

N O T E

Tachinid (Diptera: Tachinidae) Parasitism in Adult Horned Passalus Beetles (Coleoptera: Passalidae) at the Wormsloe Historic Site, Savannah, Georgia¹

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The horned passalus beetle, *Odontotaenius disjunctus* Illiger, is subjected to a high number of parasites, both externally and internally, with at least 16 species of parasites living on or in the beetles (Pearse et al. 1936. Ecol. Monogr. 6: 456 - 490). These include mites, a gregarine, 2 nematodes and a tachinid fly. The tachinid fly parasite, *Zelia vertebrata* Say, has been reported in passalus beetles at a number of locations throughout the beetle range in eastern North America, including in Georgia (Fattig 1949. Emory Univ. Mus. Bull. No. 8: 1 - 40). Adult flies lay their eggs in the tunnels made by the beetles in rotting logs, and the maggots enter the beetle larvae in the tunnels. The fly larvae then grow inside the host, breathing air through the opening made in the body cavity wall (Mangrum 1942. Ann. Entomol. Soc. Am. 35: 73 - 75). Most of the fly larvae exit the host before the host pupates, though some exit during pupation (Gray 1946. Am. Midl. Nat. 35: 728 - 746). Tachinid flies have never been reported in adult passalus beetles despite a long history of parasite surveys in this species in the past century. Here, we report discovery of 2 adult horned passalus beetles that were parasitized with tachinid fly larvae.

The 2 parasitized beetles were from a collection of 17 passalus beetles made on 22 September 2012 at the Wormsloe Historic Property in Chatham Co., near Savannah, GA. This is a 485-ha property of maritime forest habitat with the dominant trees being mature live oak (*Quercus virginiana* Mill) and southern magnolia (*Magnolia grandiflora* L). The day after collection, the beetles were transported to our laboratory at the University of Georgia (Athens, GA) and housed in a glass aquarium (50 × 25 × 25 cm) containing hardwood logs for food and cover. On 9 November 2012 (47 days later) the beetles were killed in a killing jar with chloroform and dissected for a separate project examining prevalence of nematodes in this species. During this process, we discovered that 2 of the beetles were parasitized with tachinid fly larvae, and 1 had a large

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number of larvae (Fig. 1). There were 8 tachinid larvae in this beetle (a female), whereas the other parasitized beetle (a male) had just 1 larva. The larvae were primarily confined to the abdominal cavity. We found they could be lifted out easily with fine forceps. They were white in appearance, with a smooth exterior, and generally matched the description of *Z. vertebrata* given by Mangrum (1942), although we did not taxonomically identify the species of tachinid because this was not the goal of our study. We also observed the respiratory funnel described by Mangrum (1942) on 2 larvae. The larvae measured approx. 15 - 20 mm in length and 7 - 10 mm in width.

This discovery is important for a number of reasons. First, it demonstrates that passalus beetles can survive to adulthood if parasitized by tachinid flies (i.e., parasitism is not always lethal for beetle larvae or pupae), and they can do so even if parasitized by 8 larvae. Second, because a considerable length of time had passed without emergence of the fly larvae from these hosts (at least 47 days), this may represent a previously-unknown overwintering behavior on the part of this parasitoid. Certain other tachinid species are known to overwinter as larvae in adult hosts (Lopez et al. 1992. *Entomophaga* 37: 311 - 315), and this behavior can even vary by site within the same tachinid species

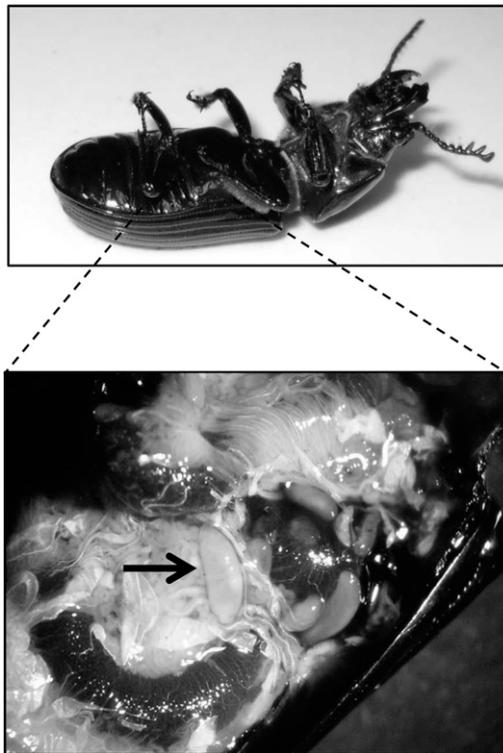


Fig. 1. Tachinid fly larvae (presumed to be *Zelia vertebrata*; arrow) found in the abdominal cavity of an adult female *O. disjunctus* specimen (top) from the Wormsloe Historic site near Savannah GA. At least 6 larvae are visible in this image.

(Watanabe. 2005. Appl. Entomol. Zool. 40: 293 - 301). Finally, the parasite load of the female beetle (8 larvae) was considerably higher than previously reported for *O. disjunctus*. This further demonstrates the extremely high tolerance for parasitism in the horned passalus beetle.

We hope to expand on this discovery by conducting more extensive surveys of adult beetles at this site and over several years to determine how widespread this behavior is and if it occurs each year. It also will be important to determine the course of parasitism in adults (in laboratory experiments) to determine how long the larvae can persist in the host, or alternatively, how long parasitized adult beetles can survive.

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