Project Veracruz 2001 Report summary

Beltian Bodies and Nectaries: the Key to Ant-acacia symbiosis?

The project proved to be a complete success. The data we obtained was highly satisfactory and the experience gained was invaluable.
On arrival it proved impractical to study both *Acacia cornigera* and *A.colinsii* due to A.colinsii's sparse distribution within the forest. However, after working with staff at the station and a local guide, we decided to study *Acacia Mayana* in its place, which proved unique amongst Ant-acacia symbiosis!

Introduction

Our project studied the Ant-acacia symbiosis in a tropical Rainforest located in Veracruz State, Mexico.
Our aim was to focus on how the Acacia tree benefits the protecting host ants.
Almost nothing was known about the daily patterning of nectar secretion and Beltian body (protein-rich nutrient body) production by the Acacia trees. The daily patterns of these resources by the tree were found to be crucially important in the timing of ant activity patterns upon which the tree relies as a defence against herbivory and vegetative competition.
The aims and objectives of the study were to investigate the following points on *A. cornigera* and *A. mayana*:

- When and how much nectar was secreted during the day?
- Which leaves produced the Beltian bodies? (How old are these leaves?)
- When did the ants harvest Beltian bodies?
- When and where were the ants most active on the tree?

Methodology

- Ant activity; hourly observations of ant numbers on selected 40cm branches were undertaken throughout 24-hours. Branches were broken into four leaf categories depending on leaf age.
- Beltian Body Collection; removal rates were monitored hourly throughout daylight hours.
- Nectar secretion; the volume of nectar secreted was measured using microcapillary tubes placed over the nectaries. This was done at 15-minute intervals throughout daylight hours.

Results

Acacia cornigera

A. cornigera were generally located in areas newly cleared of forest cover where light levels and temperatures were high and humidity relatively low. All studied trees had *Pseudomyrmex ferrugineus* ant colonies.
Ant activity was found to be extremely low during hours of darkness. However, at sunrise activity rapidly increased to a daily high. Following this, activity dropped but remained relatively high until sunset. Results from the nectar secretion work showed that nectar was only really secreted just after sunrise and only on leaves no longer containing Beltian bodies. Results showed a relationship between nectar secretion and peak ant activity. Beltian body harvesting occurred throughout the morning, beginning after nectar secretion ended, tailing off during early afternoon. Beltian body collection coincided with the higher ant activity observed after the peak activity during sunrise.

Acacia mayana

A. mayana were located in the actual rainforest where light levels and temperatures were lower and humidity higher than areas were *A. cornigera* were found.
Unique amongst Ant-acacias, was that a significant proportion of *A. mayana* trees were found to have two different ant species living and utilising the trees resources together. These were *Pseudomyrmex ferrrugineus* and a *Camponotus* species, as of yet unknown. The exact nature of their relationship remains unsolved. However, the *Camponotus* species was dominant over *P. ferrrugineus* in all experiments that were conducted. The role of the *Camponotus* species in the protection of the tree could be questioned.
In general ant activity was found to be at it's highest during daylight hours, while the peak for both ant activity and nectar secretion was found to be mid morning. Unlike *A. cornigera* the activity at night never really dropped to the same levels of inactivity. Beltian body collection was observed throughout the day as well as at a lower level during the night.

Conclusions

Ant activity appears to be closely related to the pattern of production of food sources within space and time for both *Acacia* tree species.
At present with the help of Nigel Raine and Dr Graham Stone, preparations are being made for the production of possibly two scientific papers.

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Appendices

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