

ANT ID ACTIVITY

ABOUT THIS ACTIVITY

There are about 14,000 ant species in the world. That's almost three times more than all the mammal species combined! All of these ant species are divided into groups to make it easier to identify and study them. These groups are subfamilies, families, genera and species (also see "Tree of Life" activity).

Just in North Carolina there are almost 200 ant species. To tell them apart, scientists mostly rely on morphological characters (i.e. how they look), but also take into account their behavior, where they live, and sometimes even how they smell!

In this activity students learn how to use dichotomous keys to identify ant species using the same traits scientists use to identify ants. Students either view them using pictures and/or under a dissecting (stereo) microscope (see helpful hints in PART 1). Finally, they can collect a target species (the Odorous House Ant) and **participate in a real science project**.

North Carolina Standards Alignment

Bio.3.5.2 Analyze the classification of organisms according to their evolutionary relationships (including dichotomous keys and phylogenetic trees)

HOW IT WORKS

1. In "PART 1: Identify prepared ants" students become familiar with using a dichotomous key. – *No microscopes or real ant specimens are necessary for this part.*
2. In "PART 2: Identify your own ants" students collect ants and contribute to ongoing research. – *Microscopes are essential for this part.*
3. In "Creating an ant collection" we provide instructions for preparing real ant specimens. – *This is an extension task for either the teacher or an advanced student to complete.*

ABOUT THE SCIENCE

The Odorous House Ant (*Tapinoma sessile*), also often called "sugar ant", is a common species in the United States. Although the ants are native to North America, they are very adaptable and can live in a variety of habitats including your kitchen. They behave in two different ways depending on whether they live in a natural setting (like the woods) or in an urban setting (like your kitchen). In an urban setting, these ants have huge colonies combining many nests with many queens - this is a trait commonly found in invasive species (like fire ants). In fact, the Odorous House Ant has recently been reported for the first time outside its home range. It has invaded Hawaii. This means that we need to watch this species as it may become a worldwide invader.

Unfortunately, we currently know very little about the biology of the Odorous House Ant, such as where exactly it originated within North America, how it disperses, and how many populations there are. Previous research indicates that there may even be cryptic species (i.e. several species that all superficially look like the Odorous House Ant) - but to answer all these questions we need more samples! That's why we turn to YOU to send us your "sugar ants".

ABOUT THE SCIENTIST

Dr. Magdalena Sorger is a postdoctoral researcher at the North Carolina Museum of Natural Sciences and Pennsylvania State University. She's an evolutionary ecologist interested in the diversity, distribution, and behavior of ants and other insects.

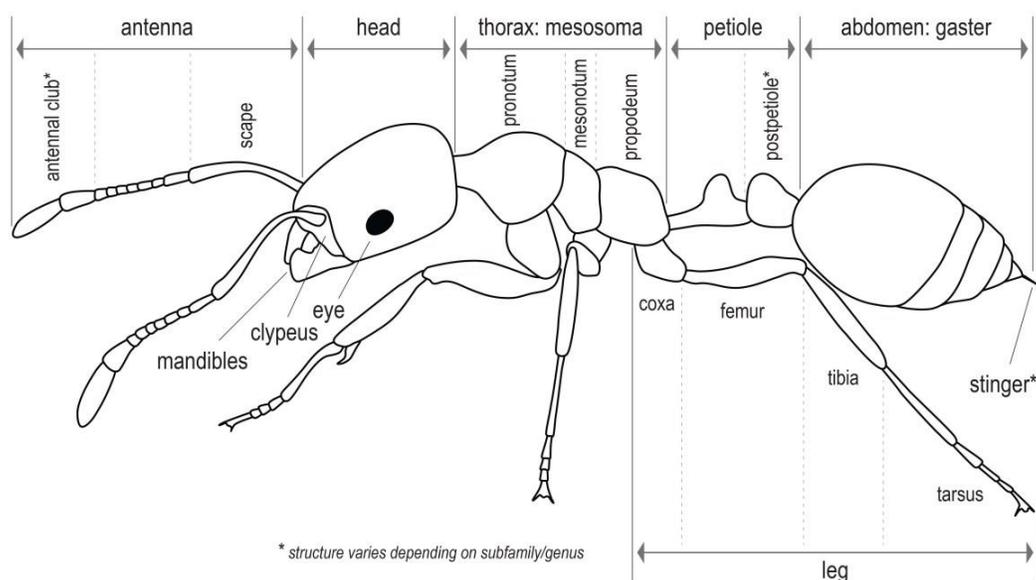


VOCABULARY

- Entomology = the study of insects
- Myrmecology = the study of ants
- Myrmecologist = a person who studies ants
- Dichotomous key = used to identify an organism where each stage presents descriptions of two distinguishing characters, each choice leads to the next stage in the key until the species is identified
- Taxonomy = a scientific branch dealing with the description, identification, naming, and classification of organisms
- Taxon (pl. taxa) = a taxonomic category, a group that forms a unit such as a species or a genus
- Stereo microscope (dissecting microscope) = a binocular microscope that gives a relatively low power (low magnification) view of the subject where the light shines down onto the subject instead upward like in a compound microscope
- Morphology = the shape/form of an organism
- Subfamily = taxonomic classification below the family level, above the genus level

Ant Anatomy Terms:

- Abdomen = the posterior section of an insect's body, in ants this is called the gaster
- Thorax = The section of an insect's body directly behind the head and before the abdomen.
- Petiole = sometimes called a petiole node, one or two small bumps located between thorax and abdomen, not easily visible in all ant species
- Antenna (pl. antennae) = projection on either side of an ant's head, ants have elbowed antennae
- Gaster = the abdomen of an ant
- Mandible = the jaw of an ant
- Acidopore = a round orifice encircled by hairs located at the posterior end of an ant's gaster, this structure releases formic acid, only present in members of the subfamily Formicinae

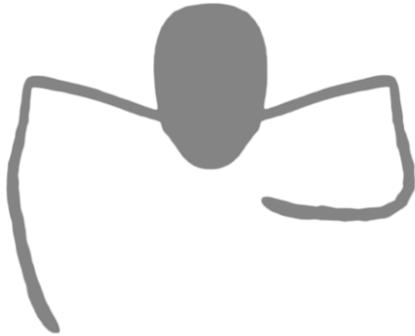


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PART 1: IDENTIFY PREPARED ANTS

ABOUT THIS PART

This part introduces students to the practice of identifying organisms. They learn how to use a dichotomous key and practice identifying ants.



HERE'S WHAT YOU'LL NEED

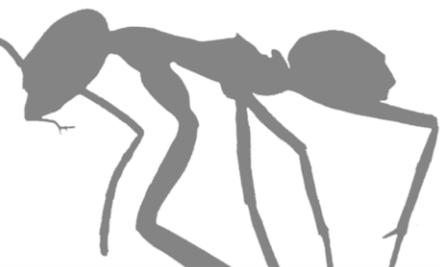
- Student worksheet “AntWeb ID” (one per student pair), see below
- [Ant Identification Key](#)
- [22 AntWeb cards & answer key](#)
- [Ant Subfamily Fact Sheet](#) – optional but helpful
- [Ant Petiole Info Card](#) – optional but helpful

DIRECTIONS

1. Print AntWeb cards in color (if color printer is not accessible make cards available electronically)
2. Print Ant Identification Key in color (if color printer is not accessible make key available electronically)
3. Set up 8 ID stations (number of stations can be adjusted). Add AntWeb cards (2-3 per station) and Ant Identification Key (1 per station).
4. Put students in pairs.
5. Give one student worksheet to each pair of students.
6. Assign each pair a starting station. Students will then rotate through the remaining stations. Allow a set amount of time per station (suggestion: 4 min). Provide more time at the first station as students will likely need to familiarize themselves with the identification key (suggestion: 6 min).
7. After all students have rotated through all stations, provide the correct [answers](#).
8. Discuss with students what they found challenging and what they found enjoyable about identifying the ants.
9. Move on to PART 2 “Identify your own ants” which includes the option to participate in a citizen science project.

HELPFUL HINTS

- If you have access to microscopes and real ant specimens (see “Creating an ant collection”), set up demonstration stations for students to use the key on real ant specimens.
- Adjust time at ant stations according to student needs.
- Advanced students could do this activity individually.
- Homework for PART 2 (collecting ants for citizen science project) can be assigned prior to completing PART 1. That way both activities can be completed in the same class period if time allows.



PART 2: COLLECT & IDENTIFY SUGAR ANTS

ABOUT THIS PART

In this part students can participate in a real science project if they find the Odorous House Ant. They collect ants in or around their homes (or at school) using sugar water baits and then send them to a scientist for DNA analysis.



HERE'S WHAT YOU'LL NEED

- “Find that sugar ant” handout, see below
- Stereo microscope (not possible without)
- [Ant Identification Key](#)
- “How to recognize the Odorous House Ant” [info card](#)

DIRECTIONS

Preparation for this activity:

1. Pass out “Find that sugar ant” handout to students (includes directions for collecting ants)
2. Assign homework: students follow directions for collecting ants. Note that it is ideal to obtain ants from student homes in order to get a wide geographic spread of samples for the citizen science project.

In Class:

1. Allow students to use stereo microscopes and ant identification keys (from PART 1) to identify collected ants.
2. If the ants are Odorous House Ants - place the ants into the smallest airtight container you can find (e.g., [film canister](#)) and fill it with unscented 70% ethanol hand sanitizer, e.g., Purell Advanced Instant Hand Sanitizer (any other brand is fine too, as long as it is unscented and contains at least 70 % ethanol)
3. Fill out this [Google Form](#).
4. Place the container/s in a box or padded envelope along with the completed info sheet (bottom part of “Find that sugar ant” handout).
5. Mail to:
Dr. Magdalena Sorger
NC Museum of Natural Sciences
11 West Jones Street
Raleigh, NC 27601

*Send specimens immediately after putting them in hand sanitizer. The shipment must be **received within 1 week** due to DNA degradation!*

HELPFUL HINTS

- This part is best when it is incorporated into PART 1. Alternatively samples collected during the Ant Picnic lesson (if it was done) can be used to identify the Odorous House Ant (if it was present).
- Other ant activities can be completed if there is extra time (see “Spirit Ant”, “Pipe Cleaner Ant”, “Tree of Life”)
- This part cannot be completed within one day due to time required to euthanize ants.
- If students cannot collect ants at home, they can be collected at school (ideally in kitchen area).

ANT ID ACTIVITY

CREATING AN ANT COLLECTION

ABOUT

This is a guide for putting together a collection of point-mounted ants that can be used with microscopes to practice ant identification.

HERE'S WHAT YOU'LL NEED



- Containers/tools for collecting ants (tupperware, ziplock bag, petri dishes, aspirator, etc)
- Insect pins size 2 (e.g., available on [Amazon](#)*)
- Watchmaker's forceps (featherweight, narrow tip recommended) (available on [Amazon](#)* or [Bioquip](#))
- Acid-free cardstock paper (regular cardstock paper is fine if you do not wish to store specimens long-term)
- Triangle punch or template for cutting points out
- Fine tip permanent marker for labeling (Use archival ink for long-term storage on acid free paper)
- Stereo microscope
- Insect pinning block or telephone book mounting block (instructions & materials listed below)
- Piece of styrofoam or kneaded eraser for holding pinned specimens (optional)
- Wood Glue
- Tooth pick or needle (for applying glue)
- Sealed insect box with foam base for storing pinned specimens (available on [Amazon](#)* or [Bioquip](#))

* Links to example, other sellers & listings also ok

DIRECTIONS FOR POINT-MOUNTING ANTS

1. Watch tutorial video: "[How to point-mount an ant](#)"
2. Collect ants (e.g., PART 2 of this activity or "[Ant Picnic](#)" lesson plan.
3. Euthanize ants using one of two options:
 - Ethanol - submerge ants in ethanol for at least several hours
 - Freeze - place ant samples in freezer overnight
4. Following the directions in the ant mounting tutorial, practice mounting ants so that you have a collection for students to view.

CREATING A PHONE BOOK MOUNTING BLOCK

Materials needed:

- Phonebook
- Tape (Masking tape, painter's tape or duct tape will work)
- Ruler
- Bandsaw (Or any way you can get a clean cut)

Directions:

1. Tear off the front and back cover of the phonebook.
2. Starting with the edge of the phonebook, roll the phonebook as tightly as possible
3. Carefully wrap the roll in tape. The ends do not need to be covered with tape.
4. Cut the rolls 22 mm (a little less than 7/8 inches) thick using a bandsaw or any device that will cut a clean line. Finished product can be seen on the tutorial video.



Name: _____

Find that Sugar Ant!

Materials:

- 1 cup water
- 4.5 teaspoons of sugar
- Small pot (stovetop) or microwave safe container (microwave)
- Index card
- Pencil
- Cotton ball
- Quart-size ziplock bag

Homework Directions:

- Label index card with date, [GPS coordinates](#) or address
- Dissolve sugar in water (might have to heat it up)
- Soak cotton ball in sugar water and place onto index card
- Place index card with cotton ball on **kitchen counter** (or where you see ants)
- Leave it out for 1-2 hours
- Put index card with cotton ball into ziplock bag (you might have move quickly so that the ants don't have time to run away)
- Put the ziplock bag into the freezer
- **Bring the ants to school on this date:** _____

In order to contribute to scientific research, we need to find and identify the Odorous House Ant (Sugar Ant) and send these ants to a scientist!

✂-----CUT HERE AND INCLUDE COMPLETED BOTTOM PORTION WITH ANT SHIPMENT-----

School Name: _____

Date: _____

Use <http://www.gps-coordinates.net/> to convert your address into GPS coordinates:

Latitude of your address: _____

Longitude of your address: _____

Exact location of index card (kitchen counter, kitchen floor, etc.):
