EUONITICELLUS INTERMEDIUS (COLEOPTERA: SCARABAEIDAE: SCARABAEINAE: TRIBE COPRINI): ITS PRESENCE AND RELATIVE ABUNDANCE IN CATTLE PASTURES IN NORTHCENTRAL FLORIDA

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Several species of dung beetles have been introduced into pasture habitats around the world to improve the efficiency at which manure is processed (Fincher 1986). Benefits of this tactic include reducing survival of dung-breeding pest flies and gastrointestinal parasites of livestock, returning nutrients to the soil, and physically moving manure off the fouled forage (Anderson et al. 1984).

Efforts to monitor populations and track the spread of introduced beetles have varied with species and localities. The Afro-Asian dung beetle, *Onthophagous gazella* F. (Family Scarabaeidae, Subfamily Scarabaeinae, Tribe Onthophagini) was introduced into several states (TX, CA, AR, GA, and MS) of the continental United States in the 1970s (Fincher 1981). Subsequent surveys recorded its presence and spread (Fincher et al. 1983; Hunter & Fincher 1985; Howden & Scholtz 1986; Fincher et al. 1986; Howden & Howden 2001). Currently, it is found in every state across the southern U.S. and up the east coast as far north as North Carolina. It also occurs throughout most of Mexico and into northern Guatemala (Rivera-Cervantes & Garcia-Real 1991; Montes de Oca & Halffter 1998; Bertone et al. 2005).

Another less-studied introduced dung beetle is the Afro-Tropical species, *Euoniticellus intermedius* (Reiche) (Family Scarabaeidae, Subfamily Scarabaeinae, Tribe Coprini) (Fig. 1). It was released in California, probably in 1978, in Texas in 1979, and in Georgia in 1984 (Fincher 1981, 1986; Montes de Oca & Halffter 1998). Its establishment in Texas and California was documented in the mid-1980s (Blume 1984; Fincher 1986), but further distribution patterns in the United States are not accurately known. Almquist (2001) reported new collection records of *E. intermedius* in northcentral Florida, based on a museum specimen collected in Suwannee County in 2001, and afterwards, collecting it himself at one site in Alachua County and collecting it again, with P. E. Skelley, at another site (same county). These collection data are included in the updated, electronic version of A Distributional Checklist of the Beetles of Florida (http://www.fsca-dpi.org/Coleoptera/Mike/intro44.htm), originally published in hardcopy form (Peck & Thomas 1998).

Euoniticellus intermedius was not released in Mexico, but its spread throughout that country is well-documented. The species was first recorded in north-central Mexico in 1992 and northwestern Mexico in 1994 (Montes de Oco & Halffter 1998). Those and subsequent surveys have recorded *E. intermedius* in 15 of Mexico's 32 states, from the northern border with the United States, to the southern border with Guatemala (Montes de Oca et al. 1994; Navarrete-Heredia 2001; Morales et al. 2004).

In Jun 2005, we initiated a 2-year survey to document the diversity and seasonal occurrence of dung beetles in pastures at 3 study sites around Gainesville, Florida, using the baited pitfall trap method described in Bertone et al. (2005). The bait for each site was prepared by collecting fresh cow dung from that site, measuring 55-ml portions, and setting each portion on a 21-cm^2 paper towel which was then stapled into a pouch. These were frozen (-20°C) until needed. When deployed, the dung pouches were clipped to a hardware cloth platform, which positioned the bait over a 9 cm diameter funnel that sat at ground level and extended into a 9 cm diameter PVC canister with a screened bottom. The entire trap assembly was positioned into a semi-permanently installed 35-cm length of 10.6-cm diameter PVC pipe. Baited traps were placed at field sites at least every 3 weeks. Traps were recovered from field sites following a 24-h bait exposure and captured beetles were returned to the laboratory for identification and enumeration. Ten traps were placed along pasture fence lines at each of 3 sites (30 total traps). Traps were at least 20 m apart. Beetles were identified with the keys of Woodruff (1973). Species verification was performed by Michael C. Thomas and Paul E. Skelley of the Florida Department of Agriculture and Consumer Services, Bureau of Entomology.

In this note we report numbers of *E. intermedius* collected at our 3 cattle pasture sites from Jun 2005 through Jun 2007, a period of 25 months. The relative abundance of *E. intermedius* is described for the 6-month interval for which we have 2 seasons of data (Aug through Jan). This interval was chosen because it encompasses the months during which *E. intermedius* was most abundant.

Site 1, first sampled on Jul 21, 2005, is the University of Florida's Santa Fe River Ranch, located in northern Alachua County, which pastures beef cattle. During the first year of the survey (Jul 2005 through Jun 2006), peak collections occurred in Oct, with a total of 213 *E. intermedius* collected from Sep 2005 through May 2006. Ten out of 15

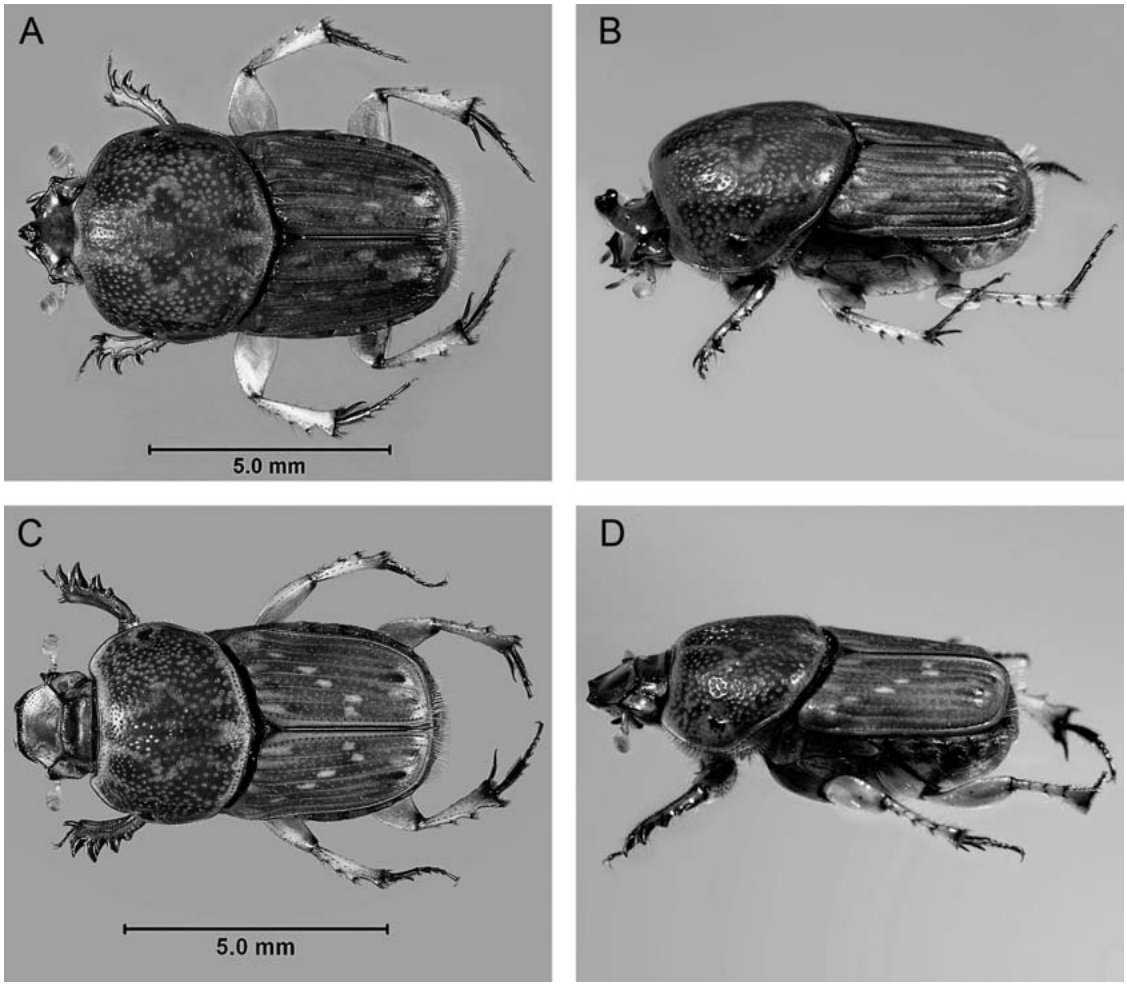

Fig. 1. Male (a, b) and female (c, d) *Euoniticellus intermedius* (Reiche) collected in northcentral Florida, 2005. Image by L. Buss, editing by J. Medley, University of Florida.

sampling dates (between Aug 2005 and Jan 2006) yielded *E. intermedius*. Of those 100 pitfall trap placements, 45 traps caught a total of 200 individuals. This number comprised 7.6% of the total Scarabaeidae captured in that specific 6-month interval. During the second year, 586 *E. intermedius* were collected from Jul 2006 through Jun 2007, with a peak in late Oct 2006. Nine out of 10 sampling dates between Aug 2006 and Jan 2007 yielded *E. intermedius*. Of those 90 pitfall traps, 40 caught a total of 549 individuals. This was considerably more than in the previous year's 6-month interval (200) and also comprised a greater percentage (16.9%) of the total Scarabaeidae captured during that comparative interval.

Site 2 was first sampled on July 19, 2005, and is a privately-owned dairy in eastern Gilchrist County. During the first year, a total of 19 *E. intermedius* were captured between Sep and Nov 2005. This comprised 2.3% of the total Scarabaeidae trapped from Aug 2005 to Jan 2006. Eight out of the 15 sampling dates (80 traps) yielded 11 *E. intermedius*. The highest number of *E. intermedius* collected (9) was in mid-Oct. During the second year, 31 individuals were captured between Aug and Dec 2006, peaking in early Oct, and again comprised 2.3% of the total beetles caught between Aug 2006 and Jan 2007. This represented 10 sampling dates of which 6 yielded beetles. Of the 60 pitfall traps placed, only 13 yielded *E. intermedius*. A total of 10 beetles were captured from Mar through Jun 2007.

A privately-owned beef cattle ranch in southern Alachua County served as Site 3 and was first sampled on Jun 17, 2005. *Euoniticellus intermedius* was not collected at this site during the first year, and only 3 individuals were collected during the second year, all in Dec 2006. This constituted 1.9% of the total number of Scarabaeidae caught between Aug 2006 and Jan 2007.

These collection data indicate that *E. intermedius* is well-established in some sites in northcentral Florida and has an autumn/winter seasonality (but with diminished collections in Mar, Apr, and May). Our plans are to continue monitoring the relative dynamics of *E. intermedius* over the next 2 years.

SUMMARY

The introduced dung beetle, *Euoniticellus intermedius* (Reiche) originally released in California, Texas, and Georgia and subsequently reported in northcentral Florida in 2001, was collected from 3 cattle ranches in Alachua and Gilchrist Counties, Florida. We report on the seasonality of this beetle over a two-year period. The beetle was found principally between Aug and Jan with the largest collections recorded during Oct of both 2005 and 2006. The numbers of beetles collected increased from 2005 to 2006, suggesting that this beetle may be firmly established in this part of Florida.

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