

**OBSERVATION OF A NUPTIAL FLIGHT OF THE HORNED PASSALUS  
BEETLE, *ODONTOTAENIUS DISJUNCTUS* (ILLIGER)  
(COLEOPTERA: PASSALIDAE)**

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**Abstract**

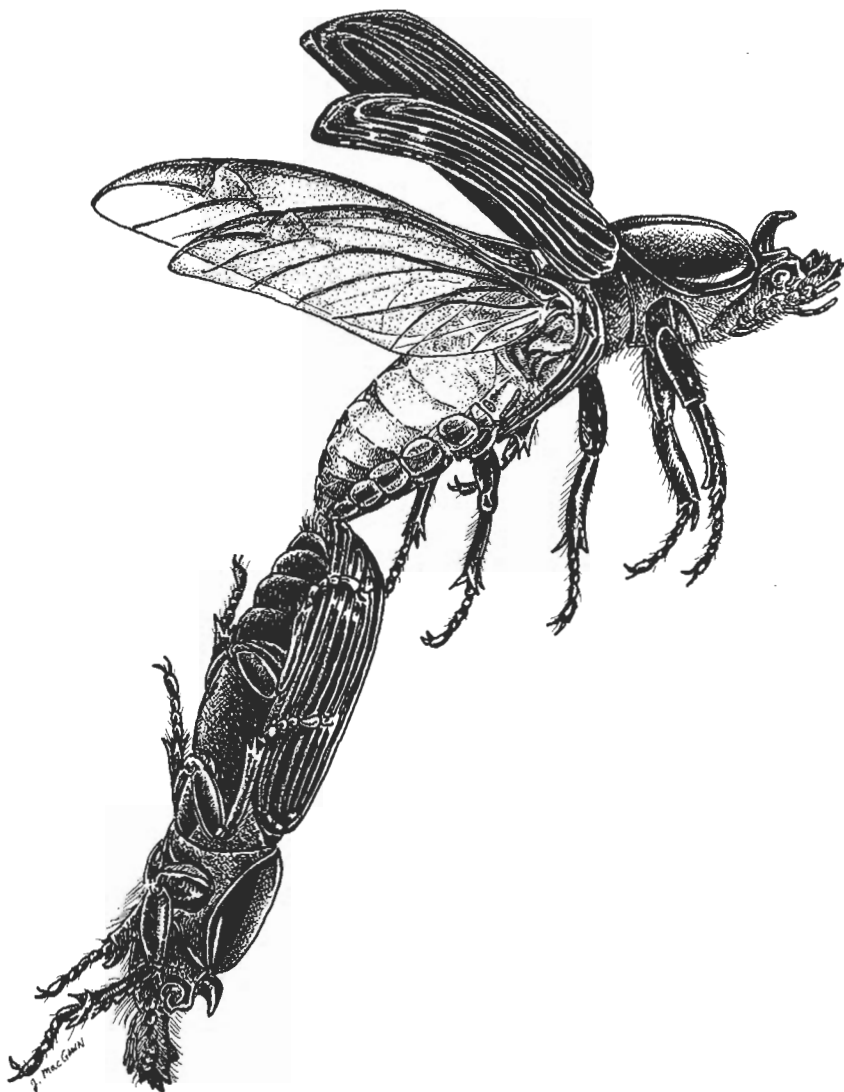
The horned passalus beetle, *Odontotaenius disjunctus* (Illiger), was observed mating during a crepuscular flight. In addition to the first record of a nuptial flight, observations of the elytral positions while in flight differed from the only previously published report on this species.

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Little has been recorded regarding the flight and mating habits of the horned passalus beetle, *Odontotaenius disjunctus* (Illiger). Gray (1946) reported on the life history of this species, but he did not observe mating and suggested that the wings were never used for anything but stridulation. In answer to the question as to whether *O. disjunctus* was capable of flight, Hunter and Jump (1964) reported isolated records of *O. disjunctus* collected in flight or in light traps. In one observation of its method of flight, these authors stated that the body of the beetle was bent ventrally while the elytra were raised as a unit without separating to allow extension of the membranous hindwings. However, Schuster (1975) observed an individual of *Passalus punctiger* Serville flying a short distance from the ground with the elytra spread. A crepuscular flight of about 20 individuals of *Oileus sargi* Kaup also has been observed at 18:49 hours, May 25, 1989, in Guatemala in a cloud forest on Volcan Zunil at 1500 m altitude (Enio Cano, pers. comm.).

Schuster (1975) observed copulation in six species of Passalidae that were maintained in large petri dishes, and he described the copulation of *O. disjunctus* in detail. Schuster reported that courtship behavior in Passalidae involves the pair circling each other with the male frequently parallel with the female and facing the same direction. He noted that one individual (usually the male) occasionally turned onto its back and then righted itself during this courtship. He reported that the courtship behavior might continue up to 12 hours with continual production of characteristic acoustical signals. When copulation of *O. disjunctus* was observed, Schuster reported that the male turned on his back and the female shifted the posterior end of her body onto the male's ventral surface, after which the female rotated until their bodies were end to end. After a short period of oscillation of the female's abdomen from side to side, the aedeagus was everted and copulation ensued, lasting for 10 to 28 minutes and ending when the female walked forward.

Castillo and Reyes-Castillo (1989) observed *Passalus punctatostriatus* Percheron mating in a gallery of a decomposing log and listed 14 species of Passalidae that have been reported to mate in captivity. The venter to venter position, which was present in all these observations, was assumed to be an adaptation for mating in narrow galleries.



**Fig. 1.** Orientation of mating pair of *Odontotaenius disjunctus* based on observations of beetles in flight.

On May 14, 1995, during a period of 20 to 30 minutes at dusk until just after dark (during a period between 8:00 and 8:45 PM), we observed between 12 and 15 individuals of *O. disjunctus* in flight at the first author's house, located in the Black Belt Prairie in Oktibbeha County, Mississippi. The house was the highest landmark in the area, and no other obvious landmarks were present in the area. The origin of the beetles was not detected, but the nearest location of decomposing logs was in a small wooded lot about 30 meters from

the flight area. The beetles were flying at a height of approximately 2.0-3.7 meters above ground through an open, grassy area on the north side of the house. The extent of the area where the beetles were flying or congregating outside the observation site was not determined. The beetles appeared to be strong fliers but were slow enough to observe in close proximity and capture by hand. Beetles in flight had elytra clearly separated, in contrast to the observation of Hunter and Jump (1964). After catching one beetle and determining its identity, it was tossed repeatedly into the air for varying heights in attempts to induce flight, but flight was never resumed.

During this time we observed two pairs of beetles coupled together while in flight. Each apparently mating pair included one individual in flight with wings spread and elytra that were separated, coupled with one individual having both wings and elytra retracted. The two individuals were oriented in a venter to venter position with their heads facing opposite directions as in figure 1. The sound produced by the coupled pair was noticeably different from that of single individuals, being a much louder buzz and sounding similar to a bumble bee. The buzzing sound was constant and appeared to be a result of wing beating rather than stridulation. The louder buzz of the coupled pair may have been due to the double load of the flying individual.

We observed one pair coupled in flight for approximately two minutes until they suddenly broke apart and flew quickly in opposite directions as compared with the flight speed of the other individuals in the swarm. The beetles dispersed as the evening progressed.

No observations were made in the area on May 15. Six beetles were heard and observed flying in the same area on May 16 from 8:15 to 8:45 PM, but no coupled pairs were observed. Darkness prevented observations after 8:45, but no buzzing sounds of flying beetles were heard after this time. Two of the six specimens were collected as voucher specimens and deposited in the Mississippi Entomological Museum.

On the first night of observation, May 14, the moon was full, and there was some cloud cover. The temperature was about 31°C. On May 16, the ambient temperature at 8:15 PM was 28°C.

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#### Literature Cited

- Castillo, M. L. and P. Reyes-Castillo. 1989. Copulation *in natura* of passalid beetles (Coleoptera: Passalidae). *Coleopterists Bulletin* 43:162-164.
- Gray, I. E. 1946. Observations on the life history of the horned passalus. *America Midland Naturalist* 35:728-746.
- Hunter, P. E. and B. J. Jump. 1964. Flight in the horned passalus beetle, *Popilius disjunctus* (Illiger). *Proceedings of the Entomological Society of Washington* 66:260.
- Schuster, J. C. 1975. A comparative study of copulation in Passalidae (Coleoptera): new positions for beetles. *Coleopterists Bulletin* 29:75-81.
- Schuster, J. C. 1975. Comparative behavior, acoustical signals, and ecology of New World Passalidae (Coleoptera). Ph.D. dissertation, University of Florida.

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