

Life History and Behavior of the Embiopteran *Oligotoma saundersii* (Westwood, 1837)

Why this was prepared: This is posted for anyone that has an interest in members of the insect order Embioidea (a.k.a. Embioptera, Embiidina). It is designed as a supplement to information that is available elsewhere, particularly the scientific literature published between 1800 and 1972 that is often difficult to obtain and rarely illustrated with photographs. Any mistakes will be corrected as quickly as possible after they are identified.

Description of the species: *O. saundersii*, also known as Saunders webspinner has nearly worldwide tropical distribution due to human activity and represents a good choice for studies on a common embiid. In the USA, it is an introduced species. Adult females are chocolate-brown and wingless. Nymphs are pale with a yellow-cream appearance. Adult males are nearly black with pale-cream integument and some pale markings on the legs. Males are winged with a distinct-shaped nearly black head and large compound eyes. They closely resemble the black webspinner *Oligotoma nigra* whose females are more reddish and whose males are somewhat darker. The sickle-shaped process of the left hemitergite of the 10th abdominal segment of the adult male helps to distinguish *O. saundersii* from the other species.

Rearing Methods: *O. saundersii* was collected on October 19, 2008 in Bryan, TX, USA from the exfoliating bark of a relatively large willow oak tree after observing the presence of frass-lined silk within several bark crevices. Two mature females and a few eggs were collected (Figure 1). Embiids were housed in a small clear plastic box (9 x 9 x 26 cm) with 2-3 cm of moist peat that was covered with a layer of shredded fern stems onto which several pieces of bark (approximately 1.5 x 3 x 7 cm) were placed. The bark was collected from the same tree on which the embiids were collected and was situated in the container with the length of the bark placed vertically leaning against the wall of the container. Embiids were provided with dry flake food (Wardley Total Goldfish Gourmet Flake Blend, Hartz Mountain Corp, Secaucus, NJ) that was replenished within 48 hours if it had been consumed. Food was removed and replaced if it showed signs of fungal growth. Water was added as a fine mist only if the peat layer appeared to be drying. In an effort to reduce the likelihood of fungal growth, the water was applied to the container after food had been completely consumed, but before any new food was replenished. Temperatures ranged from 20-25°C with a natural light cycle that was periodically interrupted by the presence of artificial lighting (usually for observation purposes). When possible, potentially useful or interesting observations were recorded with a digital camera.

Observations: Initially, the female embiids were rarely seen and any silk produced was well camouflaged with chewed bark, and frass or fecula. When the insects became accustomed to the flake food, they would occasionally be observed when they extended themselves beyond the silk galleries to retrieve flakes or to deposit silk onto freshly added flake food. Nymphs approximately half the size of the original females were observed in late December. To be certain that the next generation of offspring had reached maturity, confirmation was based on

the appearance of an adult male in the colony. (Because there were initially no males collected, they must have been the offspring of the original females or eggs that were collected.) The adult males also served as a basis for confirming the genus and species, based on characters of the head, wing, and terminalia (Figures 1 and 2). The first adult male was observed on February 12, 2009. Thus, the time to maturity was approximately 4 months. The male extended several silk tunnels from the bark onto the walls of the container and spent a substantial amount of time poised at the openings of the tunnels with his head and front legs extended beyond the tunnel. He was also observed outside of the silk galleries at several distant locations within the confines of the container. The male lived for several weeks. The next set of first-instar nymphs was observed beginning around May 30 and there were at least five mature females in the colony at that time. The number of first-instar nymphs that could be observed had steadily increased between May 30 and June 6 and there were more than 30 nymphs observable by June 6. If several assumptions are made (e.g. all females were producing eggs at roughly the same time, had equivalent fecundity, and nymphs hatch in a predictable and well-defined time frame) then it would appear that *O. saundersii* females probably produce an average of about one egg per day. During the time that new nymphs were accumulating in the colony, silk galleries had been extended considerably and were becoming abundant on the plastic container. This suggests that the timing of major extensions to the silk galleries by adult *O. saundersii* females is related to the anticipated growth of the colony. The silk galleries prepared on the plastic container facilitated observations of ovoposition and early egg care (Figure 3). Eggs are deposited in tunnels and covered with materials to disguise the eggs. After being camouflaged, the eggs do not appear to be guarded. On one occasion, a first-instar nymph discovered an egg before it could be camouflaged, and the nymph was observed chewing on the newly deposited egg. Hours later, the egg was missing, perhaps having been eaten. This may indicate that the act of camouflaging the eggs helps to prevent acts of cannibalism within the colony.



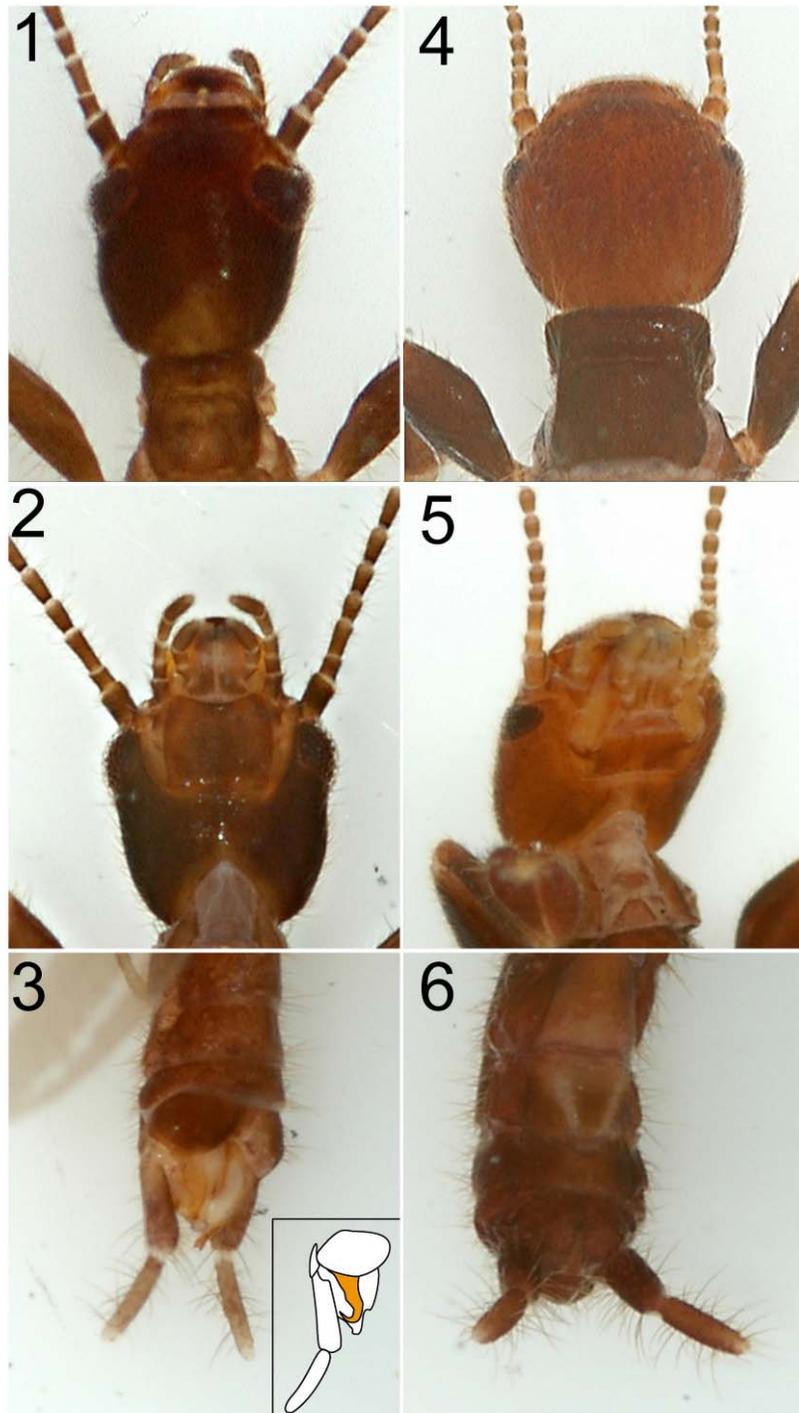


Figure 2. Adult heads and terminalia. 1) Dorsal view of the head of an adult male. 2) Ventral view of the head of an adult male. 3) Dorsal view of the terminalia of an adult male showing the distinguishing sickle-shaped process on the left hemitergite of the 10th abdominal segment (colored in the illustrated inset). 4) Dorsal view of the head of an adult female. 5) Ventral view of the head of an adult female. 6) Ventral view of the terminalia of an adult female. All specimens depicted above are alcohol-preserved.

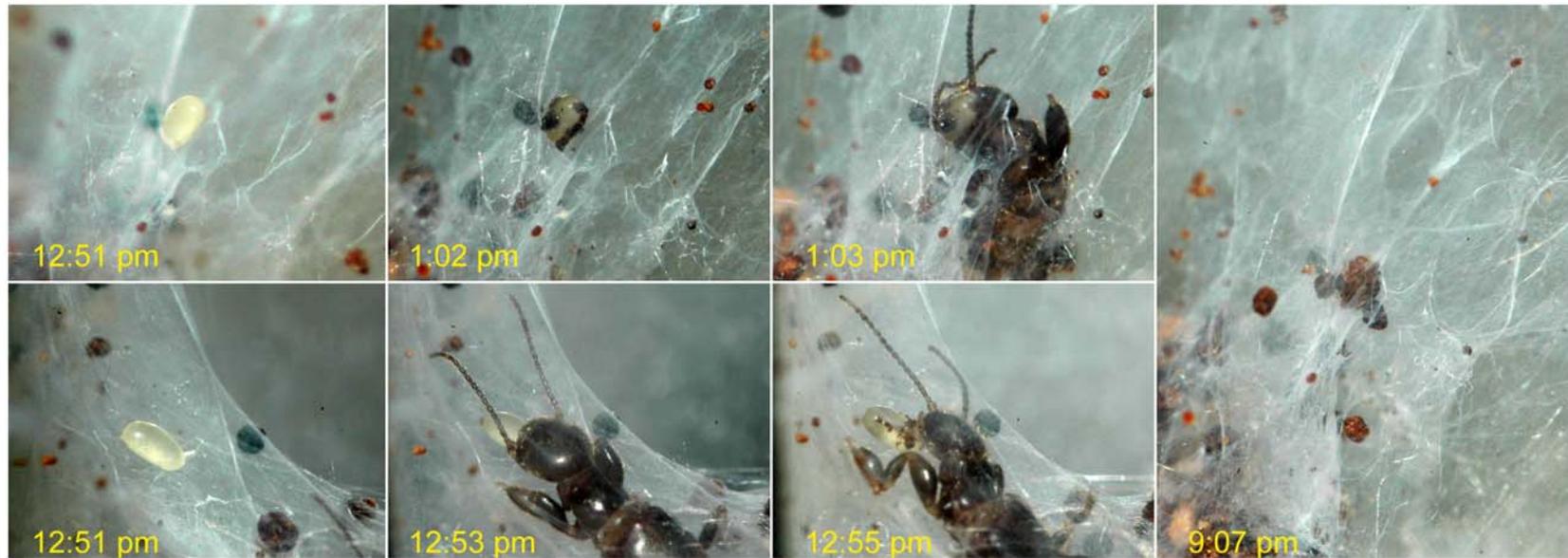


Figure 3. Early egg care. An egg viewed from perpendicular angles (top versus bottom rows). The operculum is at the very bottom of the egg in the images in the top row and to the lower right in the images in the bottom row. The naked egg (seen at 12:51 pm) was covered with chewed substrate or fecula beginning within minutes of being laid by the mother. When the egg was completely covered, it resembled and blended in with other fecula/frass left nearby (as can be seen in the 9:07 pm image) and remained unattended by the female.