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TROX HAMATUS ROBINSON (TROGINAE)
USING A CANTHON (SCARABAEINAE) BROOD BALL
AND NEW RECORDS OF NORTH AMERICAN TROX (COLEOPTERA: SCARABAEIDAE)

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Trox hamatus Robinson was observed feeding on an abandoned *Canthon* brood ball in southeastern Nebraska. Although some Aphodiinae and Scarabaeinae have been reported feeding on or stealing other scarabaeine dung balls, this represents the first reported observation of this behavior for a member of the Troginae. It is suggested that the brood ball was opportunistically used by the *Trox*, and the event is rare. In addition, new state records are provided for *Trox aequalis* Say, *T. atrox* LeConte, *T. laticollis* LeConte, and *T. tessellatus* (LeConte).

† † †

Utilization (theft, "cleptoparasitism," general feeding) of larger scarabaeine or geotrupine food or brood balls by other, smaller scarabs has been reported occasionally in the literature. Intraspecific competition within the Scarabaeinae for limited dung resources is common, and appropriation by an individual of a dung mass accumulated by another probably occurs frequently. I have observed such behavior for *Canthon pilularius* (L.) in Nebraska, *Canthon imitator* Brown in Arizona, and *Canthon indigaceus* LeConte in Mexico. These cases involved actual theft of the dung ball and were not simply accompaniment by a member of the opposite sex. Howden (1955) summarized the role played by some *Aphodius* which interspecifically "parasitized" the brood balls of other scarabs. He went on to describe his observations of *A. rubeolus* Beauv. inhabiting the brood balls of *Phanaeus* sp. in Florida, and *A. lividus* (Oliv.) "parasitizing" the brood balls of *Onthophagus medorensis* Brown in Texas. In the latter case, *Aphodius* larvae actually killed and consumed the eggs and larvae of *O. medorensis*. Although *Aphodius* usually develop rapidly in a dung mass without adult provisioning of the larvae, it seems increasingly apparent that some *Aphodius* larvae are "parasitic" in that they destroy and consume eggs and larvae of their "host." Halffter and Matthews (1966) concluded that

this is facultative for *A. lividus* because they are also found developing in cow dung at the surface; in other words, they are not specialized for attacking the nests of *Onthophagus*. Gordon and Howden (1973) reported an additional instance of "parasitism" where *A. inurbanus* Gordon and Howden usurped, in the manner just described, the brood balls of *O. cuboidalis* Bates in Mexico.

Hammond (1976) observed adults of *O. suturalis* Peringuey emerging from a *Scarabaeus* brood ball in Africa, and reviewed utilization by small dung beetles of brood material gathered by larger beetles of other species. He indicated this kind of utilization in Scarabaeinae was probably widespread, and, in fact, may be obligatory in some species living in areas where humidity is low and temperatures generally high.

Young (1969) observed *Onthophagus hopfneri* Harold exploiting an abandoned brood ball of *Canthon imitator* in Arizona. He stated that a hole in the side of the dung ball indicated that the *Onthophagus* burrowed into the ball instead of being rolled up within the ball by the *Canthon*. In this observation, the *Onthophagus* appeared to be using the dung ball for food rather than for supplying brood cells. Halffter and Matthews (1966) reviewed other instances of "cleptoparasitism" by Scarabaeinae in Asia, Europe, and Latin America.

The biology of the Troginae was reviewed by Vaurie (1955) and Baker (1968). Although much remains to be discovered about the Troginae (particularly habitat specialization), it can be generally said that both the adults and larvae are associated with bird and mammal nests and burrows, and with animal carcasses in the latter stages of decay.

Occasionally they feed also at dung and on fecal materials such as "owl pellets" which contain the remains of bird and mammal prey items. Described here is an instance where a trogine was associated with a *Canthon* brood ball.

On a trail (ca 11:00 a.m.) in the forests of Indian Cave State Park (southeastern corner of Nebraska) during June 1976, a single female of *Trox hamatus* Robinson (Fig. 1) was found clinging to the side of a *Canthon* brood ball where it was feeding. The dung ball was fresh although apparently abandoned; the *Canthon* maker was nowhere to be seen. The *Trox* was 5 mm long, and the dung ball was 20 mm in diameter. Based on the size of the ball and the species known to occur in the state, it was made by either *C. pilularius* (L.) or *C. chalcites* (Hald.). The ball consisted of feces, much matted hair, and some seeds. The hair, presumably that of a prey animal, indicated that the mammal that deposited the dung was a predator (either a coyote or red fox for this area), or that the hair in the feces resulted from self grooming by whatever (predator or not) left the dung.



FIGURE 1. Habitus of *Trox hamatus* Robinson.

Baker (1968) suggested that the smaller members of *Trox* (including *T. hamatus*) live primarily in nests and burrows, although it is apparent (based on collecting data) that they also forage elsewhere. The specimen described here was apparently using the abandoned *Canthon* brood ball as a food resource. Members of the Troginae have not been known previously to utilize the food or brood balls of Scarabaeinae. Such an event may not occur commonly, but apparently when the right kind of dung is available (e.g., that which includes vertebrate body parts), *Trox* may opportunistically exploit the resource. Opportunistic exploitation is the *modus vivendi* of dung- and carrion-feeding beetles, and *Trox* make no distinction whether the food is preformed into a ball or not. Absence of a tending *Canthon* and presence of mammal hairs in the dung ball provided the conditions necessary for an attempt on the ball.

NEW RECORDS FOR NORTH AMERICAN *TROX*

The following represent new state records which should be added to the records given by Vaurie (1955 and 1958). The specimens are deposited in the Howden collection (HAHC) or in the Canadian National Collection (CNC).

Trox aequalis Say: GEORGIA: Early County, Bakely, 1 April 1969, S. Peck, at U.V. light (1 male) (HAHC).

T. atrox LeConte: BRITISH COLUMBIA: Oliver, 6 July 1953, D. F. Hardwick (1 male, 2 females); 20 September 1953, J. E. H. Martin (1 female) (all CNC).

T. laticollis LeConte: MARYLAND: Baltimore County, Lutherville, 19 April 1958, H. Howden (1 female) (HAHC).

T. tessellatus (LeConte): SOUTH DAKOTA: Fall River County, Angostura Dam south of Hot Springs, 7 July 1968, A. T. Howden (1 male) (HAHC).

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