BIOLOGICAL STUDIES OF *PTEROPTRIX SMITHI* 
[HYMENOPTERA : APHELINIDAE] (*)

BY

D. Bar & D. Gerling

Department of Zoology, Tel-Aviv University, Tel-Aviv, Israel

The developmental history, longevity and fecundity of *Pteroptrix smithi* (Compere) are described and discussed. Both sexes develop as primary parasites of *Chrysomphalus aonidum* (L.). Developmental duration at 26 °C averages 25 days and the average fecundity at this temperature is 26.5 eggs for unmated and 21.4 eggs for mated females. Under laboratory conditions 50-80% of the eggs are laid during the first few days of adult life. Longevity of females ranges from a maximum of 84 days at 20 °C to a minimum of 15 days at 32 °C. Male longevity does not differ significantly.

The genus *Pteroptrix* contains several internal parasites of Diaspine scales. Attempts to utilize its species for biological control date back to the work of G. Compere in 1906 and F. Silvestri in 1924 (Compere & Smith, 1927). *P. smithi* was apparently introduced into Israel from Hong-Kong by the Citrus Marketing Board of Israel in 1956-1957 together with other scale parasites that included *Aphytis holoxanthus* DeBach. No immediate recoveries of *P. smithi* were made, and this species was not regarded as established until Rosen found some scales inhabited by this parasite in 1962 (Rosen, 1965). Additional recoveries were made in 1965 and since then *P. smithi* has spread through large parts of the citrus-growing regions of Israel, even outnumbering the previously successful *A. holoxanthus* (Rivnay, 1968).

Our information as to the developmental biology of the species that are included in the genus *Pteroptrix* is incomplete. The reproduction of *P. chinensis* (Howard) is biparental, but the host for male development is unknown. Although *P. albocincta* (Flanders), *P. smithi* (Compere) and *P. wanhsienensis* (Compere) show synchronous male and female emergence from an individual host, attempts at the rearing of males from eggs deposited by unfertilized females on previously unparasitized host scales have been unsuccessful (Flanders, 1966). It was, therefore, both interesting and important to

(*) Dedicated to Prof. H. Mendelssohn on the occasion of his 60th birthday.
undertake the hereunder reported studies in order to establish the biological characteristics of *P. smithi*.

**Materials and Methods**

The Florida red scale *Chrysomphalus aonidum* (L.), which is the natural host of *P. smithi*, was used as the host insect during the whole study. It was reared upon butternut squash in temperature controlled rooms with a temperature of 26 ± 1°C. Rearing was carried out according to the methods described by FLANDEAUS (1951). The squash fruits bearing uniform-aged scales were kept on metal trays within cloth sleeves that had a transparent plastic top, and were closed with metal clips when not in use (Fig. 1).

In order to start the parasite culture, scale-infested citrus fruits and leaves were collected in Rehovot and Mikveh Israel. Scales that contained parasites were isolated until the latter’s emergence. The parasites were then released upon scale-infested squash fruits. Rearing was conducted at the standard conditions of 27±1°C and 55±5% R.H. Periodic parasite samples were taken, mounted on glass slides, and their identity established in order to assure the specific purity of the culture.

The adult parasites were fed undiluted honey that was streaked on the inner surfaces of their rearing containers. For close observation and individual rearings, “oviposition cells” (Fig. 2) were used. These were made of glass rings (2 × 1.5 cm) that were glued to the squash with plastic glue and were covered with silk cloth.

Except where otherwise specified, the age of the parasites used was always 24 hours or less. This was done in order to minimize any age-induced variability. All of the parasites that were used for the experiments were allowed to emerge individually in glass vials. Whenever mated females were needed, they were kept with males in small vials for several hours until no more copulations were observed. This method was proven effective since all females treated in this way gave rise to both sexes.

Dissections were carried out in saline, measurements were taken of at least 20 individuals in each case, and for each individual the maximal width and length were taken into account.

**The host scale**

*Chrysomphalus aonidum* (L.) is a polyphagous pest that attacks host plants belonging to 23 different families (AVIDOV & HARPAZ, 1969). The damage caused to citrus trees when unchecked is severe, causing breakdown of the chlorophyll, yellowing and shedding of the leaves. Fruits are also infested and commercially degraded.