

TEN YEAR PERSISTENCE OF A NON-AUGMENTED
POPULATION OF THE BROWNBANDED COCKROACH
(ORTHOPTERA: BLATTELLIDAE) PARASITOID, *COMPERIA*
MERCETI (HYMENOPTERA: ENCYRTIDAE)

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The oothecal parasitoid *Comperia merceti* (Compere) has been used as a biological control agent against the brownbanded cockroach, *Supella longipalpa* (F.) (Orthoptera: Blattellidae), in environments where pesticide use is undesirable (Slater *et al.* 1980). In an experimental study of brownbanded cockroach populations, Coler *et al.* (1984) released *C. merceti* in 1978 in two insect rearing rooms at the University of Massachusetts at Amherst. In one room, cockroach populations were augmented during the study by provision of food. Parasitism at that site increased as the brown-banded cockroach population density increased, followed by the collapse of the cockroach population (Coler *et al.* 1984). After the end of the Coler *et al.* study in 1983, no further parasitoid releases were made in the building in which these rearing rooms were located. This note reports the status of the parasitoid populations in 1993 at the two sites used by Coler *et al.* (1984), fifteen years after the initial release and ten years after the last parasitoid release. Insect rearing has been conducted continuously in these same rearing rooms with little change since the initial parasitoid releases. In this note we demonstrate the ability of this parasitoid to persist under such conditions without augmentation for long periods and to cause high levels of mortality to host oothecae.

On 8 and 22 November, 1993, *S. longipalpa* oothecae were collected from each of the two insect rearing rooms used in the Coler *et al.* study. These rooms were of moderate size (39.8 m³ and 35.7 m³) with loose construction providing cockroach harborage. Rooms were searched thoroughly for oothecae; search areas included walls, shelving, molding, along electrical conduits, inside light timing boxes, and the underside of tables. Oothecae inside electrical conduits, in deep wall cracks, or around insect rearing cages could not be retrieved. All oothecae (both currently live oothecae and older, emerged or dead ones) encountered in accessible areas were collected and examined for parasitism. Most oothecae contained neither live cockroaches nor parasitoid stages, but rather were oothecae which had either died, or from which cockroaches or parasitoids had previously emerged. These oothecae were probably no more than two to three years old, as the rearing rooms are periodically repainted. In the laboratory, all oothecae were examined under a stereoscope for either wasp emergence holes or the oviposition stalks present on the surface of parasitized oothecae. Oothecae from which cockroach nymphs had emerged were easily identified by opening the oothecae and observing the remnants of hatched eggs. Oothecae from which neither cockroaches nor wasps emerged were held for 60-70 days and those producing either cockroach nymphs or parasitoids recorded. Oothecae from which no emergence occurred were dissected. Of the 556 oothecae collect, only three were classified as having died, with nothing emerged. The remaining oothecae all resulted in emergence of hosts or parasitoids, either in the field prior to collection, or during rearing.

As a separate measure of parasitism, oothecae from a laboratory colony were exposed at one study site as "trap hosts" for a 14 day period (22 November-6 December, 1993). Trap host oothecae were evenly distributed on walls and shelving. These oothecae were then recovered and reared to determine the rate of parasitoid attack during

TABLE 1. LEVELS OF PARASITISM OF OOTHECAE OF THE BROWNBANDED COCKROACH, *SUPPELLA LONGIPALPA*, BY *COMPERIA MERCETI* IN TWO INSECT REARING ROOMS IN FERNALD HALL, UNIVERSITY OF MASSACHUSETTS, AMHERST, MASSACHUSETTS, USA, IN 1993, FIFTEEN YEARS AFTER INITIAL RELEASE OF THE PARASITOID.

Type of Host	% Parasitism					
	Room No. 1			Room No. 2		
Old oothecae	35.5	(6.4) ¹	(214) ²	92.6	(2.8)	(312)
Live oothecae	46.2	(27.1)	(13)	88.2	(15.4)	(17)
Trap host oothecae		—		45.8	(19.9)	(24) ³

¹95% confidence interval for parasitism.

²Number of oothecae examined.

³Number of oothecae deployed as trap hosts, 22 Nov.-6 Dec., 1993.

the exposure interval, which was approximately half of the total period for oothecal development.

When comparing parasitism of the total live oothecae versus total oothecae showing previous emergence, no significant difference was observed ($\text{Chi}^2=0.004$, d.f.=1, p-value=0.95) (Table 1). Percent parasitism of oothecae deployed as trap hosts was lower than that of live oothecae collected in the same room. However, trap host oothecae were exposed for 14 days, approximately half of the normal exposure period of

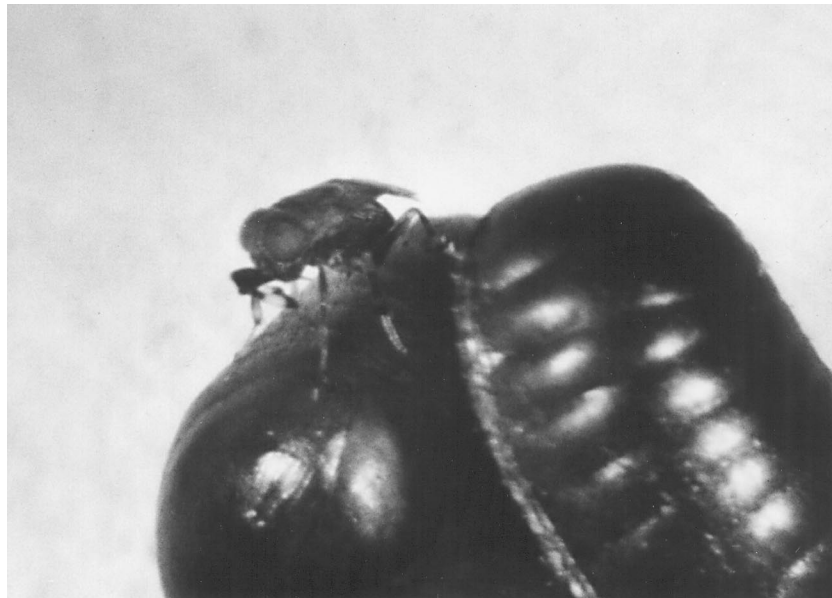


Figure 1. *Comperia merceti* preparing to oviposit in ootheca of *Supella longipalpa* (Photograph courtesy of R. Coler).

oothecae to parasitoid attack (LeBeck 1985). In addition, trap host oothecae were deployed at a time immediately following the removal of many wasps from the study site through collection of existing live oothecae.

Data on cockroach densities were not collected, and it is not clear to what degree the existing parasitoid populations contribute to lowering cockroach densities. These observations show that *C. merceti*, once established at a site with a permanent population of brownbanded cockroaches, is able to persist without need for periodic release. These observations also indicate that levels of mortality from parasitism under such conditions can be large, suggesting that even non-augmented populations of this wasp may be of value in suppressing brownbanded cockroaches at some sites, such as animal rearing or breeding facilities, and zoos, where pesticide use is not desired.

SUMMARY

A non-augmented population of the brownbanded cockroach (*Supella longipalpa*) oothecal parasitoid *Comperia merceti* was observed to have persisted at two indoor urban sites in Massachusetts for 10 years. Levels of parasitism were high (36-93%), suggesting that this parasitoid has the potential to contribute to pest suppression at some types of urban sites, even when repeated releases of the parasitoid are not made.

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