An ImportAnt Topic Notes
Go Forth and Science Podcast
Complied by Kate Hruby
5/15/2020

Ant behavior:

- Banks, A.N., Srygley, R.B. 2003. Orientation by magnetic field in leaf-cutter ants, *Atta colombica* (Hymenoptera: Formicidae). Ethology; 109: 835-846
    - Ants find their way from leaves to nest by sun orientation, and when the sun is behind a cloud they use cues from the Earth's magnetic field, as well as landmarks and chemical cues.
- Kristiansen, S.M., Amelung, W. 2001. Abandoned anthills of *Formica polyctena* and soil heterogeneity in a temperate deciduous forest: morphology and organic matter composition. European Journal of Science; 52: 355-363
    - change the makeup of the soil at and around the anthill
    - Because debris is brought in for the construction of the anthill, the dirt around the anthill has a higher concentration of organic materials and nutrients compared to surrounding soil.
    - Increased rooting in abandoned anthills
- MacLean, H.J., Penick, C.A., Dunn, R.R., Diamond, S.E. 2017. Experimental winter warming modifies thermal performance and primes acorn ants for warm weather. Journal of Insect Physiology; 100: 77-81
    - Ants overwinter in nests
    - When it's cold out, it's harder for the ants to move: they run around more slowly and have to expend more energy when they do.
    - Acorn ant still has to move in winter
    - Lives in a hollow acorn or other nut shell, but acorn can be infected/parasites come along and ants have to move
    - Warmer winters make ants move faster in 70 degree or warmer temps
    - Ants move faster in warmer temperatures

Ant food:

- Koptur, S., Jones, I.M., Liu, H., Díaz-Castelazo, C. 2017. Playing the system: the impacts of invasive ants and plants on facultative ant-plant interactions. Ant-Plant Interactions: Impacts of Humans on Terrestrial Ecosystems, Ch. 12.
    - Some plants produce a sugary nectar on their skin. This attracts ants, which eat the nectar, and the ants provide the plant protection from other creatures that would eat it.
    - Invasive ants are most successful at this process, and they shove out the native ants.
    - Plants that have this sugary skin nectar are also invasive a lot of the time, so the invasive ants help the invasive plants survive.

Human-ant interactions:

- Huang, CL., Fu, JT., Liu, YK., Cheng, DM., Zhang, ZX. 2015. The insecticidal and repellent activity of soil containing cinnamon leaf debris against red imported fire ant workers. Sociobiology; 62(1): 46-51
    - Red fire ants are from South America
    - Pest in crops throughout the U.S.
    - Insecticides lead to groundwater contamination and poison other species
    - Essential oils repellent or toxic to red ants: mint, camphor, eucalyptus, mugwort, turpentine wintergreen, chrysanthemum, forsythia, cinnamon
    - Eugenol and cinnamaldehyde are the chemicals that repel/kill the ants
    - Planting cinnamon and/or incorporating their leaves into the soil is a great way to get rid of fire ants, and helps create greener spaces!
    - Used Cinnamomum aromaticum in this study

Leafcutter ants:

- Garrett, R.W., Carlson, K.A., Goggans, M.S., Nesson, M.H., Shepard, C.A., Schofield, R.M.S. 2015. Leaf processing behavior in *Atta* leafcutter ants: 90% of leaf cutting takes place inside nest, and ants select pieces that require less cutting. Royal Society Publishing; 3(150111): 1-12
    - Only 12% of cutting happens outside the nest
    - For each square meter of leaves, 2.9 km of cutting with mandibles was necessary to get the leaves fungus-ready.
    - Leafcutting jobs:
        - Holding: either the only job or holding+cutting at the same time
        - Licking: ant "spit" is antibiotic, so helps clean the leaves, and removes some of the wax on the outside of the leaves, making the leaves better food for the fungi
        - Scraping: get's off wax and other stuff on the outside of the leaf. May also scratch the surface so it's easier for the fungus to eat
        - Cutting: slicing, sawing, and scraping the leaf with it's mandibles
        - Puncturing: bite the leaf to let the fungus get at the inside of the leaf easier
        - The ants give the leaves to the fungus by rocking them into holes in the fungus. And if one of the leaves comes loose or wasn't put into correctly, they'll take it out and redo it, suggesting quality control.
        - They also take small balls of fungus and rock them into sections with a lot of leaves, kind of like mortar in a brick wall.
        - This is an energy intense process, so if the ants go farther than 100m from the nest, the end up spending more energy to cut and process the leaves than they get from the fungus feeding off those leaves.
        - Younger ants with super sharp mandibles stay in the nest and do all the cutting work that happens there. As the ants get older and their mandibles get more worn down, they travel out of the nest to get the leaves and do the initial cut. Once their mandibles have worn down so much that they can't even cut the leaves, they are the ones to carry the leaf bits back to the nest.