

The little things that run the world...

-E.O. Wilson

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Who's Boli?

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- 5th year Ph.D. student in EBIO
- M.Sc. in Conservation Ecology at the University of Michigan
- B.A. in Political Science, University of Puerto Rico, Río Piedras

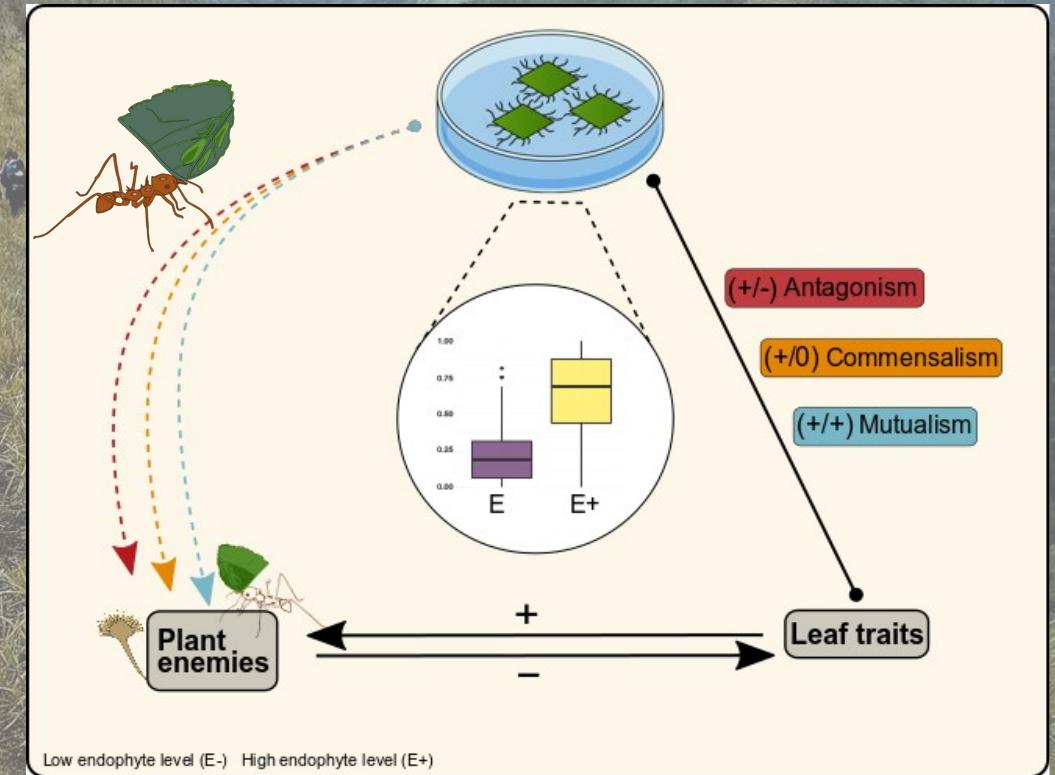


Changing paths

- **Political Science:** the analysis of political activity and behavior (Oxford).
- **Ecology:** a branch of science concerned with the interrelationship of organisms and their environments (Mirriam-Webster)
-



Fungi and ants to ask questions

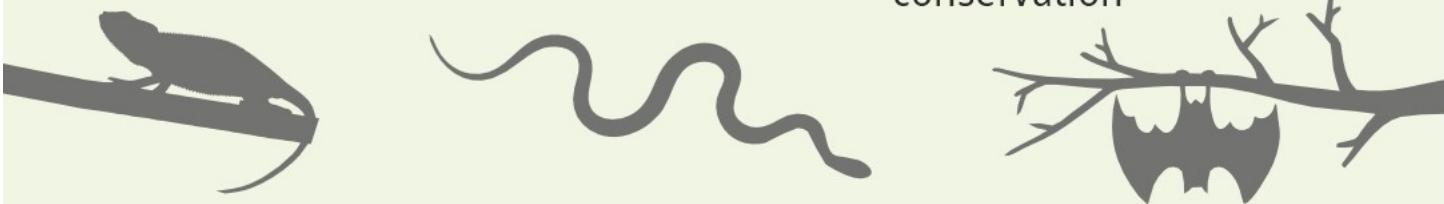




The "Charismatic" Divide

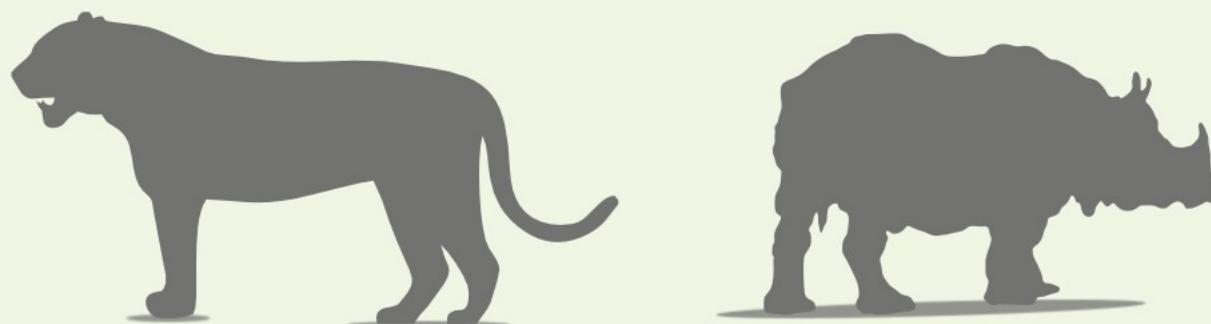
NON - CHARISMATIC SPECIES

- ▶ Smaller in size
- ▶ Reptiles, invertebrates, etc.
- ▶ Lack of physical appeal
- ▶ Negative reputation hinders conservation



CHARISMATIC SPECIES

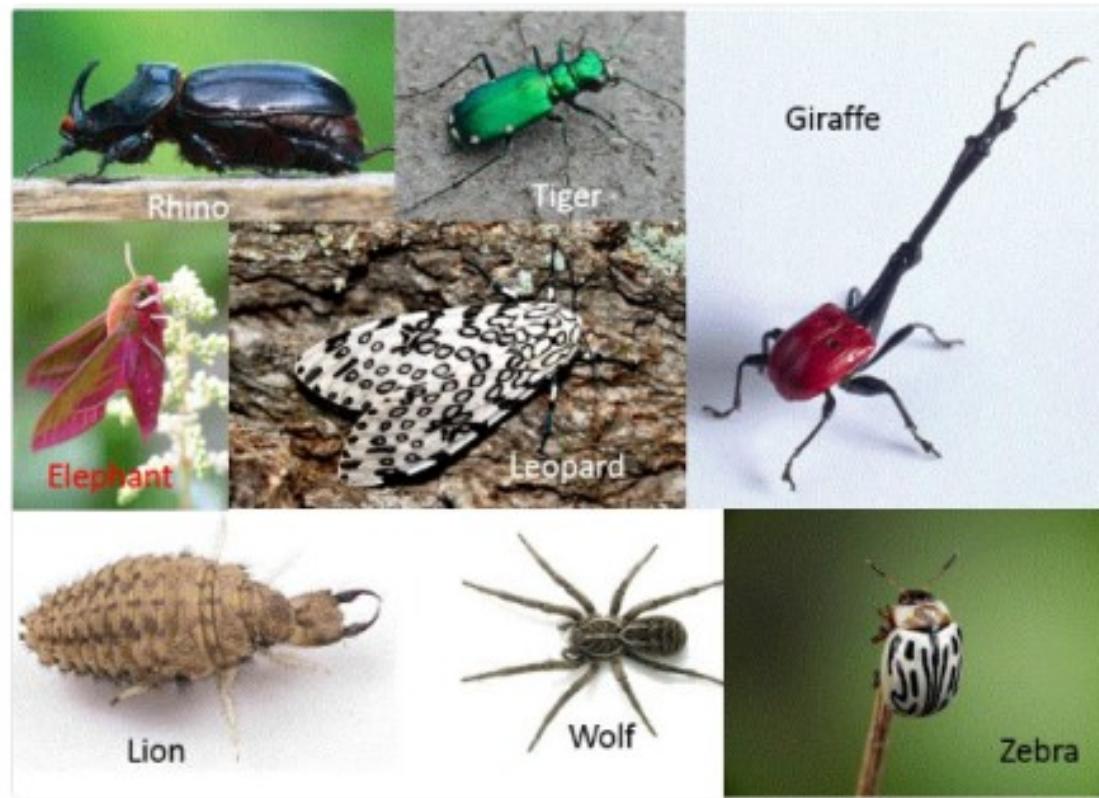
- ▶ Large size
- ▶ Mostly mammals
- ▶ Aesthetic appeal
- ▶ Attract funds for conservation





Simon Leather
@EntoProf

You don't need vertebrates to go on an exciting safari :-) Invertebrates rule!!



What do we now about ants?

Pros

- Eat carrion
- Can pollinate

Cons

- Eat my food (or my cat's)
- Can sting
- Can be pests to crops
- Dig up my plants



Big questions

- Where do you see ants?
- How can we study ants? Why study ants?
- Why do they run the world?



©alexanderwild.com

How do we know it's an ant?

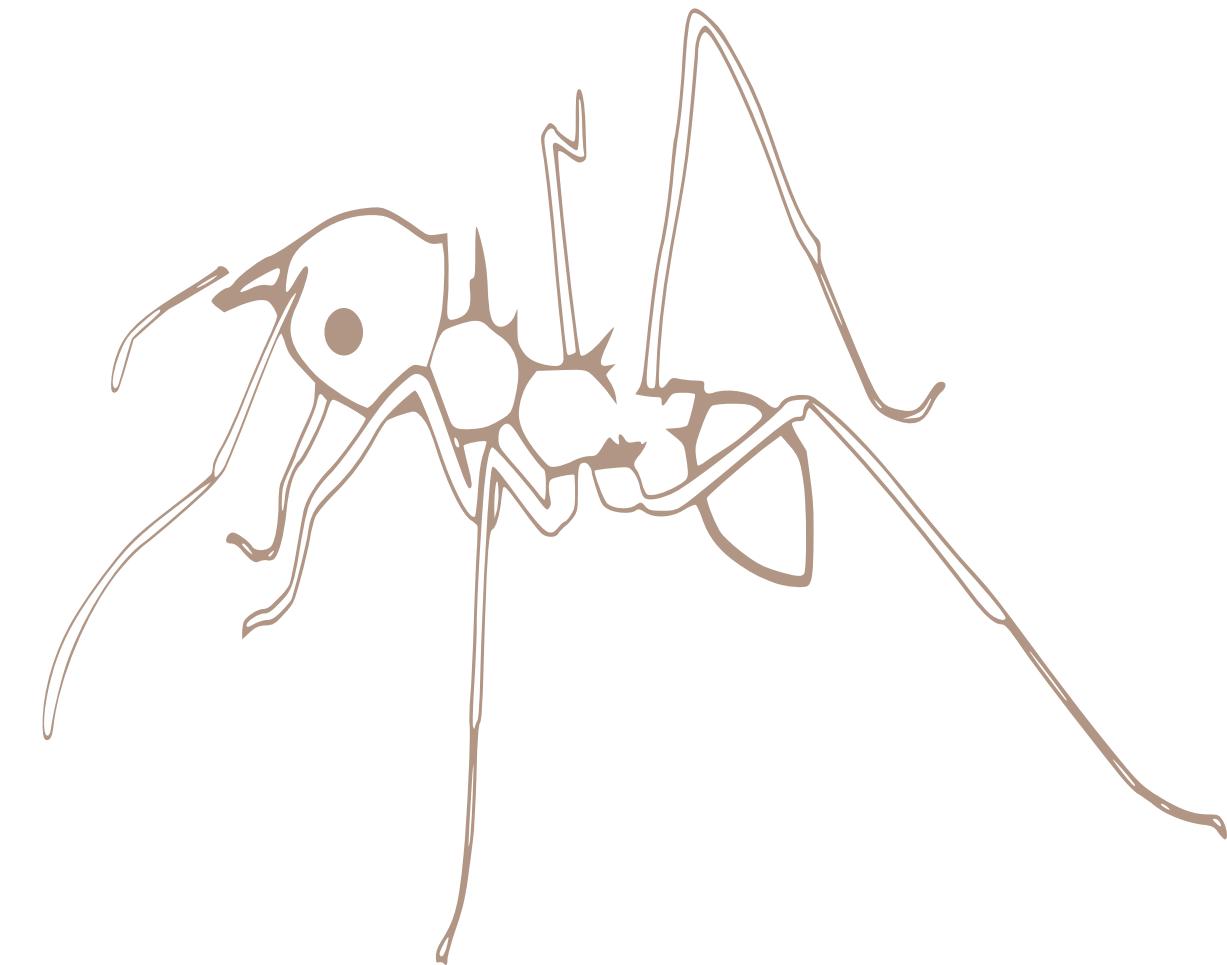
- Ideas?



- Order?

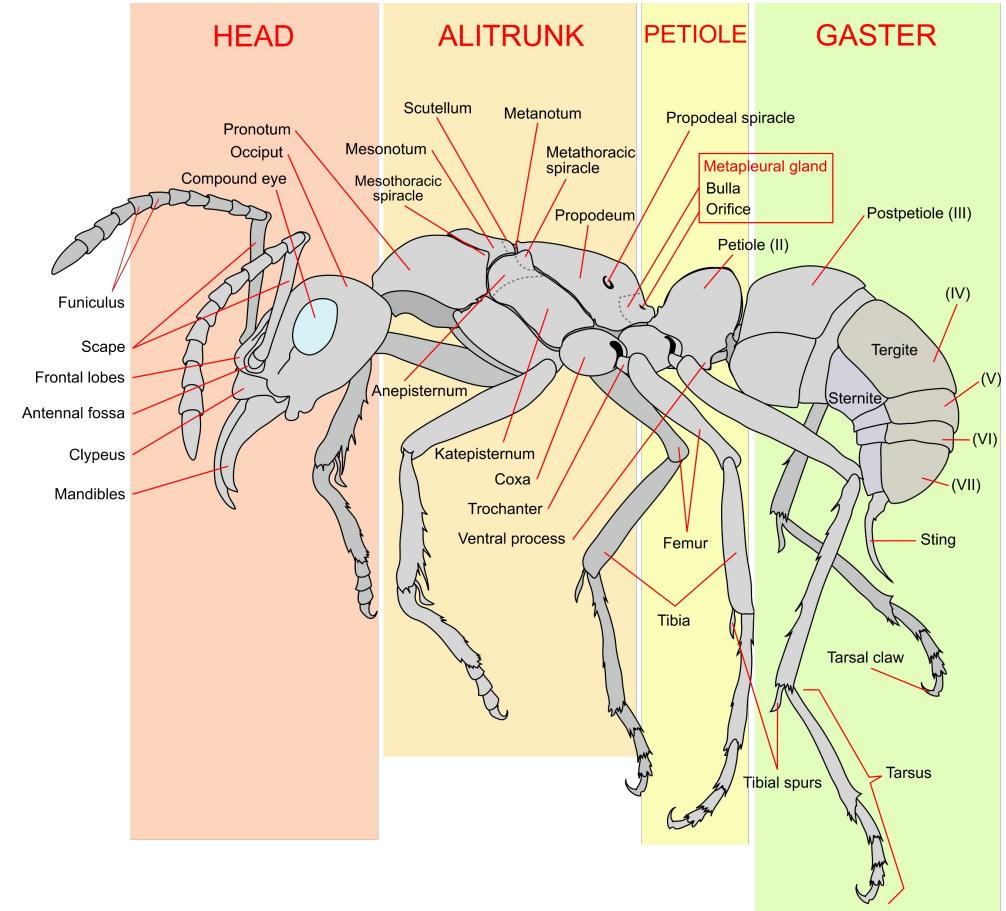


- Family?



How do we know it's an ant?

- Ideas
 - They look ant like!
 - What does that look like?



Who's who?



Dasymutilla occidentalis



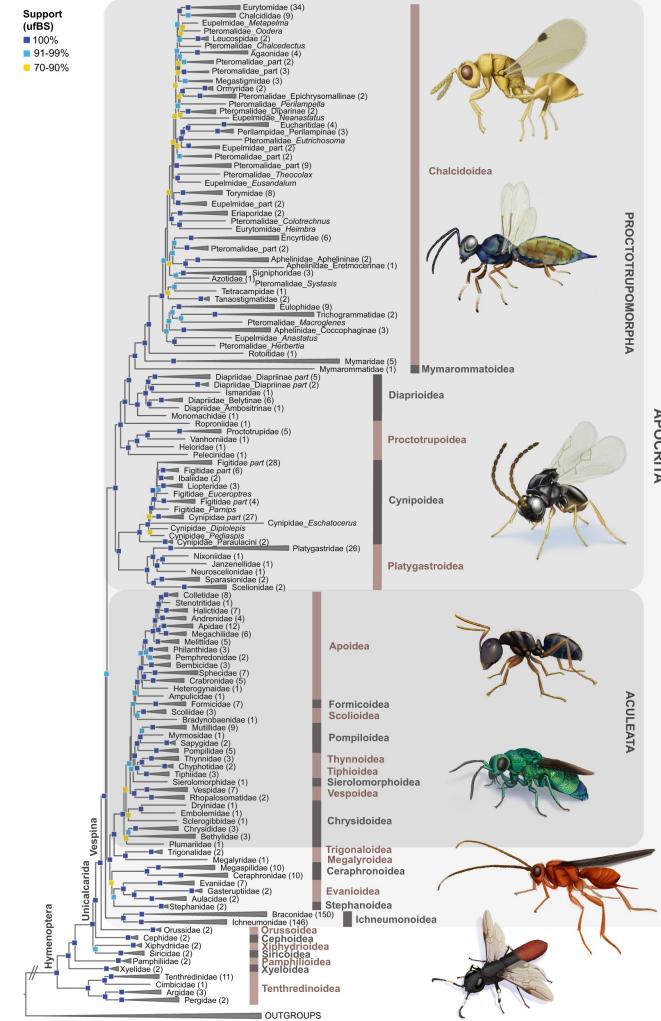
Strumigenys ayersthey



Euspinolia militaris

How do we know it's an ant?

- Ideas
 - Head
 - Alitrunk
 - Petiole
 - Gaster
 - Order?
 - Hymenoptera
 - Family?
 - Formicidae



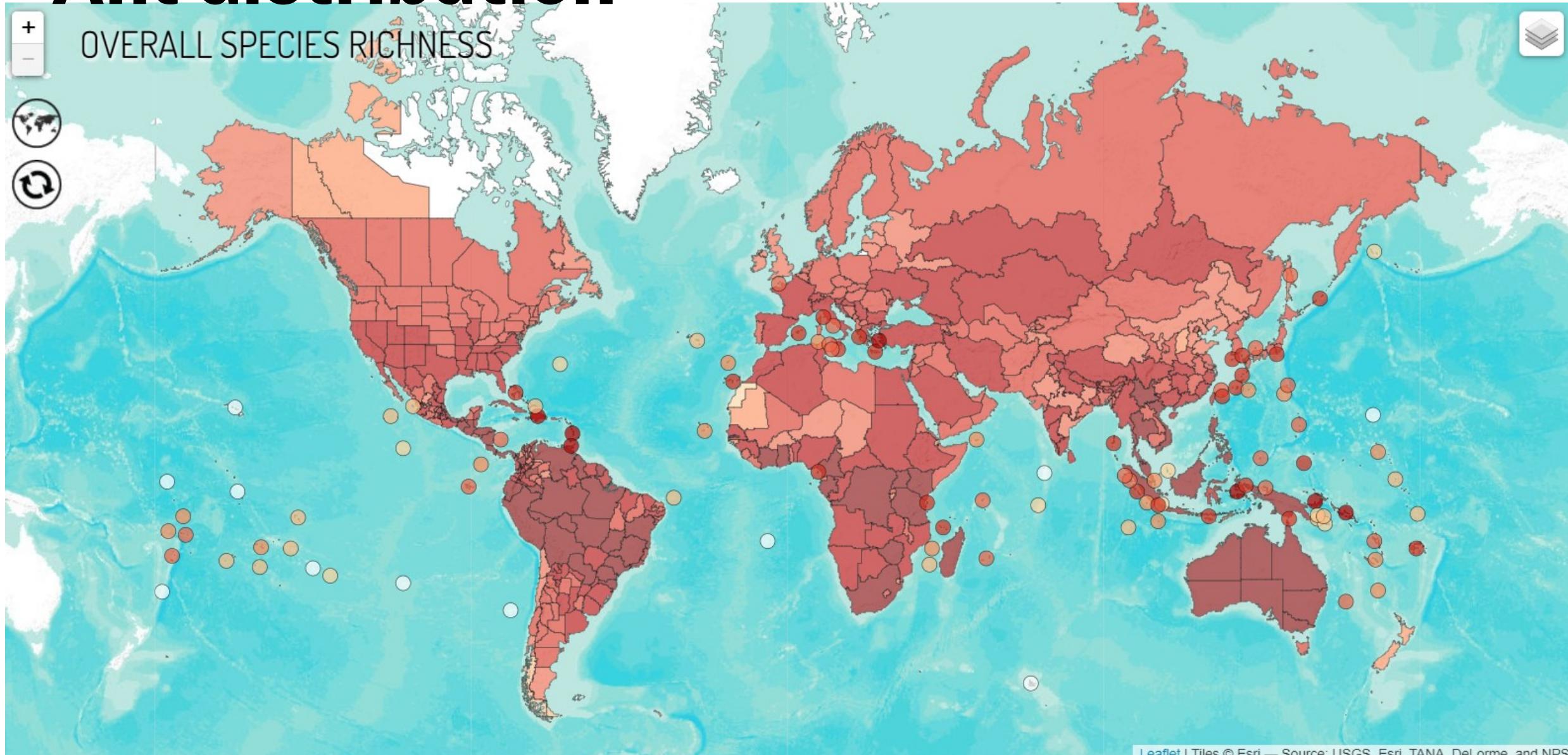
Eusociality: roomies forever



Alexander Wild (public domain). *Pheidole californica*



Ant distribution



Ants in Ecuador

Country:  Ecuador

[Field Guides](#)

[Download Data](#)

Specimens: 5,243

Images: 6,006

Imaged Specimens: 535

Subfamilies: 11

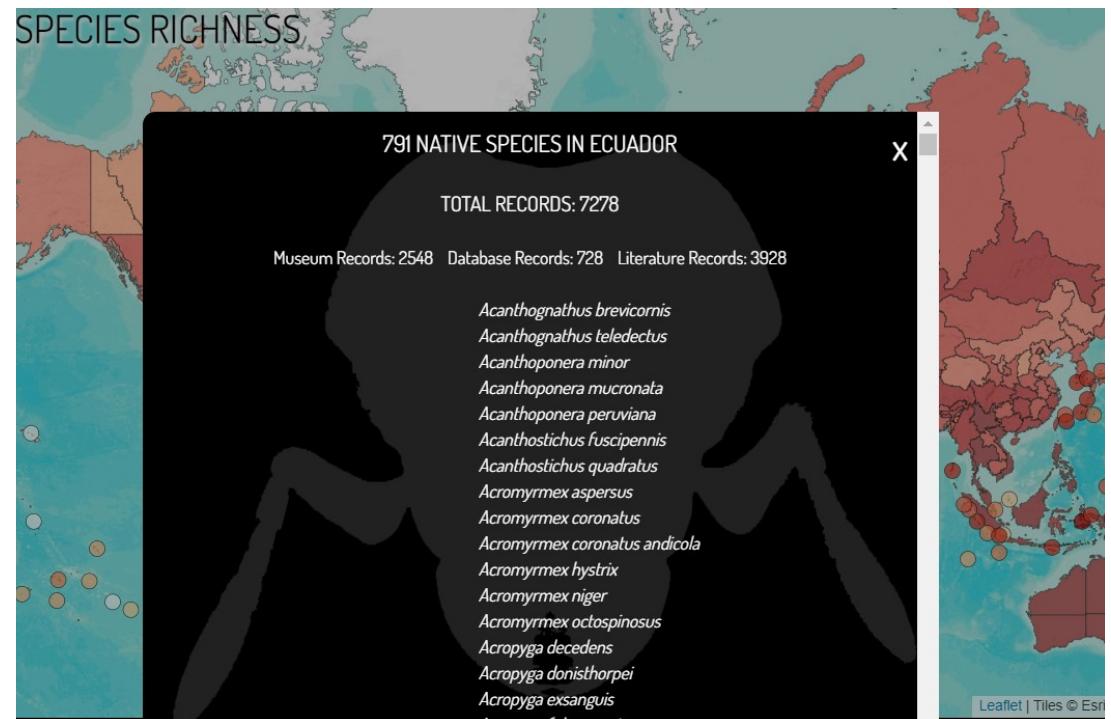
Genera: 97

Species/Subspecies: 829

Valid Species/Subspecies: 504

Endemic: 75

Introduced: 21



Ants in Ecuador



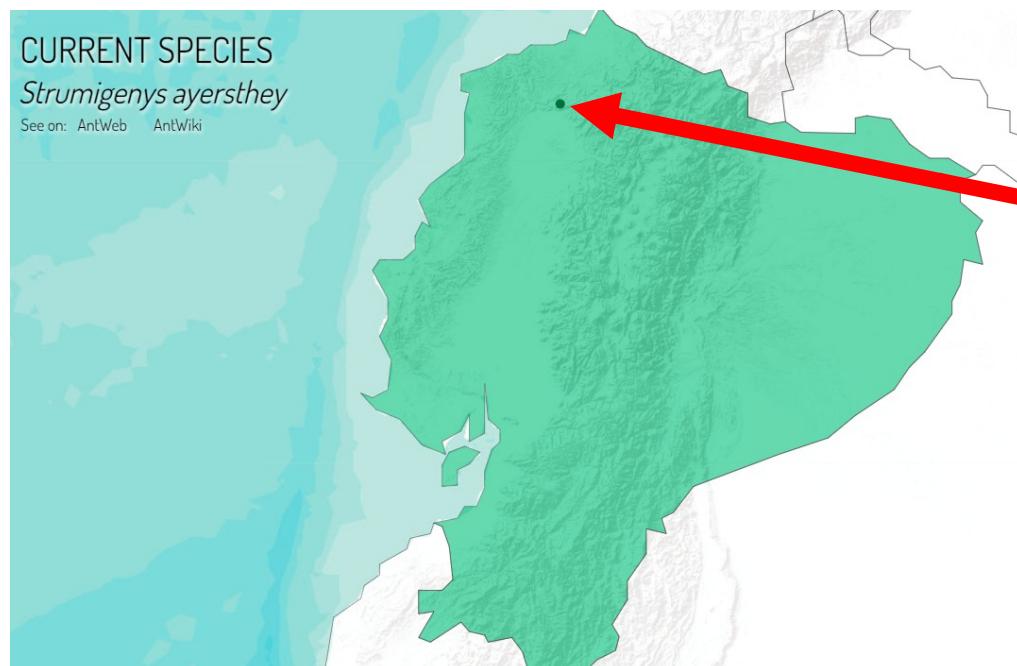
RAINFORESTS OCEANS ANIMALS ENVIRONMENT BUSINESS SOLUTIONS FOR KIDS DONATE IMPACT MORE

To search, type and hit enter.

Many species to discover

Naming of new ant species from Ecuador breaks with binary gender conventions

by Jansen Baier on 5 July 2021



Ants in Ecuador

Paraponera clavata (bullet ant)



Azteca spp. (cecropia ant)



<http://www.inaturalist.org/observations/48272196>

Ants in Ecuador

Paraponera clavata



Ophiocordyceps. Photo by Piotr Naskrecki.

Azteca spp.



<http://www.inaturalist.org/observations/48272196>

Ants in Ecuador

Eciton burchelli (army ants)

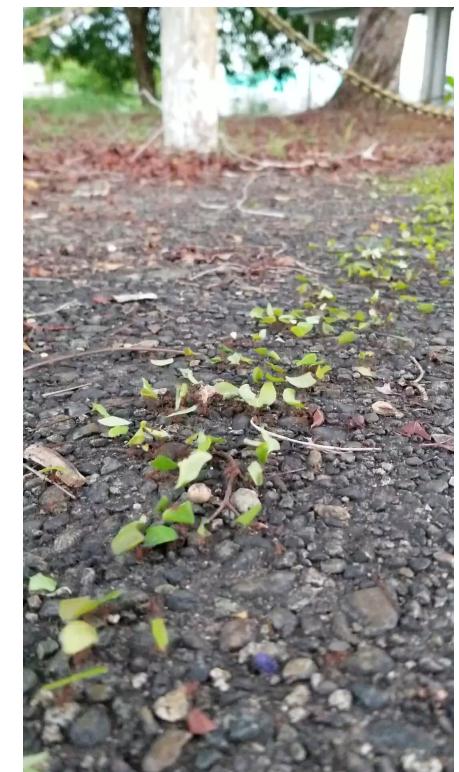


<https://antwiki.org/wiki/File:Eciton-hamatumSF1.6.jpg>

Atta cephalotes (leaf-cutter ants)

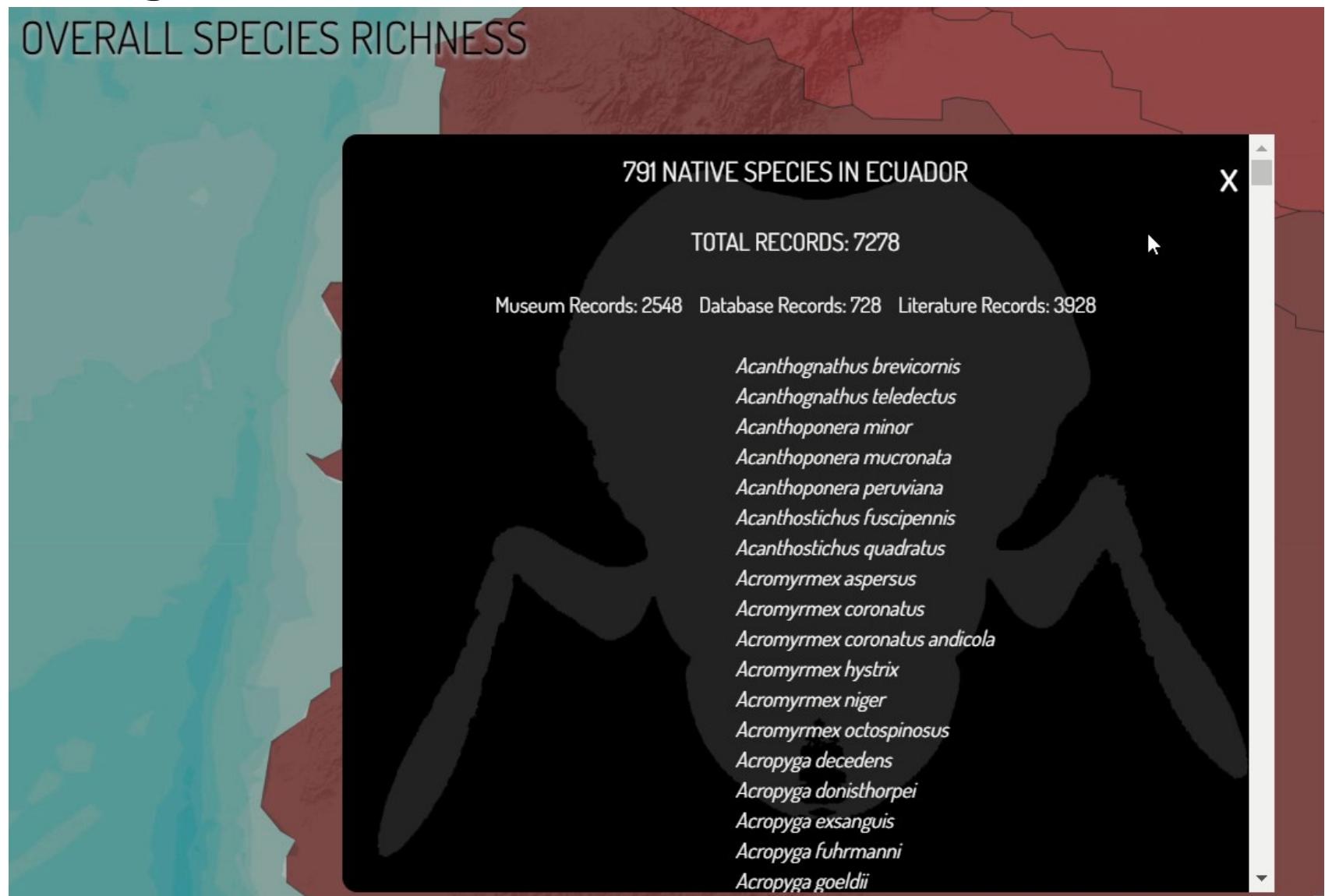


Photo by Piotr Naskrecki.



Bolívar Aponte Rolón

... and many more



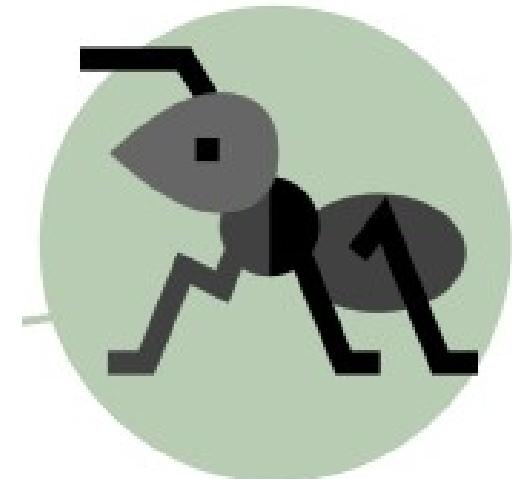
Human impacts on the environment



<https://www.caltech.edu/about/news/the-human-impact-on-the-environment>

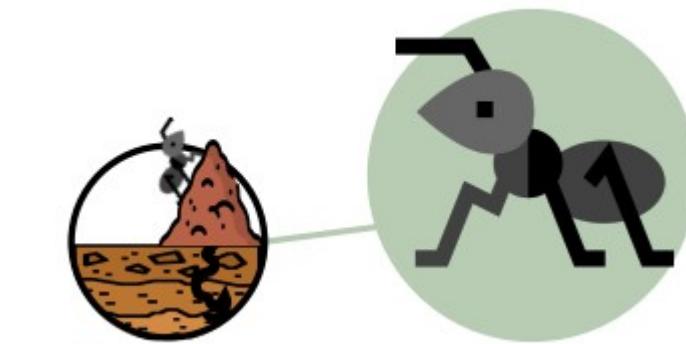
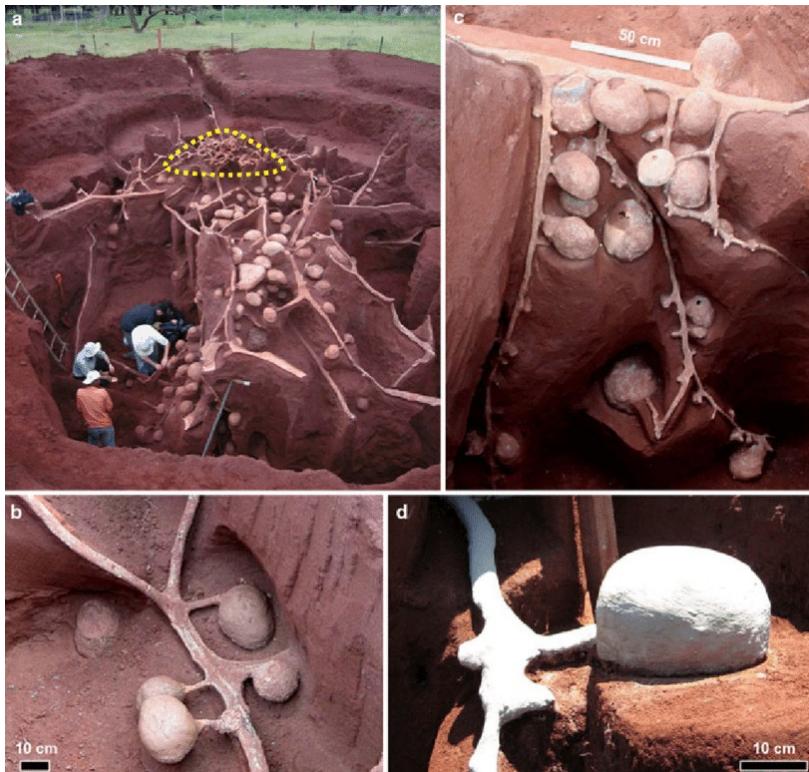
How can ants help us understand...

- Ecosystem processes
- Impacts on the environment
- Ecological interactions
- Biodiversity



Ants and Ecosystem Processes

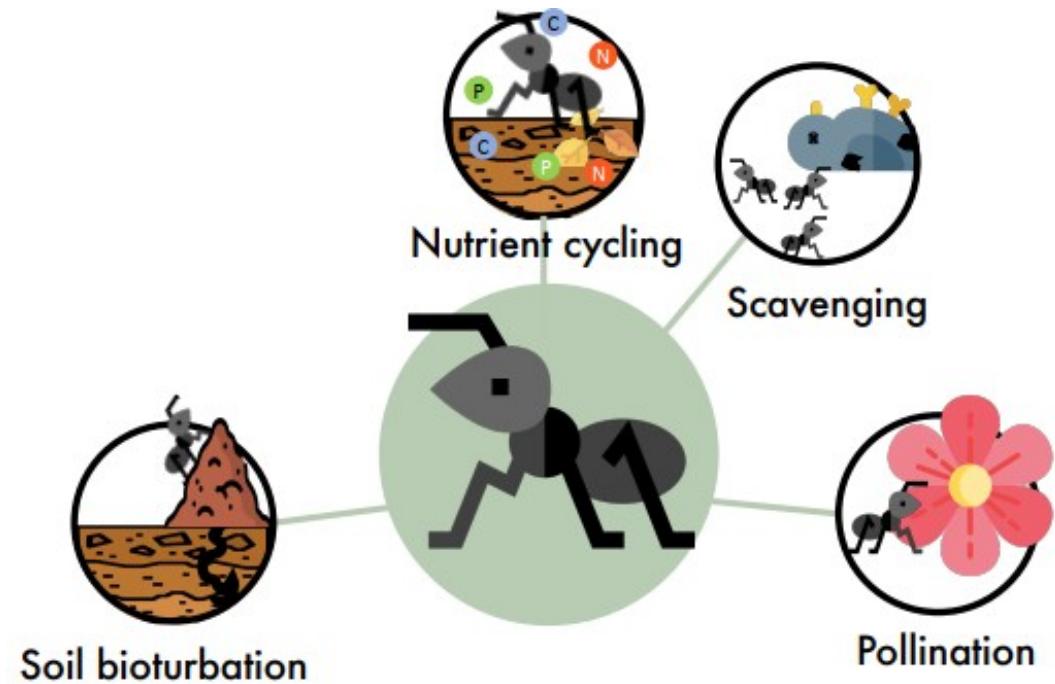
Soil bioturbation



Soil bioturbation

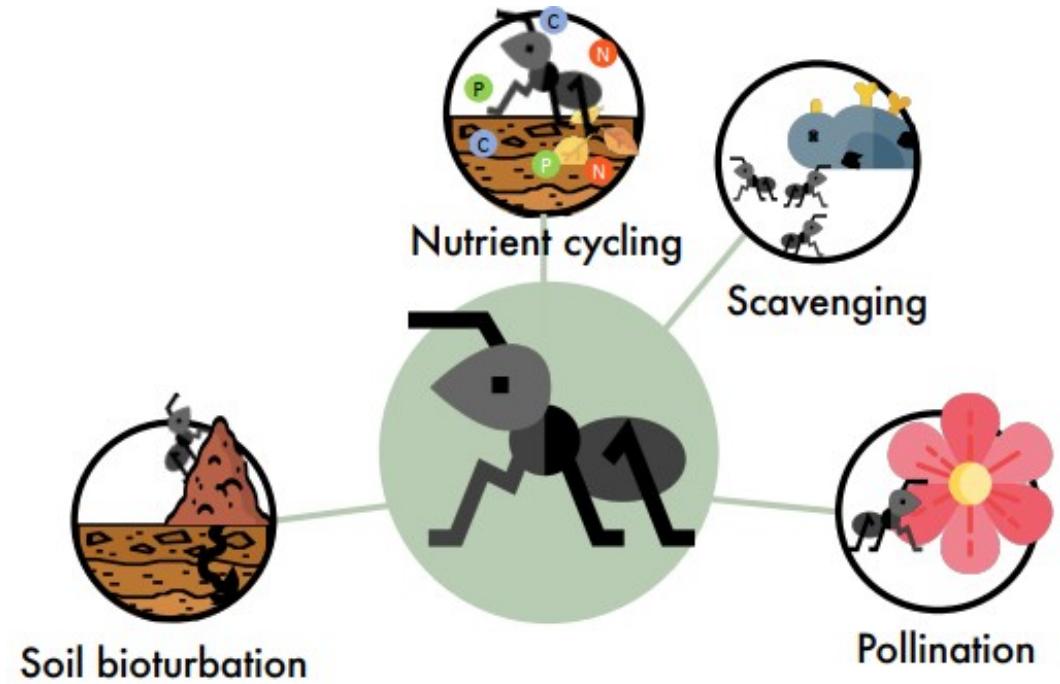
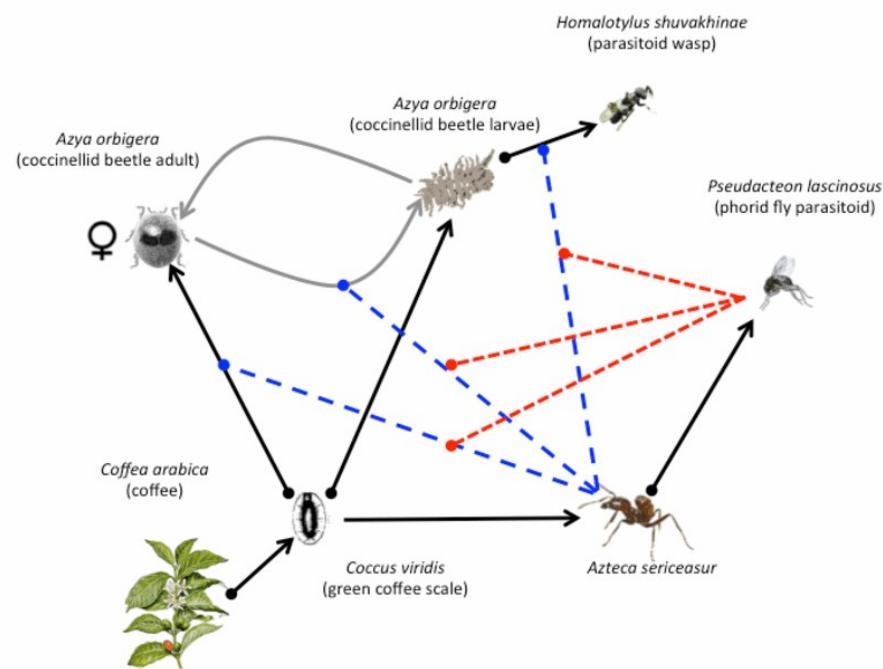
Ants and Ecosystem Processes

- Biological pest control (service)
- Pollination (to an extent)
- Nutrient cycling



Ants and Ecosystem Processes

Biological pest control (service)



Hsieh, Hsun-Yi. (2015).

Ants and Ecosystem Processes

Nutrient cycling

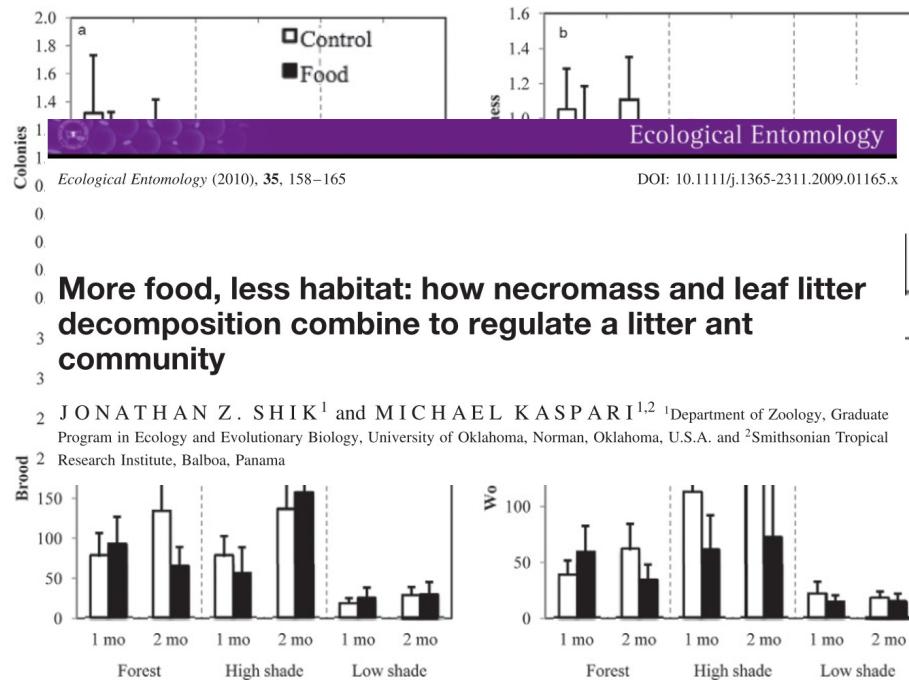
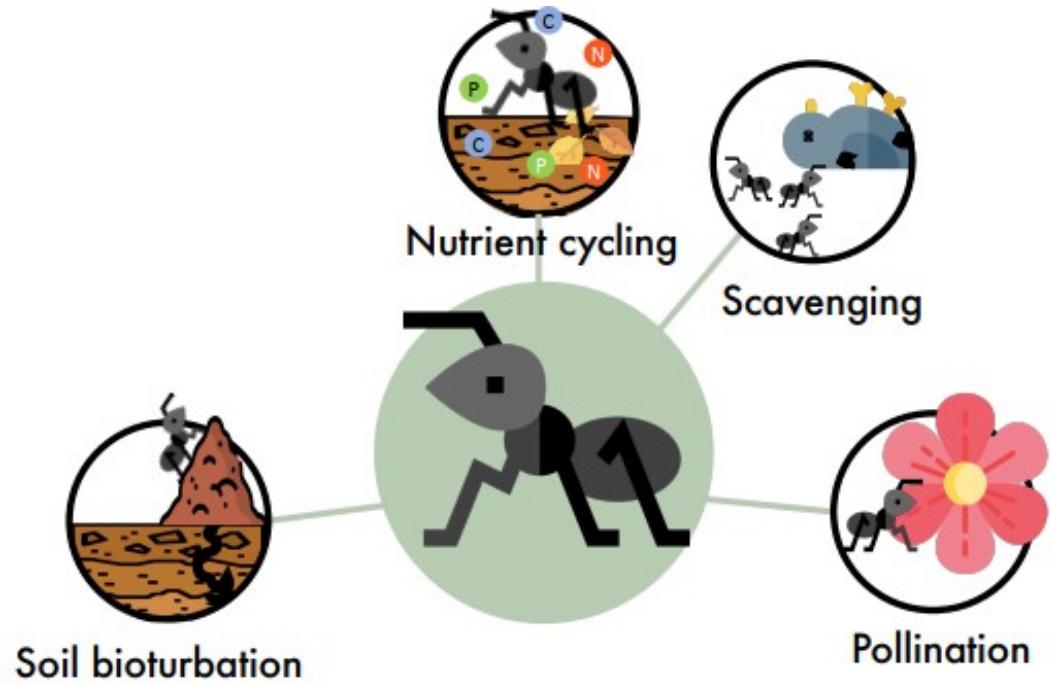


Fig. 2. Mean (\pm SE) number of (a) colonies, (b) species, (c) brood, and (d) workers per plot across habitat type, sampling month, and food addition treatment.



Ants and Ecosystem Processes

Nutrient cycling

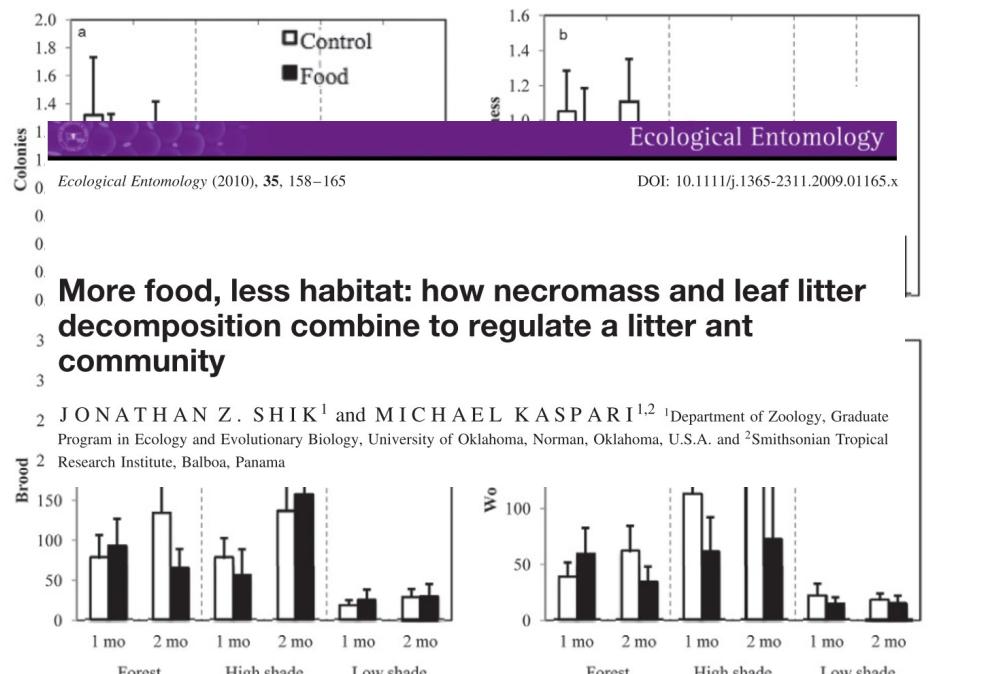
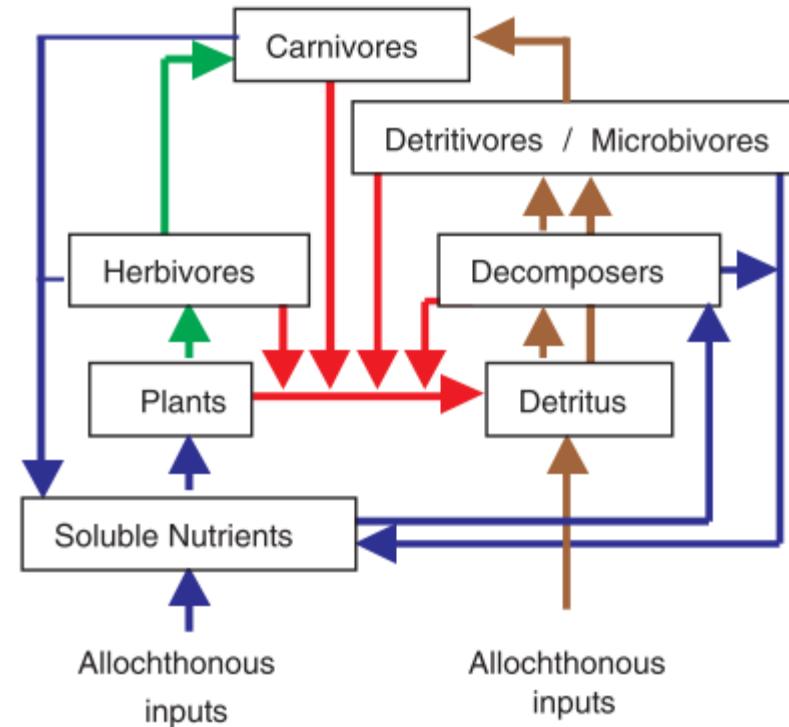


Fig. 2. Mean (\pm SE) number of (a) colonies, (b) species, (c) brood, and (d) workers per plot across habitat type, sampling month, and food addition treatment.

Murnen et al (2013)

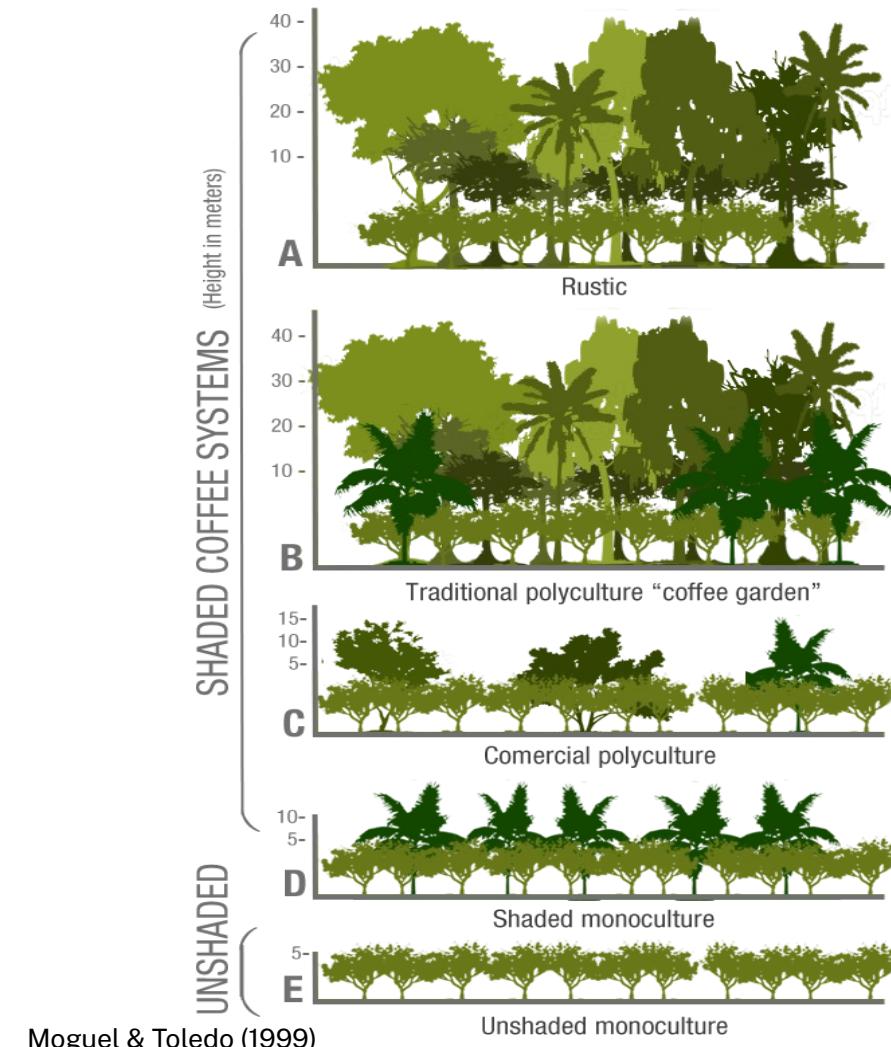


Moore et al (2004)

Ants and Ecosystem Processes

Coffee agroecosystems (case study)

- Intensified agricultural plantations (sun-coffee) that result in low-biodiversity levels (Armbrecht et al., 2005; Perfecto et al., 1996).
- Low-management (shade-grown) styles promote high levels of biodiversity (Philpott et al., 2008)





Coffee Plantation in São João do Manhuaçu City - Minas Gerais State – Brazil (2004)



Coffee Plantation in Chikmagalur, India (2012)

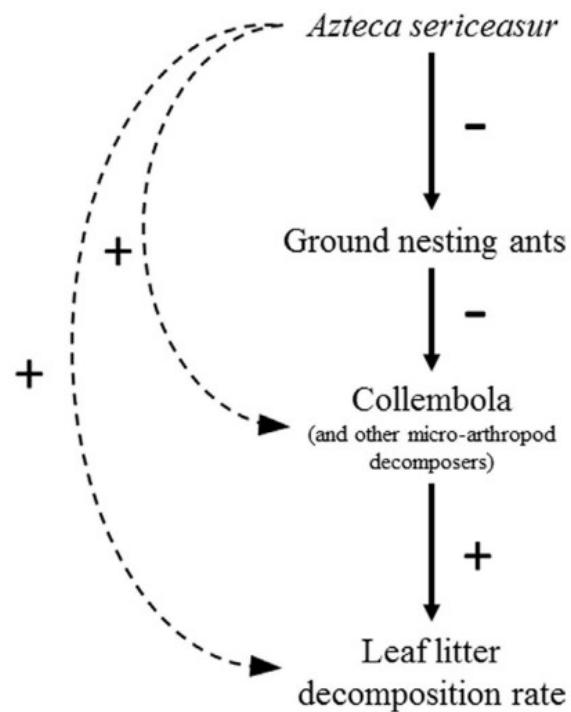




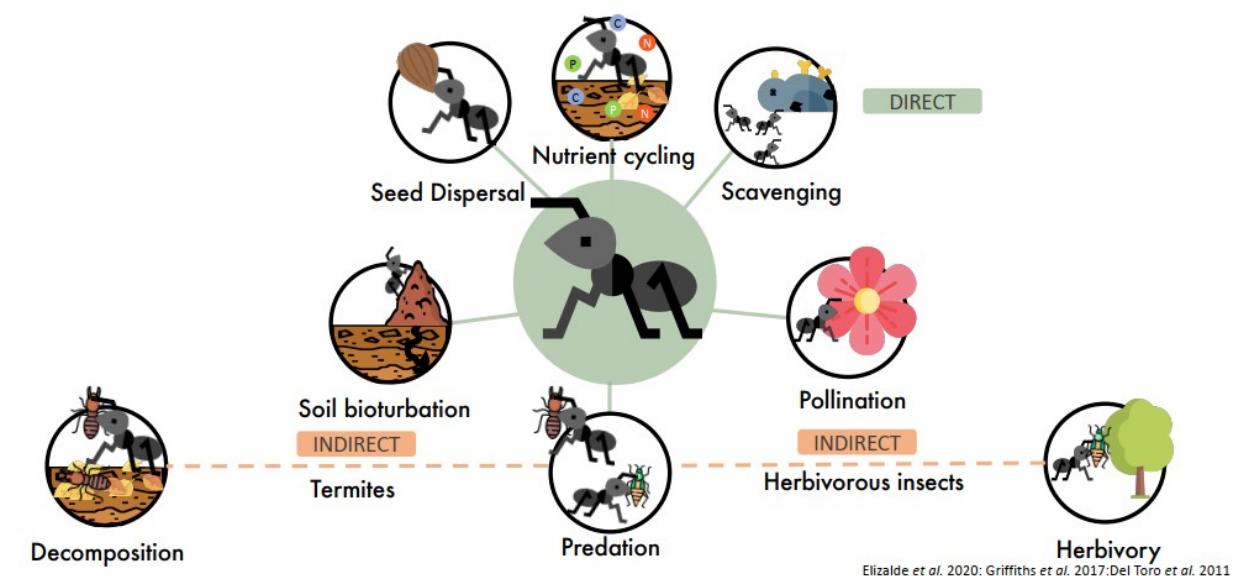
Finca Irland, Soconusco, Chiapas, Mexico

Ants in Coffee Agroecosystems

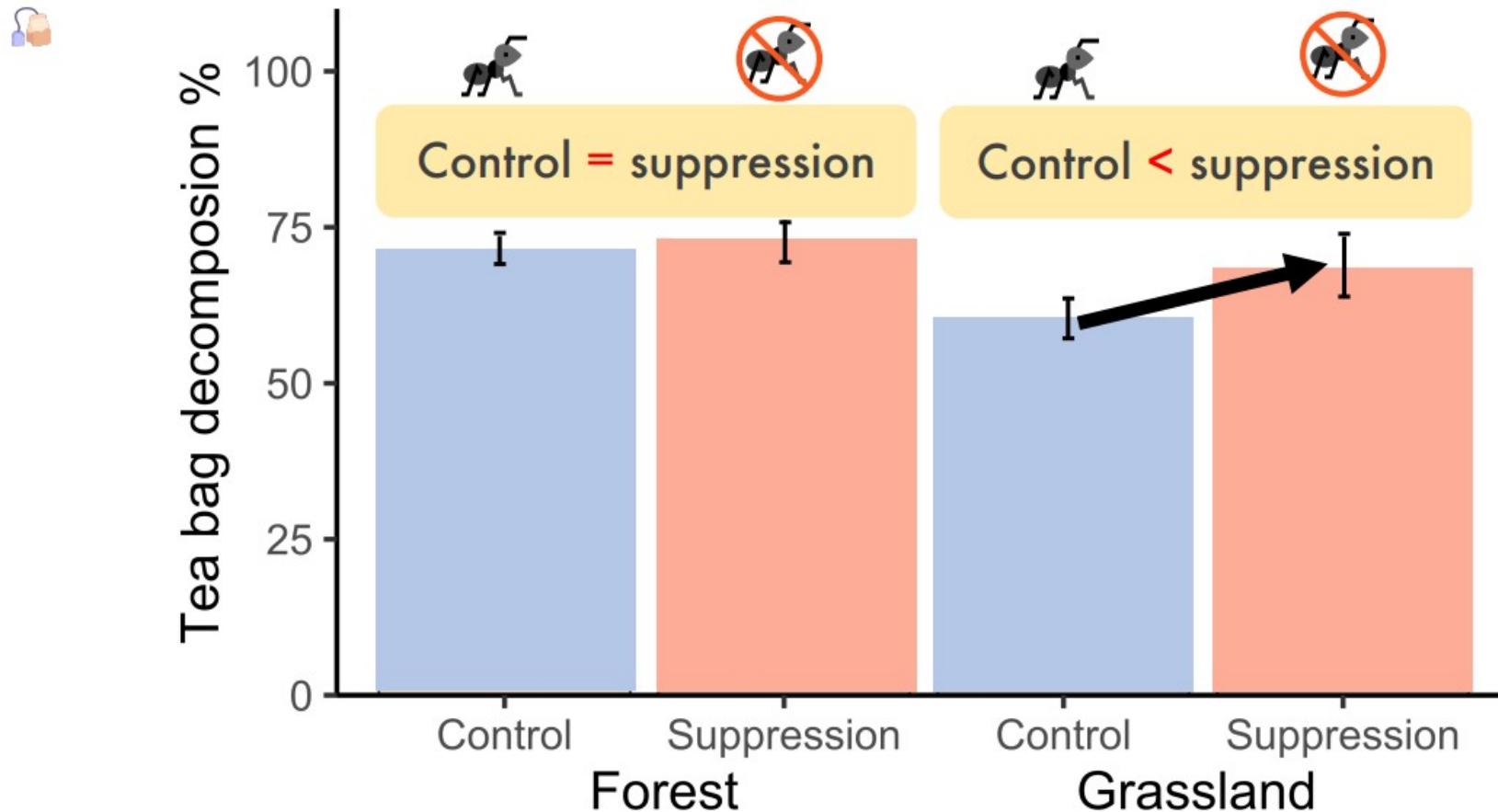
Decomposition



Schmitt et al. 2019.



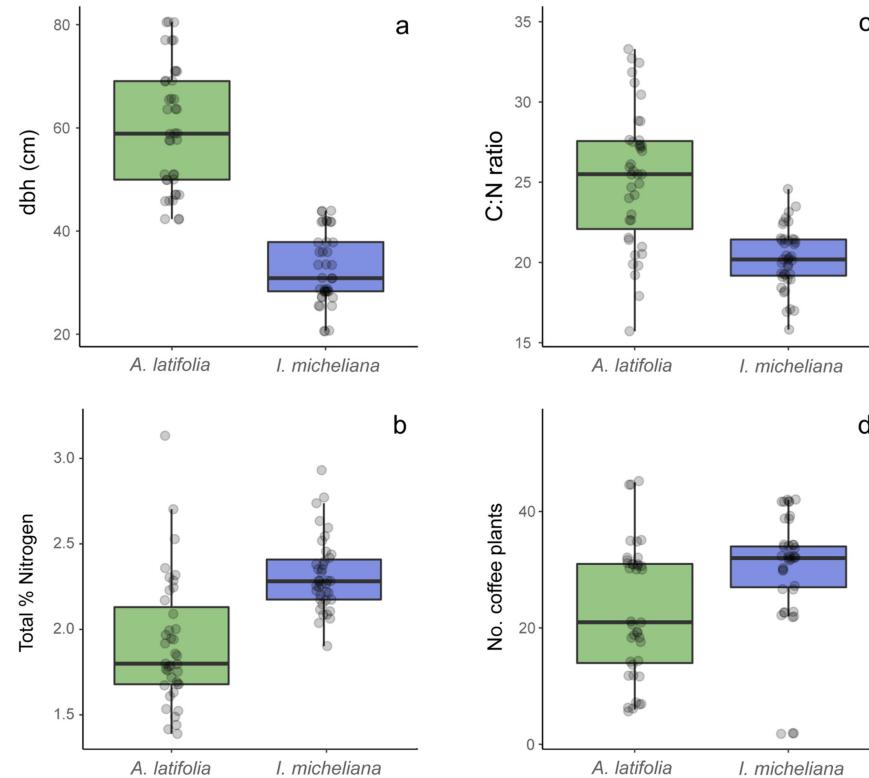
Ants and Decomposition



Data from Tiago Fernandes, PhD.

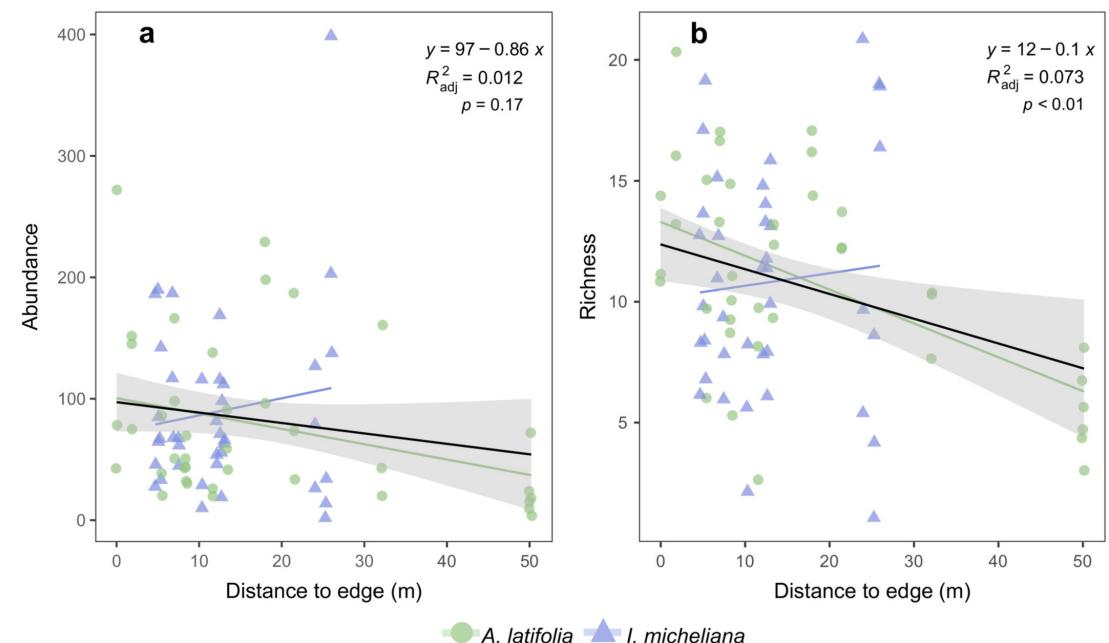
Ants in Coffee Agroecosystems

Nutrient availability and Ants



Aponte Rolón & Perfecto 2023

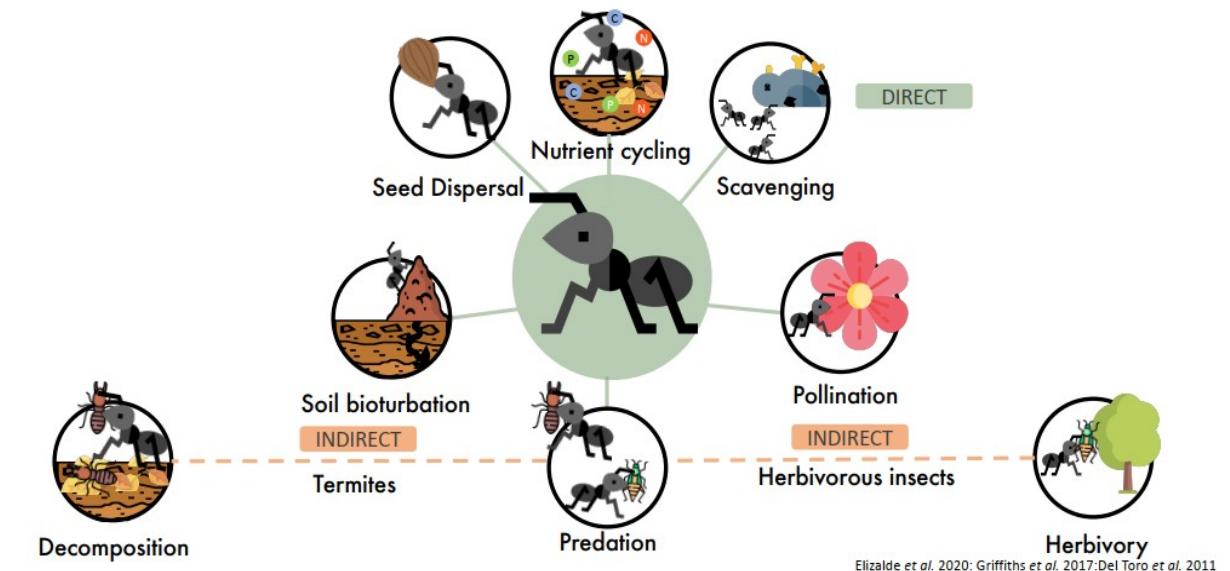
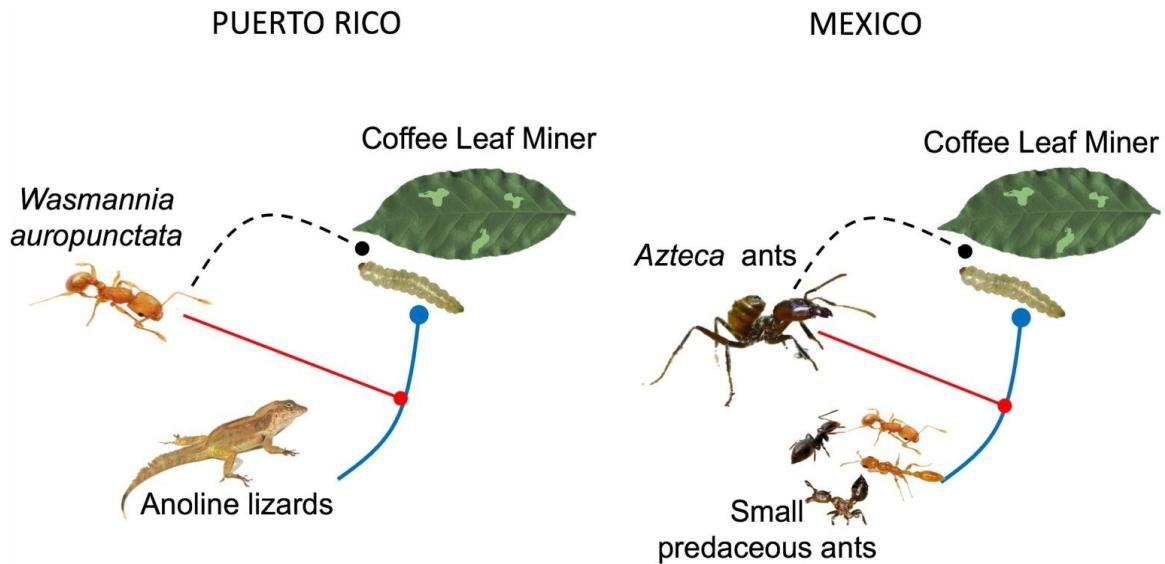
Distance to Edge and Ants



Aponte Rolón & Perfecto 2023.

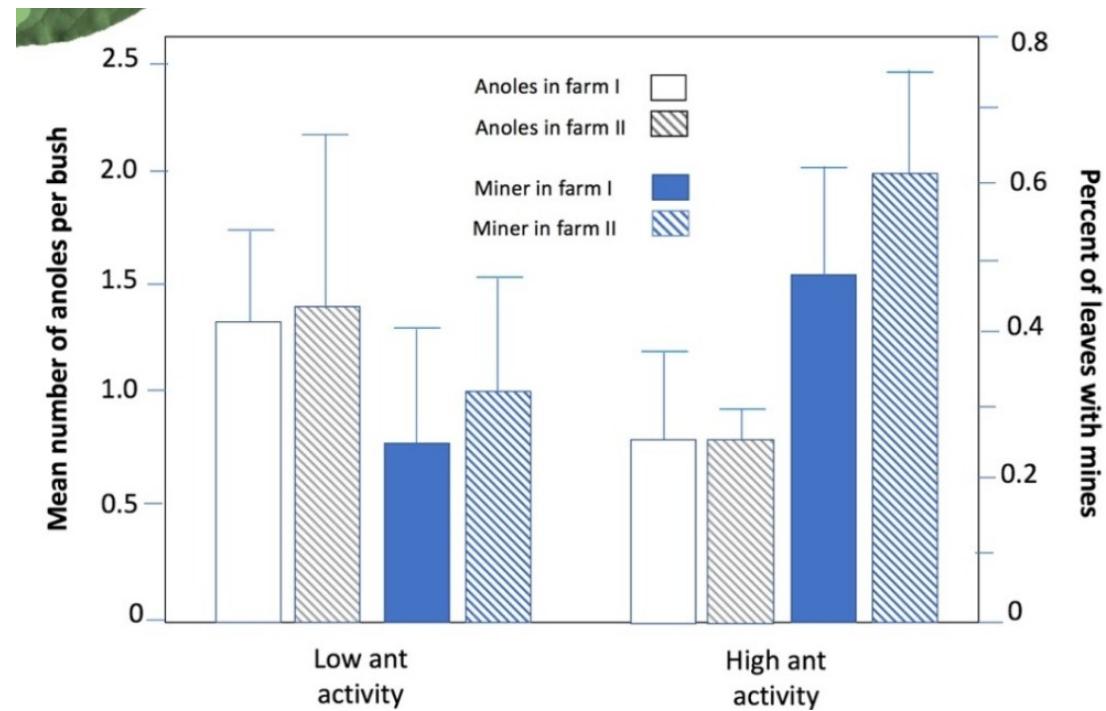
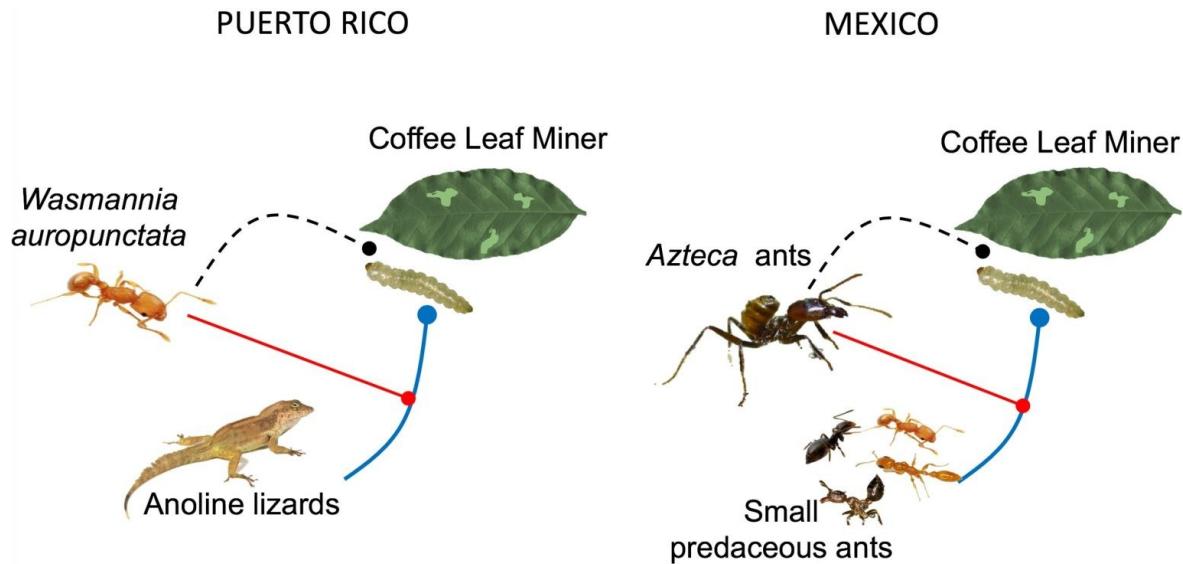
Ants in Coffee Agroecosystems

Predation and Herbivory



Ants in Coffee Agroecosystems

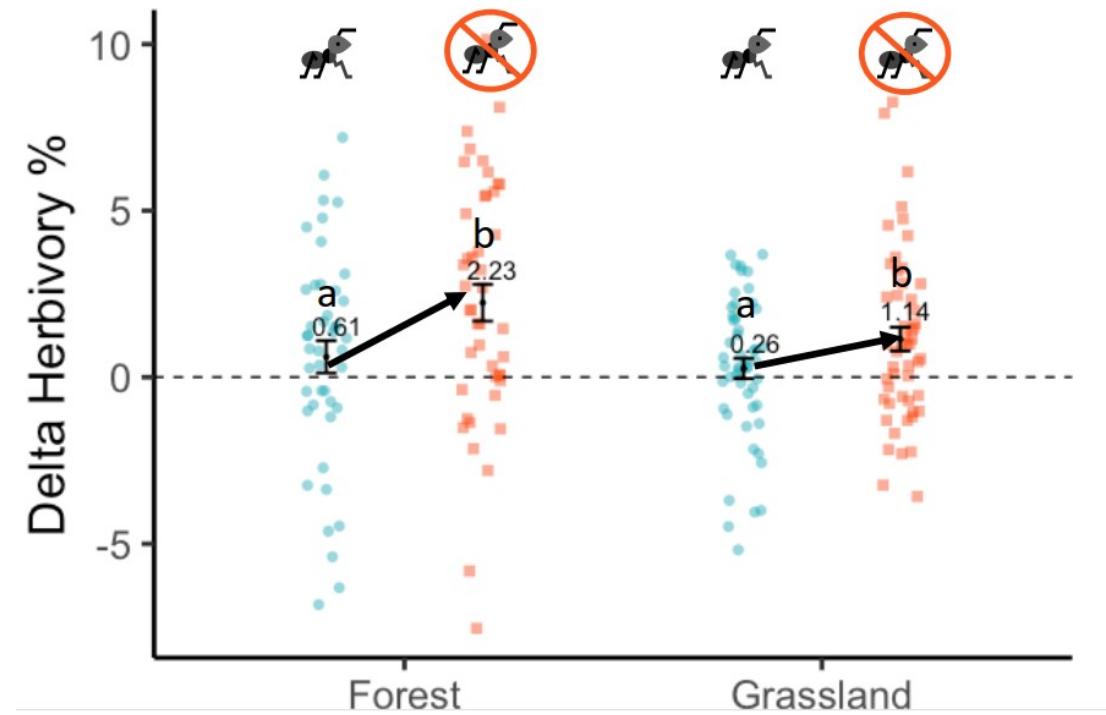
Predation/trait-mediated interactions



Ants in Tropical systems

Herbivory

- By predating on other insects, ants can reduce herbivory.



Data from Tiago Fernandes, PhD.

Ants in Tropical systems

Farming ants?

- *Atta* & *Acromyrmex* (Attini)



Atta sexdens



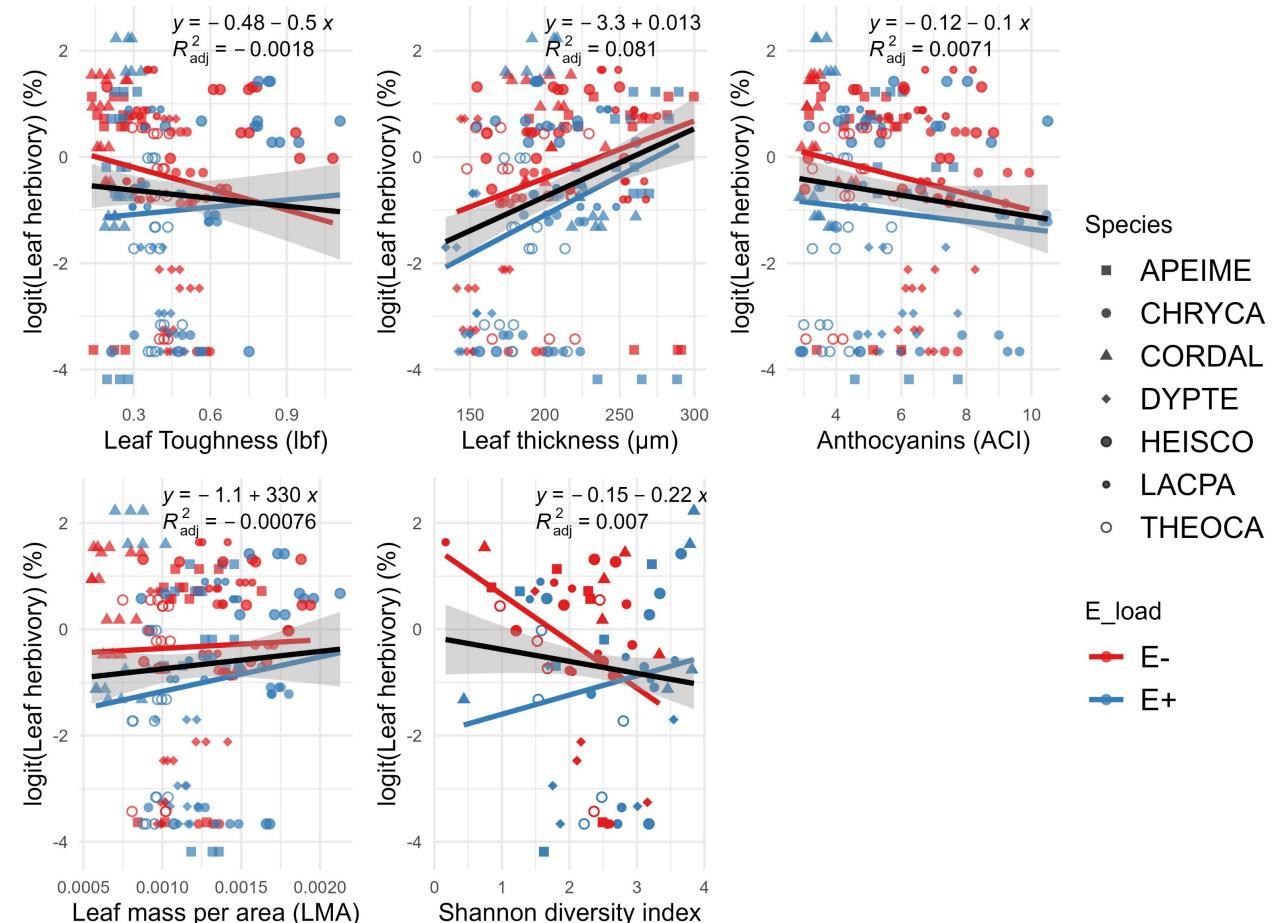
Atta colombica

Christian R. Linder (1999).

Ants and Leaf Traits

Plant have multiple defenses to counter ants.

- Physical, chemical and ecological traits can influence potential impacts of ant herbivory.



*All individuals per tree species included (n = 210)

Take home messages

- Ants influence multiple ecosystem processes.
- Understanding ant ecology (fine scale) provides insight into large scale ecosystems process.
- Ants are complex and fun, just like us!

