

JAMES RENNIE BEQUEST

REPORT ON EXPEDITION / PROJECT / CONFERENCE

Expedition/Project/ Conference Title:	Characterising moth species richness and determining the effect of termite mounds on surrounding vegetation in Meta, Colombia
Travel Dates:	18/06/2018 - 15/07/2018
Location:	Pajure (town), Meta (department), Colombia
Group member(s):	Sophie Jones, Gabriele Negro, Juan Pablo Lobo-Guerrero
Aims:	<p>Conduct ecological research on moths and mound-building termites, two invertebrates traditionally researched as pests in the Colombian Llanos:</p> <ul style="list-style-type: none">• To provide a foundation for knowledge on moths (<i>Heterocera</i>) by surveying the local species richness.• To determine the relationship between termite mounds and surrounding plant diversity.

OUTCOME (a minimum of 500 words):

Introduction and methods:

Moths and mound-building termites are highly understudied invertebrates in the Meta department of Colombia. This is evidenced by existing studies solely focusing on their status as agricultural pests. This angle of research disregards the ecological importance of moths as pollinators and the role of mound-building termites as ecosystem engineers. This project aimed to start filling significant knowledge gaps, furthering our understanding of these invertebrates and their role in the Colombian 'Llanos' (seasonally flooded savannas). Research was conducted in a farm near the village of Pajure in the region of Meta, Colombia. The habitat of our research was that of the Colombian Llanos.

Most of the studies of *Lepidoptera* in Colombia focus on butterflies, and the few available studies on moths only focus on the management of pest species (Gómez Jiménez & Poveda, 2009). Furthermore, most records of *Lepidoptera* in Colombia are butterflies and almost none are georeferenced in the Meta region of Colombia. To start providing a foundation for knowledge on moths in the Colombian Llanos, we surveyed the species richness using a portable wooden Skinner trap. Each night the trap was positioned outside, in the same location, at sunset and after three hours, we surveyed the trap for new moth species and took photos. Since no field guide was available for identification, we used morphospecies as a method of classification. Note that this method carries the assumption that no species is sexually dimorphic.

Mound-building termites are considered ecosystem engineers in savannah environments (Moe et al., 2007). The presence of termitaria has been associated to the increased regeneration capacity of woody species following natural and anthropogenic disturbance (Stoen et al., 2012), and to the distribution and availability of soil nutrients essential for plant growth (Jiménez et al., 2008). However, and similarly to moth species, research on termites has been associated to agricultural processes, and to efforts to understand their impact as

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pests. There is limited evidence in the Colombian Llanos that can establish the role of mound-building termites as keystone species that regulate ecosystem processes and determine short-statured plant species diversity. To study the relationship between termite mounds and surrounding plant diversity, we recorded the vegetation coverage in randomly allocated plots of fields currently under cattle grazing disturbance and the number of termite mounds within the plots or the distance of the nearest mound. Furthermore, to test for the effect of termitaria at a smaller scale, we established transects directly from the mounds and recorded the number of plant species (excluding grass) in quadrats placed on a gradient away from the mound.

Results and discussion:

After 12 consecutive night of surveying, we recorded 93 different morphospecies of moths. The species accumulation curve we constructed from this data (Figure 1) indicates that 12 days of moth surveying was not enough to record the full species richness of moths in the study site. A study conducted by Jonason et al. (2014) in Germany suggests that a species accumulation curve can take more than a month to reach a plateau. However, given the tropical location, we expect to find an even higher diversity index in this study site than in temperate regions, meaning that the period to find a plateau could be even longer. There is currently a lack of means (such as complete keys) to easily identify Colombian moths, which means it will take longer to confirm all the morphospecies recorded in this study. From the sample, we have been able to confirm the presence of the species *Rothschildia arethusa rhodina* (Figure 2) which was previously never recorded in the Colombian department of Meta (Amarillo, 2000).

Linear regression analyses (Figure 3) revealed that the distance to the nearest mound had no significant effect on all the response variables we tested. However, when we tested for the effects of termite mounds at a smaller scale we found that plant diversity was higher within 50 cm from the mound. Previous studies indicate that termite mounds support a denser and more diverse plant coverage. Termite mounds alter soil characteristics by changing the physico-chemical structure of soil (Asawalam et al. 1999), something that increases water infiltration and rainfall use efficiency (Leonard and Rajot 2001). Termites can also influence the local nitrogen and carbon mineralisation process and can change microbial activity rates. These characteristics of termite mounds can improve the conditions to favour a wider variety of plant species. Alternatively, a greater diversity might be related to the disturbance regime of the fields surveyed in this study. Cattle might avoid grazing directly around termite mounds, thus allowing for a greater proportion of woody vegetation to remain ungrazed or trampled. These findings have implications for the management of grazed savanna landscapes and termite mounds within these: despite commonly regarded as pests and detrimental to pastures, termite mounds might be important to harbour diversity at small scales in these largely disturbed landscapes.

We would like to thank and acknowledge the James Rennie Bequest and all the people that helped make this research project a reality, including Juan Pablo Lobo-Guerrero and his family, Jorge Villegas for letting us use his farm, and Miller and Gonzalo and their families.

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Figure 1. Partial species accumulation curve of moth morphospecies.

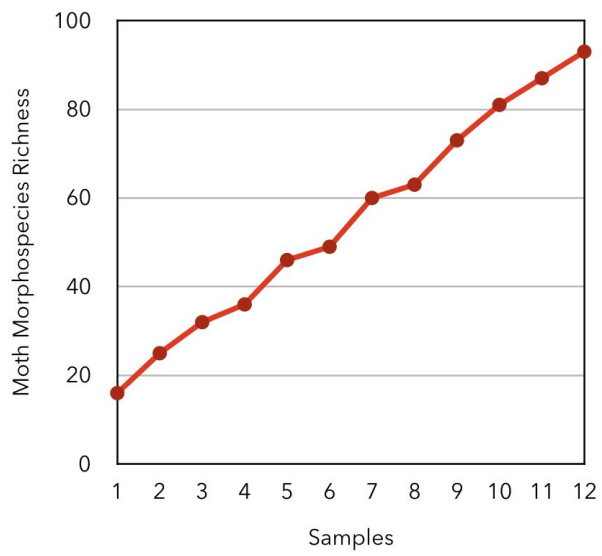


Figure 2. *Rothschildia arethusa rhodina*



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Figure 3. Values of species richness of plants (grasses excluded) present in close proximity to termite mounds.

