pupae from mass breedings also were used. In all experiments the photoperiodic regime was 16 h light and 8 h darkness. The longevity of the adults was examined under the conditions described above, at various temperatures, with honey supplied as food.

20 Phytoparasitica 9:1, 1981