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Egg resorption behaviour by the solitary egg parasitoid *Anaphes nitens* under natural conditions

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Abstract

We investigated under outdoor conditions and inside a climate chamber: (i) whether *Anaphes nitens* Girault (Hymenoptera: Mymaridae), an egg parasitoid of the Eucalyptus snout beetle, *Gonipterus scutellatus* Gyllenhal (Coleoptera: Curculionidae), experienced egg resorption, and (ii) how various treatments (location, food, and/or host supply) and body size influenced egg load, egg resorption, fecundity, and longevity. One-day-old females were mated and randomly assigned to five groups: (A) honey + hosts, (B) water + hosts, (C) only honey, (D) only water, and (E) control females killed at emergence. We compared the egg load of the newly emerged females, which represent the control group (egg load = ovarian eggs present at emergence), with the lifetime egg load (i.e., ovarian eggs + emerged offspring + not emerged offspring) of the females with various host and diet treatments, by dissection of the ovaries to find evidence of egg resorption. All groups reared outdoors had fewer eggs than the control, while indoors there was no significant difference. Outdoors, starved but host-provided wasps (B) experienced the highest reduction of the lifetime egg load (51%). Groups without access to food (B + D) resorbed more eggs than groups provided with honey (A + C). Females with honey and hosts (A) had the highest lifetime fecundity, but those with water and hosts (B) showed a higher daily realized fecundity. Host-deprived females with access to food (C) attained the longest lifespan. Our results suggest that under stress conditions, such as low temperature and food shortage, *A. nitens* females practice egg resorption, probably to save energy.

Introduction

In an unpredictable environment, one of the most important factors that influence foraging behaviour and fitness gains of a female parasitoid wasp is the balance between time available for host searching and egg load (Minkenberg et al., 1992; Rosenheim, 1999). Because egg production and host searching are both energy-consuming processes, parasitoids try to obtain a high reproductive success by optimizing the trade-off between egg load and the number of hosts encountered (Pelosse et al., 2007). On the other hand, oviposition behaviour in parasitoids is also a highly dynamic process at the individual level, responding in an adaptive way to variation in the abiotic environment, host abundance and quality, and female age, experience, and nutritional status (Papaj, 2000).

Parasitoid species can be divided into two physiological categories based on egg production schedules: strictly proovigenic females, which emerge with the entire complement of eggs, and strictly synovigenic females that can mature additional eggs throughout adult life (Godfray, 1994). The ovigeny index expresses the proportion of the maximum potential lifetime egg complement that is mature when the female emerges (Jervis et al., 2001). An index of 1 indicates that all the eggs are mature at emergence, while an index of 0 denotes that there are no mature oocytes. Actually, evidence supports the existence of a continuum of ovigeny rather than a strictly binary classification (Heimpel & Rosenheim, 1998; Jervis et al., 2001).

An important adaptive behaviour of most synovigenic species is the capacity of females to resorb egg lipids and

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