ANT RESPONSES TO DISTURBANCES IN ACACIA TREES WITH AND WITHOUT WREN NESTS

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Abstract . *Campylorhynchus rufinucha*, the Rufous-naped Wren, often nests in acacia trees, Acacia collinisii protected by *Pseudomyrmex nigrocincta* , a symbiotic ant. In trees with nests the ants apparently become acclimated to the wrens and do not attack them If true, then ants should respond less to disturbances made near wren nests than those made further away from nests. In addition, ants should respond less to disturbances made in trees with nests relative to those without nests. In this study, however, we found no differences in the number of ants that responded to disturbances in trees with and without wren nests. Furthermore, in trees with nests, there were no differences in the number of ants that responded to disturbances near and far from the nest. These results indicate that either our disturbances did not accurately mimic disturbances made by wrens, or some other explanation is needed to account for the wrens' successful use of acacias as nest sites.

Key Words: Campylorhynchus rufinucha, Acacia collinisii

INTRODUCTION

The acacia tree (*A. collinsii*) is often protected by P. nigrocincta, an ant symbiont (Janzen 1983). The ants feed on proteinaceous Beltian bodies and extra floral nectaries provided by the plant in return for defense by the ants from herbivory and competition. Despite the defensive behavior of ants that inhabit this species of acacia, two species of birds, the Rufous-naped Wren (*Campylorhynchus rufinucha*) and the Streaked-back Oriole (*Icterus pustulatus*), build their nests in these trees. While the ants initially attack the nests, they eventually become habituated to the presence of the birds nest, and therefore seem to provide protection for the birds without harming them (Janzen 1983). The fact that birds seem to be able to nest successfully in some acacia trees suggests that ant behavior on A. collinsii may vary either spatially within a tree or perhaps between trees.

We hypothesized that the presence of *Campylorhynchus rufinucha* nests in ant acacia trees would affect the defensive response of the ants that inhabit them. Specifically, we predicted (i) that ants in trees with nests will respond less defensively to an externally applied disturbance than those in trees without nests and (ii) that ants will respond less to disturbances made near wren nests than those made farther away.

METHODS

We studied nine *P. nigrocincia-A. collinsii* (ant-acacia) trees along the road west of the OTS biological field station at Palo Verde National Wildlife Refuge, Costa Rica. Six contained wren nests that could be reached and observed from the ground, and three did not have nests.

On all nine trees we created disturbances by shaking a selected branch and tapping on the trunk of the tree next to that branch with a stick in order to simulate the disturbance caused by a landing bird. Each treatment lasted for 2 min, during which time we disturbed the branch every 20 s After establishing three imaginary lines several cm above, below, and distal along the twig from the disturbance, we measured P. nigrocincta response in all nine treatments by counting the numbers of ants moving toward the disturbance from all three directions.

To compare ant responses to disturbances at different distances from wren nests, we disturbed half of the trees with nests within 5 cm of the nest location, and we disturbed the other half on a branch located no closer than halfway to the nest from the ground. We disturbed the trees without nests on a branch between one and two meters from the base of the trunk.

RESULTS

Comparisons of ant response among the control, near nest, and far nest treatments revealed no significant differences in the number of P. nigrocincta that responded to disturbances across treatments (ANOVA, F=1.688, df=8, P=0.21; Fig. 1).

We did find a significant difference, however, in the directions from which the ants responded to disturbances within each treatment (ANOVA, F=4.959, df= 8, P=0.02). A greater number of ants consistently came from above and below the disturbance than from the disturbed branch itself (Fig. 1). However, since the branches had fewer thorns and less total surface area than the trunk regions, relatively fewer ants may have resided on the branches, thus explaining the disparities between directions. The direction of ant recruitment did not differ across treatments (F=0.191, df=8, =0.94).

Other activities, such as moving disturbed egg sacs to a safer location (pers. obs.). Alternatively, these trends might be caused by decreased search areas resulting from an increase in ant turning rates triggered by pheromones (Janzen 1983). The clipping treatment produced the strongest effect in all four measured variables, and crushing was intermediate in three (Table 2); this suggests that the crushing and clipping treatments represent an increasing gradient of disturbance and pheromonal release that might lead to more effective defense of the ant-Acacia system.

Our data did not support the hypothesis that different numbers of ants would respond to disturbances in trees with and without wren nests. This result is most likely due to our inability to accurately simulate the disturbance caused by a landing bird. During the experiment we observed that ants do not seem to respond to wrens' presence in an acacia tree. At one of the sampled sites, we witnessed a Rufous-naped Wren in the process of constructing her nest, and although the wren repeatedly landed upon the branch, the ants did not respond to the wren's presence. We also observed that the wrens repeatedly landed upon the acacia at regular intervals and remained for a relatively long period of time. Thus, the ants may become acclimated to a disturbance if it is repeated over a greater time interval than was done in this study. Further study of ant's response to disturbances should allow a longer interval (> 2 min.) between each disturbance, and longer time (> 5 hours) to run the experiment to see if ants actually become acclimated to the disturbance.

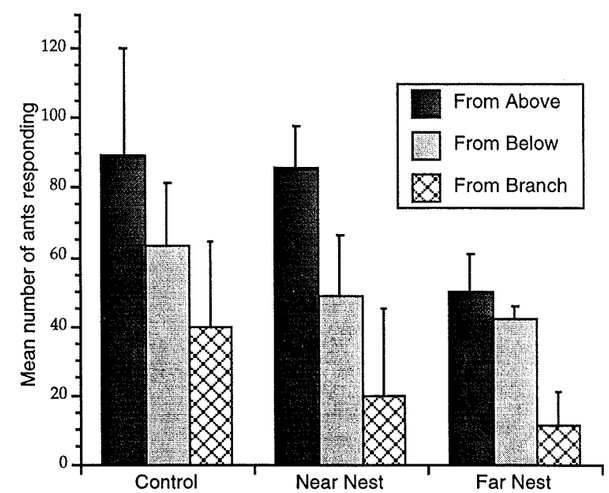

Fig. 1. Number of ants and the direction from which the ants responded to disturbances in acacia trees without wren nests (control) and with wren nests. Disturbances in trees with wren nests were made both near and far from the nest. A total of 9 trees, 3 for each treatment, were sampled.

LITERATURE CITED

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