

Biodiversity conservation and scientific capacity development in the Brazilian Amazon using ants as bioindicators and ecosystem health indicators

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Overview

The Amazon is a global biodiversity hotspot and the loss of its biodiversity negatively affects ecosystem functions. In the Neotropics, ants are among the most abundant insect taxon, with a combined biomass greater than all vertebrates.

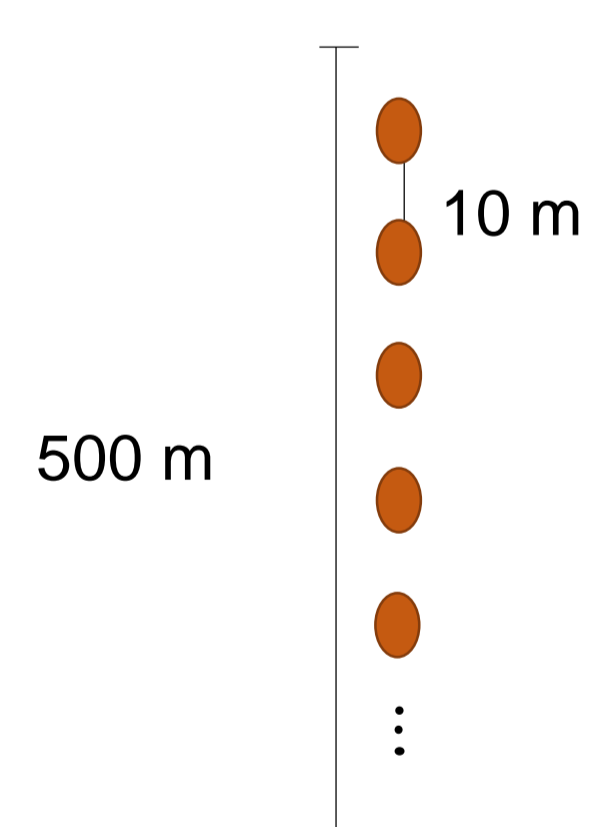
The Amazon is predicted to host some of the highest generic ant diversity in the world, so inventorying the biodiversity in the face of human population growth and climate change is particularly urgent.

Integrated frameworks, such as the use of genes, species and functional guilds, improve understanding of biodiversity and ecosystem function and our capacity to inform ecosystem management and conservation practices.

Assessing ant biodiversity at various levels will lay the baseline for continued monitoring of ecosystem health and biodiversity under climate change and help inform conservation decisions by allowing rapid and efficient appraisal of ecosystems. The study of ant biodiversity will also provide the framework for the identification of tropical pest species and thus will provide the basis for applied research of national and international importance.

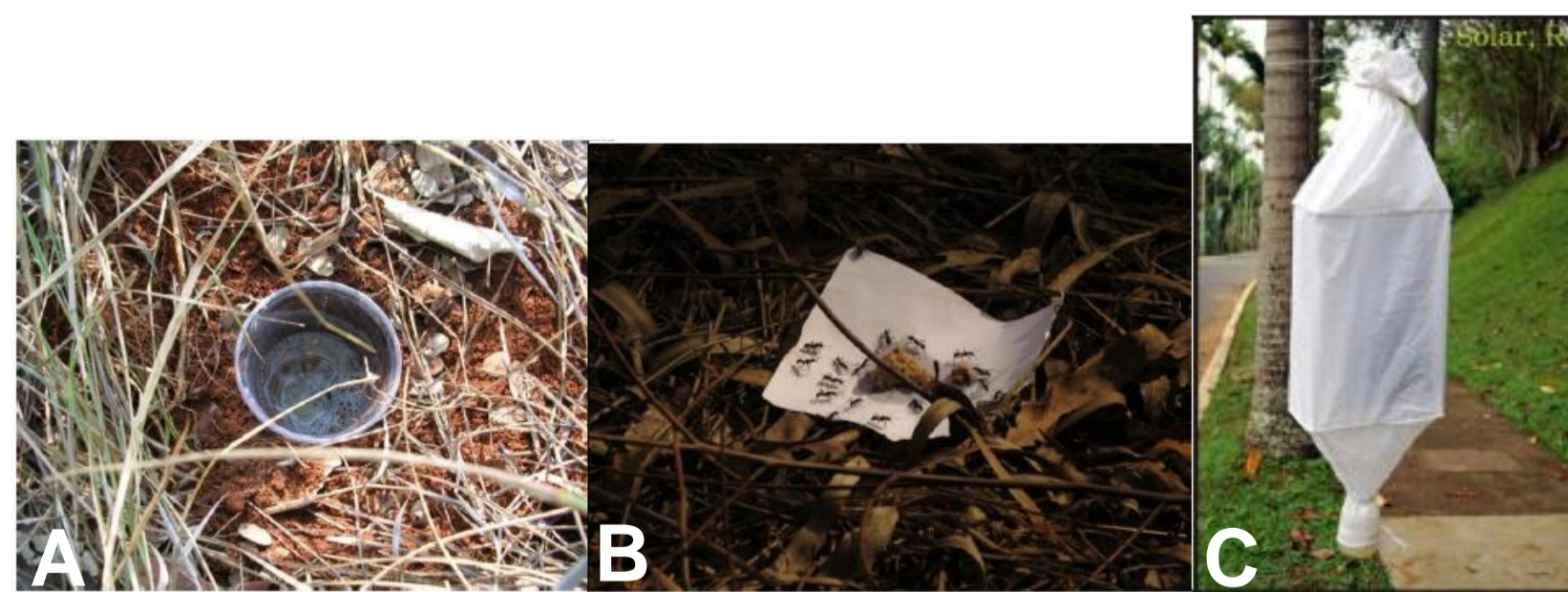
Methods

Biodiversity collections of ants will be conducted in six regions within the Brazilian Amazon Basin (Acre, northern Amazonas, Roraima, northern Pará, Amapá, and Maranhão). Importantly, each region contains sites of varying degrees, types, and ages of disturbance



In each site 50 pitfall traps will be placed in the ground along a 500 meters transect, distant ten meters from each other.

Collection methods will include pitfall traps (A), baits (B), leaf litter sample (C) and hand collecting.



Research plan

Six regions will be targeted in the most undersampled areas of the Brazilian Amazon forest, in collaboration with several Brazilian researchers and universities.



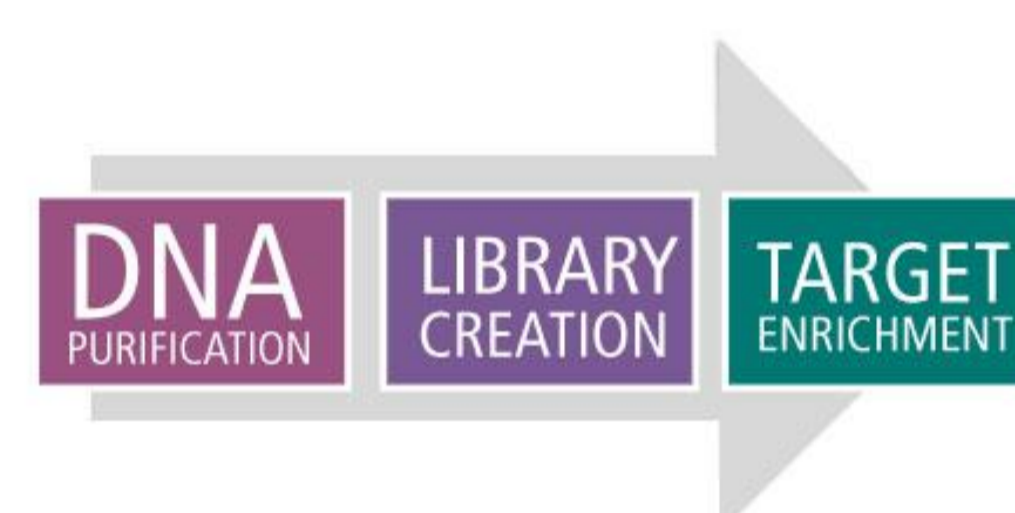
The biodiversity inventory will form the basis of an entomological research and teaching collection at UFPR, of national and regional importance and will support education, training, and scientific research by students and researchers in Brazil and around the world.



The use of DNA barcodes will ensure high-throughput technology and workflows for rapid and highly accurate species identification, in collaboration with Dr. Ross at University of Georgia.



Together with the DNA barcoding techniques, next-generation genomic techniques will be used. These can be easily expanded to develop functional genomic resources allowing the development of biotechnological control methods and sophisticated state-of-the-art conservation genetic applications.



Train the next generation of Brazilian scientists in state-of-the-art genetic and genomic techniques, and educate the Brazilian public, shareholders, and government about the importance various levels of biodiversity conservation in the Brazilian Amazon.

Development impacts of the research

- State-of-the-art genomic training and support at UGA's Georgia Genomics Facility, with focus on the use of ultraconserved elements as evolutionary genetic markers.
- Participation in a formal training Workshop on Molecular Evolution at the Marine Biological Laboratory, Woods Hole.
- Regular visits to the National Museum of Natural History, Smithsonian Institution, will be conducted, which is a world leader in high-throughput genetic biodiversity discovery using DNA barcodes.
- Creation of a state-of-the-art genetics laboratory in Brazil.

- Workshops for graduate students, taking place annually at UFPR. Training and outreach materials, including manuals outlining the various protocols and workflows used in the project, and field guides to Brazilian ants, will be developed and made available both online and in print.
- Participation in the 2016 Entomological Society of America and XXV International Congress of Entomology Meeting in Orlando, Florida and at XXII Simpósio de Mirmecologia, an international ant meeting in Brazil.
- Public outreach will include the development of a project website in Portuguese and English with links to training materials and illustrated field guides and identification keys designed for use by non-experts.

Literature cited

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Acknowledgments

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