

Lesson plan for elementary-middle school students on social insect communication:

20 min - introduction to social insects as Q&A interactive discussion (see guiding questions below)

5 min - explain what we are going to do outside and divide class to ~6 groups (e.g., by table)

25-30 min - each group collects ~30 Argentine ants outside using brushes and/or aspirators (they are very easy to find and we will go to a place where they are foraging all together so that the class stays cohesive).

30-45 min – return to classroom and provide the ants each group collected with sugar water + food coloring on one cotton ball and a different color with just water on a different cotton ball. Use the same color for water and same color for sugar for all groups and don't tell the kids which is which. In older classrooms, the pre-collection phase can include some questions that will lead the students to this experiment... Observe as ants feed from colored cotton balls and change the color of their abdomen. Look for ants transferring the colored sugar water to other ants (trophalaxis). After 30-45 min (depending on kids' patience) count number of ants of each color. Write the numbers on the board to help figure out which color had sugar and which one did not.

10-15 min wrap up –discussion of what we saw and what this teaches us about social behavior (e.g., discuss the idea that the whole can be greater than the sum of its parts...).

** Additional activity if more time is allocated – termites following pen ink (need to order termites in advance for this – good activity to add if there are 2 hours or more...)

Guiding questions for introduction to social insects:

Ants are social insects, what does that mean?

- They live together in one nest, get food collectively and share it, take care of the brood together. (Brood= eggs, larva, pupae)
- Colonies can be of one hundred or less to millions of individuals

Can you think of any other social insects?

- bees – ants with wings
- wasps – not all species are social

Who lives in a colony?

- **Queen(s)** – the mother of all others in the colony

- **Workers** – sterile **females** – practically all the ants you see walking around are girls... might differ in size – soldiers vs brood care (Atta, Eciton)
- **Males** – only in certain times of the year. They have wings, fly off, mate with queens from other colonies and die.

What do ants eat?

- Sugar – in nature sugar comes from nectar of flowers and from aphids that turn the juices of the plant into honey dew (so they actually eat aphid poop...)
- Seeds (harvester ants – large ones – can see colonies in Torrey pines SP)
- Other dead insects
- Larvae of other ants (army ants) – these are also taken to raise as slaves (by slave maker ants – there are some species of these in the Sierra Nevada)
- Fungus that they grow inside the nest (leaf cutter ants)

Where do ants live?

- Everywhere...
- Specifically in school, look for them in cracks between paving stones (they like those because when kids step on them they don't get squished) and in a sunny area (it is winter and cold now so they need the warmth of the sun) leading to place with water and food (so where you eat lunch...)

Before going out to collect ants, how do we identify an ant?

- Like all insects it has 6 legs
- 3 body segments (head, thorax, abdomen)
- The special thing about ants is that their antennae have an elbow
- There will probably be more than just one... (remember they are social)

Some websites that can be pulled up if there is a computer and projector:

Identifying ants: <http://www.antweb.org/>

some ants to search for (to show cool pictures and distributions):

Atta (leaf cutter ant) – south and central America

Eciton (army ants) - south and central America)

Tapinoma (odorous ant) – small, all over the US

Linepithema humile (argentine ants) – world wide – the ant we'll be collecting

Materials

- Insect aspirator/ paint brushes
- food coloring (green, blue, red)
- cotton balls
- sugar
- bottle for mixing
- dropper
- round Tupperware coated with fluon