

SCIENTIFIC NOTE

Notes on the feeding behavior of *Mycotrupes lethroides* (Westwood) (Coleoptera: Geotrupidae), a flightless North American beetle

Reports by Pérez-Ramos *et al.* (2007) and Verdú *et al.* (2007) of acorn-feeding by *Thorectes lusitanicus* Jeckel (Coleoptera: Geotrupidae) in Spain prompted us to publish our field and laboratory observations of similar behavior in one species of the North American genus *Mycotrupes*, *M. lethroides* (Westwood). This species is only known from the general vicinity of Augusta, Georgia.

Field observations. On 3 November 2007, we observed and collected *M. lethroides* on a sandy road in the Yuchi Wildlife Management Area (YWMA), near Girard, Burke County, Georgia. It appeared that much activity, indicated by adult burrows, was concentrated in a part of the road somewhat shaded with oak trees. At approximately 3:00 PM on that day, the following observation was made. In the middle of the sandy road shaded by oak trees, a male *M. lethroides* was observed feeding on an acorn in a shallow, cup-shaped depression (not a burrow) apparently excavated by the beetle. The acorn was standing upright and the beetle was straddling it, with its legs wrapped around the acorn. The beetle was feeding on soft matter which was exposed through the top of the acorn. In the process of excavating burrows of *M. lethroides* in the same area, acorns and oak leaves were often found at the bottom of the burrows with single adult *M. lethroides*.

On 6 November 2007, dung-baited pitfall traps, which had been set 3 days earlier, were picked up at YWMA. In one of the pitfall traps, an individual of *M. lethroides* was seen feeding on an unidentified caterpillar which had apparently fallen into the trap with the beetle. This was most likely a case of opportunistic feeding.

Laboratory observations. A live series (5 ♂; 5 ♀) of *M. lethroides* was collected at YWMA on 6 November 2007 and maintained in a laboratory at the Department of Entomology & Nematology, University of Florida (Gainesville, Florida). The beetles were kept in a glass terrarium (approximate dimensions: 40 cm long, 20 cm wide and 20 cm high) which was mostly filled with sand. The sand was periodically moistened with water.

On 7 November 2007, several peanuts and cashews were soaked in water for 30 min. and placed in the cage. One female *M. lethroides* was observed feeding on a cashew. Later that day, this female attempted to drag the cashew backwards. She used her fore-tibial spurs to grasp the cashew, and used her middle and hind legs to walk backwards. Although this beetle abandoned the cashew after approximately 10 min, by the next day (8 November 2007), all peanuts and cashews were observed to have been buried.

On 6 December 2007, a female *M. lethroides* was observed initiating feeding on a cashew. She then proceeded to excavate a burrow next to the cashew, and pull the cashew down into the burrow in a similar manner to the female observed on 6 December.

On 13 November 2007, 2:20PM, three fresh portobello mushrooms were placed in the cage; two of these were “planted” with their stems in the sand. Ten minutes later, at 2:30PM, a female *M. lethroides* started to feed on different parts of one of the mushrooms. This female then excavated a small hole in the sand next to the mushroom, and continued feeding.

On 27 November 2007, four pieces of dog food (moistened with water) were placed on the sand in the cage. A single *M. lethroides* attempted feeding on a piece, and, minutes later, was observed pulling it down into a burrow, holding the dog food with its front legs and walking backwards with its middle and hind legs.

Discussion. The five foods on which *M. lethroides* were observed to feed (acorns, insects, cashews, mushrooms and dog food) are diverse in composition and some (cashews and dog food) are not representative of foods that these beetles are likely to encounter in nature. Although experiments were not conducted to determine feeding preferences or the nutritional quality of the foods accepted in the laboratory, these observations would suggest that adult *M. lethroides* are fairly generalist feeders as adults. Field observations support this idea. *Mycotrupes lethroides* has been collected under fungus (Harpootlian 1995). The strong attraction of adult *Mycotrupes* to dung would suggest that they feed on

this resource as well. Generalist adult feeding is common in the Geotrupidae and in other scavenging Scarabaeoidea. In the scarab subfamily Scarabaeinae, adult feeding on a variety of foods has been observed (Anduaga and Halffter 1993; Young 2006). Larval foods (which, in *Mycotrupes*, are provisioned in burrows by adults [Olson *et al.* 1954]) would presumably be more restricted, as these foods probably have to conform to a more narrow range of physical/chemical requirements in order to maintain food quality underground for the duration of larval development. Although it was confirmed in laboratory experiments that *Thorectes lusitanicus* prefers acorns to dung (Verdú *et al.* 2007), acorn feeding may be part of a more general feeding habit in *Mycotrupes*. The ability of adult *Mycotrupes* to exploit a wide variety of foods would be advantageous in a heterogeneous and unpredictable environment, especially given that *Mycotrupes* are flightless, and so cannot cover as much area in search of food. Fungus, acorns, and dung probably vary in relative abundance through a given year (and across years, especially for acorns [Whitney *et al.* 2004, p. 99], and *Mycotrupes* adults may feed on different types of foods depending on the season and other factors. That *Mycotrupes* have been seen to feed on and bury acorns in the field suggests they may be a factor in the regeneration of oak trees, as hypothesized for *Thorectes* by Pérez-Ramos *et al.* (2007).

Literature Cited

- Anduaga, S., and G. Halffter. 1993. Nidificación y alimentación en *Liatongus rhinocerulus* (Bates) (Coleoptera: Scarabaeidae: Scarabaeinae). *Acta Zoológica Mexicana* 57:1–14.
- Olson, A. L., T. H. Hubbell, and H. F. Howden. 1954. The burrowing beetles of the genus *Mycotrupes* (Coleoptera: Scarabaeidae: Geotrupinae). *Miscellaneous Publications of the Museum of Zoology, University of Michigan* No 84. 59 pp.
- Pérez-Ramos, I. M., T. Maraño, J. M. Lobo, and J. R. Verdú. 2007. Acorn removal and dispersal by the dung beetle *Thorectes lusitanicus*: ecological implications. *Ecological Entomology* 32:349–356.
- Verdú, J. R., J. M. Lobo, C. Numa, I. Pérez-Ramos, E. Galante, and T. Maraño. 2007. Acorn preference by the dung beetle, *Thorectes lusitanicus*, under laboratory and field conditions. *Animal Behavior* 74:1697–1704.
- Whitney, E. N., E. Whitney, D. B. Means, and A. Rudloe. 2004. *Priceless Florida: Natural Ecosystems and Native Species*. Pineapple Press Inc., Sarasota, FL. 423 pp.
- Young, O. P. 2006. Laboratory studies on the feeding behavior of the putative dung beetle, *Ateuchus histeroides* (Coleoptera: Scarabaeidae). *Journal of the New York Entomological Society* 114(3):157–169.

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(Received 13 February 2009; accepted 3 April 2009. Publication date 24 June 2009.)