Dung Beetles of Southern Guyana - A Preliminary Survey

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Chapter 3

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INTRODUCTION

A number of key features of dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) are largely responsible for their being used as biodiversity indicators. They are distributed on all of the continents and can be found from the equator to subarctic regions – inhabiting an array of terrestrial ecosystems. Diversity is often highest in tropical rain forests but temperate forests, grasslands and even xeric or high elevation sites can support diverse dung beetle assemblages. Because most dung beetles rely on dung from vertebrates, their abundance and diversity often reflects that of local vertebrates. A number of scarabaeine beetles are associated with non-dung food sources (e.g., fungi, millipedes or termites). These species are rarely collected in dung traps – thus it is important to note that this survey will reflect only a portion (albeit the majority) of the full scarabaeine beetle fauna for this region. Additionally, the dung beetles themselves support a vast assortment of symbionts, primarily mites, nematodes and fungi and as such are an indirect measure of these taxa.

One important characteristic of dung beetles that sets them apart from other potential biodiversity indicator taxa is the ease (and rapidity) with which they can be collected using baited traps. Previous studies have shown that a large percentage of the species (alpha diversity) for a region can be surveyed in a relatively few number of days. However, scarabaeine beetles do show some seasonality in their abundance and thus sampling across several seasons can be expected to yield a better overall diversity measure.

The ability to identify the dung beetles collected on this study varies depending on the genera. Some new world genera can be readily identified to species, however, some groups (e.g., *Dichotomius* or *Deltochilum*) are greatly in need of modern revisions and many species are poorly described or remain unnamed. Other groups (e.g., *Phanaeus*, *Coprophanaeus*, *Canthon*, *Ontherus*, etc.) are better known and species, including undescribed species, can be more easily determined using modern keys.

This report summarizes preliminary results of dung beetle collecting at two sites in southern Guyana, near the border of Brazil. These data will later be compared with preexisting data from other sites across the Guayana Shield and elsewhere in South and Central America.

METHODS

Study site

The Acarai Mountains are seasonally wet, forested, low to mid- altitude (<1500 m) uplands located in the southern part of Guyana. The Acarai Mountain range lies along the border shared between Guyana and Brazil, and is one of four mountain ranges in Guyana. Two important Guyanese rivers, the Essequibo (the longest river in the country and the third largest river in South America) and the Courantyne, originate in the Acarai Mountains. The Acarai Mountains are actually one part of a larger range that extends into the Wassarai Mountains to the north and east. North of the Acarai Mountains is the Sipu River, a western tributary of the Essequibo River. Along the river 200-400 m elevation, the forest resembles classic low elevation Amazonian forest. It is clear from the vegetation and sandy soil that this habitat floods annu-

ally. Terra firme forest is present above 400 m and continues up to elevations approaching 1200 m. At Site 1 (Acarai Mountains), dung beetle traps were set at several elevations; approximately: 350 m, 500 m, 800 m, and 1000 m.

The second site (Site 2, Kamoa Mountains) was located along the Kamoa River (another western tributary to the Essequibo) which is further north and runs directly south of the Kamoa Mountains. Site 2 was not in the Kamoa Mountains, but east of the range. Only one transect was possible at this site, at approximately 500 m elevation in terra firme forest.

Field methods

Dung beetles were sampled at several sites in the Acarai Mountains between 6-19 October 2006. From 21-27 October 2006, the site on the Kamoa River was sampled. Sampling consisted of: (i) baited pitfall traps, (ii) hand sampling, and (iii) light trapping. Pitfall trapping was conducted along an approximately linear transect and included 10 pitfall traps, placed 50 m apart. Each trap consisted of a 32-ounce polyethylene cup, sunk into the ground up to its lip and partially filled with water. Over each trap was suspended a cheese-cloth enwrapped mass of dung (~30 g). A leaf was then placed over the entire trap to repel rain. The traps were emptied and rebaited after 24 hours and left in the field for a total of 48 hours. Additional traps, baited with other baits, were also set to retrieve any species not associated with dung. Dung beetles seen perched on leaves while hiking in the forest were placed into vials. Lastly, light traps were set up (UV or Mercury Vapor) to sample several non-dung scarabaeine beetles (aphodiine dung beetles) that can be attracted in this manner.

Sampling largely follows procedures set forth by the ScarabNet group, a consortium of dung beetle biologists working around the world to better understand dung beetle diversity, and will allow these data to be compared to similar datasets. All specimens collected were preserved in 95% ethanol for subsequent sorting and identification.

RESULTS

A significant portion of the material collected still remains to be sorted and prepared in the lab – and thus species-level results from this sampling method are not reported here. Some genera have been mounted, so a preliminary account of the genera is possible. These initial data indicate that Site 1 (Acarai Mountains) supports a more diverse assemblage of species and genera than does Site 2 (Kamoa River). At Site 1, the following genera were observed: *Deltochilum*, *Ateuchus*, *Dichotomius*, *Ontherus*, *Canthon*, *Eurysternus*, *Oxysternon*, *Phanaeus*, and *Cryptocanthon*. At Site 2, no *Phanaeus*, *Deltochilum* or *Cryptocanthon* have yet to be found in the samples, but it is possible that they are present in the unprepared samples. The multiple elevations assessed at Site 1 appear to show different scarabaeine fauna although a few species, such as *Oxysternon festivum,* were common at all sites, irrespective of elevation.

Based on the dung beetles so far identified, the habitat associated with these forested sites appears unaffected by human activity. Evidence of human trails (perhaps hunting/fishing/migration) was minimal.

CONSERVATION RECOMMENDATIONS

Given the relatively pristine nature of this region, the precautions necessary for conserving the native dung beetle fauna largely stem from potential threats of development. Agriculture and livestock cultivation are the clearest threats. Although many dung beetle species prefer disturbed agricultural systems, the regional endemics would not be expected to survive as they are particularly sensitive to micro-climatic variables such as humidity, tree cover, temperature, and soil type.

Hunting, given its potentially negative impact on mammalian and bird populations, could also negatively affect dung beetles. However, at this time, the hunting by the native Wai-Wai community does not appear to present itself as a major threat. If their population expands significantly or they begin to hunt commercially, this might change.

Human habitation and the associated waste management systems have also been suggested as potential impacts to local dung beetle communities. A large quantity of exposed human or animal waste would undoubtedly attract large numbers of dung beetles; however it is somewhat difficult to imagine this threat in the absence of far more threatening development (e.g., agriculture, habitation and deforestation).