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Authors: Hall, Donald W., and Branham, Marc A.

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AGGREGATION OF *CALOPTERON DISCREPANS* (COLEOPTERA: LYCIDAE) LARVAE PRIOR TO PUPATION

DONALD W. HALL AND MARC A. BRANHAM
Entomology and Nematology Department, University of Florida, Gainesville, FL 32611-0620

Adult net-winged beetles of the genus *Calopteron* (Coleoptera: Lycidae) are aposematic models for a variety of beetle and moth mimics (Eisner et al. 2005). *Calopteron* larvae are reported to live in rotten logs, under loose bark or, less commonly, in soil or leaf litter. Lycid larvae are reported to be predacious by some authors (Miller 1988; Triplehorn & Johnson 2005) while other authors (Lawrence 1991; Marshall 2006; McCabe & Johnson 1979; Withycombe 1926) report that they feed on myxomycetes, fungi, or fermenting plant juices.

Last instar *Calopteron terminale* (F.), *Calopteron reticulatum* (F.) and *Calopteron tropicum* (L.) (as *C. fasciatum* F. [Withycombe 1926; Bocak & Matsuda 2003]) larvae are reported to form aggregations for pupation (McCabe & Johnson 1979; Moffat 1883; Withycombe 1926). Miller (1988) observed aggression between 2 early instars of *C. reticulatum* in the laboratory and concluded that either the aggressive tendencies are inhibited in last instars or that this species does not aggregate prior to pupation.

There are 3 species of *Calopteron* in North America north of Mexico. Two of these, *Calopteron discrepans* (Newman) and *C. reticulatum*, are nearly identical in appearance (and both are somewhat variable), being differentiated primarily on the basis of the color of the metasternum and second antennal segment (Dillon & Dillon 1961; Green 1952).

On Jan 15, 2007 two large aggregations (626 and 222 individuals, respectively) of *C. discrepans* pupae were observed on the trunks of saplings and a young tree in a floodplain forest in Alachua County, Florida. The forest canopy was dominated by southern live oaks, *Quercus virginiana* Mill. and sweet gums, *Liquidambar styraciflua* L., and the soil was covered with a thick layer of leaf litter. There were decaying logs in the area but not in close proximity to the pupal aggregations. Some adults had already emerged and were resting on surrounding vegetation when the aggregations were discovered. The aggregations were not removed from the field, though they were visited several times in order to document activity. Emergence continued until almost all individuals had emerged by mid-Feb.

The 2 aggregations were approximately 10 m apart, and pupae in each aggregation were partitioned between the trunks of 2 plants with the trunks less than 30 cm apart in each case. The aggregations began slightly above ground level and extended to a height of 80 cm. There were separated clumps of pupae within the main aggregations on 2 of the plants. Other saplings in the area contained no pupae. All 4 of the plants on which the pupae occurred were of different species (and in different families). Therefore, it is doubtful that the aggregating larvae were oriented toward a chemical cue from the plants. Earlier instars of *Calopteron* species are not known to be gregarious. Possibly an aggregation pheromone is involved.

Calopteron reticulatum adults contain pyrazines that likely impart the repugnant scent of the beetles and lycidic acid and other fatty acids that may render them distasteful to predators (Eisner et al. 2005). The integument of *Calopteron* larvae also displays bright, contrasting coloration and the larvae are likely distasteful. Pupation occurs within the last instar larval exuviae (Young & Fischer 1972). Pupae in the aggregations were shingled in tight masses (Fig. 1). The exuviae, which retain the larval coloration pattern (Fig. 2),

Fig. 1. Aggregation of *Calopteron discrepans* (Newman) pupae.

Fig. 2. *Calopteron discrepans* (Newman) pupa within last instar exuviae.

likely provide not only shelter but aposematic benefit to the pupae. Aggregation of aposematic insects is generally believed to be adaptive as a defensive mechanism against predators (Riipi et al. 2001; Vulinec 1990), and that is likely the benefit of pupal aggregations of *Calopteron*. It also should be mentioned however, that similar, though smaller aggregations of cryptically colored larvae are known to occur in other lycid species.

Although a few mating pairs were observed near the aggregations, mating was never observed on the aggregated mass of pupae nor was there obvious evidence of pupal attendance by males. In fact, most of the resting adults on surrounding vegetation were not in copula. Male-female pairing is unlikely to be a major function of the pupal aggregations.

Voucher specimens of adults that emerged from these aggregations have been deposited in the Florida Collection of Arthropods, Division of Plant Industries, Gainesville, FL.

Summary

Pupal aggregation of *Calopteron discrepans* (Newman) is reported for the first time. Aggregation of the pupae cloaked in the brightly colored larval exuviae is believed to serve as a defensive mechanism against predators.

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