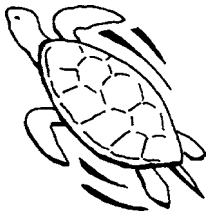


*Activity #1*

# Finding the Little Fire Ant

## ● ● ● **In Advance** *Collecting Ants*

### Materials & Setup

- Three (or more) clean disposable chopsticks
- Optional: Bright orange paint or felt-tip markers
- Peanut butter (the cheaper generic kind works best; the "natural" kind doesn't work as well)
- A spoon
- Small paper cups
- Small self-sealing plastic bags, such as Ziplocs (sandwich size or the even smaller snack size)
- Sharp or mechanical pencils
- Specimen labels (see Student Page "Survey for Little Fire Ants," p. 20)
- Optional: tongs or gloves if you do not want to pick up bait sticks without them and possibly get ants on yourself

*For each student*

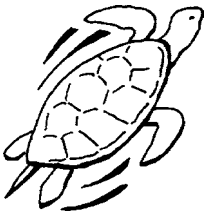
- Student Page "Finding the Little Fire Ant" (pp. 12-15)
- Student Page "Survey for Little Fire Ants" (pp. 16-20)

### Instructions

1) Several days before you start this unit, hand out the Student Page "Finding the Little Fire Ant." Ask students to collect ants to bring to class on the day you will be starting the unit. The student page contains a list of materials students will need (those listed above).

2) Students may collect ants at home or another location of their choosing. With the help of the student page, they should be able to do the ant collections by themselves. You may want to walk students through the steps in the classroom or even take them out on school grounds to do a trial run.

3) This activity is part of an ongoing effort to monitor for the presence of the little fire ant on Maui. Because the information students develop may be used by researchers, students MUST:
   - Follow the ant collection instructions in the student page precisely, and
   - Be honest about where the ants were collected. Students may be tempted to share ants with each other and claim they were collected in different places. Make sure students understand that being dishonest about where ants were collected could interfere with efforts to eradicate little fire ants if your class discovers them.





## ● ● ● **Class Period One** *Little Fire Ant Identification Lab*

### Materials & Setup

- Frozen ant specimens collected by students

*For each student or lab groups of two to four students*

- A hand lens of at least 10x or a dissecting microscope (one for each lab group or student)
- Student Page *"Wasmannia* Identification Key" (pp. 21-22)
- "Color *Wasmannia* Key" (master, pp. 10-11)
- Ruler with mm markings

*For each student*

- Student Page "Finding the Little Fire Ant" (pp. 12-19)
- Student Page "Little Fire Ant Quiz" (pp. 23-24)

### Instructions

1) Divide students into lab groups of two to four students each. Or allow students to work on their own if you have enough magnifying lenses or dissecting microscopes to go around.

2) Instruct students to keep each specimen with the appropriate bag and label. That way if there are questions about identification or if the specimen appears to be a little fire ant, the correct information about where it was collected will be readily available.

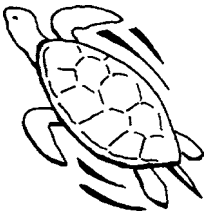
3) Hand out the Student Page *"Wasmannia* Identification Key" and the "Color *Wasmannia* Key." Explain that students will be looking for ants that match the distinguishing characteristics of the little fire ant.

4) After your students (with your help, if necessary) have eliminated all ants they know are NOT *Wasmannia auropunctata*, gather all remaining specimens, put them in their bags with the correct label inside, and store them in the freezer. These specimens may include:
   a) Ants you have identified as *Wasmannia auropunctata*, and
   b) Ants that MAY be *Wasmannia auropunctata* (i.e., you are uncertain about the identification).

5) If there are specimens that you believe are or may be little fire ants:
   - Write your (the teacher's) contact information on the back of the corresponding specimen label.
   - Put the label in the bag along with the ants and the chopstick. Seal the bag.
   - If there is more than one questionable collection, keep each in its own bag with its own label.
   - Mail the bags to: Ellen VanGelder; Research, Haleakalā National Park, P.O. Box 369, Makawao, HI 96768.

   A trained biologist will identify the ants and notify you if you have found a little fire ant.

6) Assign the Student Page "Little Fire Ant Quiz" as homework.



## Journal Ideas

- Based on your experience collecting ants, what do you think it would be like to be a field researcher studying insects? Is this a job you think you would like? Why or why not?
- ` What safety precautions did you take while collecting ants? Why are precautions like these important for people who study insects?

## Assessment Tools

- Participation in and conduct during the lab
- Student Page "Little Fire Ant Quiz" (teacher version, pp. 8-9)
- Journal entries

*Teacher Version*

# Little Fire Ant Quiz

1) Why are some ant species known as "tramp ants"?

   Some ants are especially good at "hitching a ride" with humans, expanding their range by traveling in goods and cargo being shipped around the world.

2) Describe one threat the little fire ant could pose to native ecosystems and species on Maui. Explain why you think this impact would matter.

   Possible answers include:

   - It attacks and preys on native invertebrates and possibly vertebrates such as reptiles and mammals.
   - It completely takes over an area it invades, competing with native species for food and nesting sites.
   - It stings the eyes and soft, moist tissues of animals.
   - It could eliminate or reduce diversity among native invertebrate species.

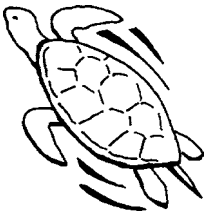
   Explanations about the importance of the impact will vary from student to student.

3) Describe one threat the little fire ant could pose to humans and domestic animals. Explain why you think this impact would matter.

   Possible answers include:

   - The ants sting people or animals when they roll on or touch them.
   - They sting people while gardening, picking fruits or flowers, or doing other outdoor activities.
   - They move into homes in search of food.
   - Stings may cause momentary discomfort, or welts and itching that last for days.

   Explanations about the importance of the impact will vary.



4) How are people trying to prevent the little fire ant from getting to Maui on agriculture and nursery items?

Through a series of precautions and inspections called quarantines

5) Why is it important to know as soon as possible if the little fire ant is now on Maui?

There is a much better chance of eradicating them or controlling their spread if we find them when their populations are still small.

# Color *Wasmannia* Key

1a. Body (not including antennae) 2mm or more in length **NOT WASMANNIA**
1b. Tiny, body less than 2mm in length.....2

Big-headed ant
*Pheidole megacephala*

2.5 mm

1.5 mm

Little fire ant
*Wasmannia auropunctata*

2a. Ant is all dark brown to black in color **NOT WASMANNIA**
2b. Ant is not all dark brown to black in color (e.g., red, yellow, or light brown).....3

Dark brown/black ants

*Solenopsis papuana*

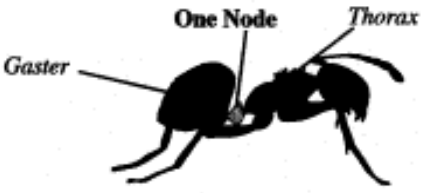
*Ochetellus glaber*

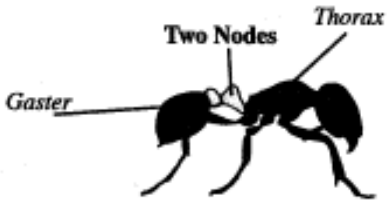
Ants not all dark brown/black

*Wasmannia auropunctata*
Color=light brown/ orange

*Solenopsis geminata*
Color=reddish

3a. One node on waist between thorax and gaster. **NOT WASMANNIA**
3b. Two nodes on waist between thorax and gaster.....4



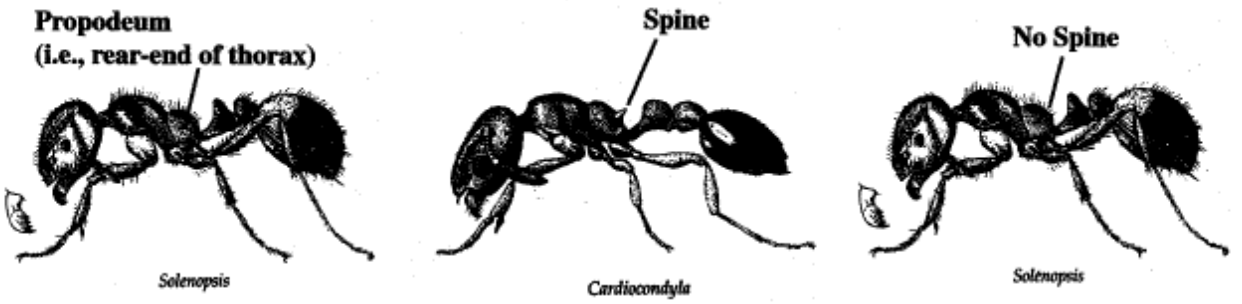




4a. Ant is bi-colored (e.g., gaster and/or head are a different color than rest of body) **NOT WASMANNIA**
4b. Ant is all one color (yellow, red, orange, light brown.....5

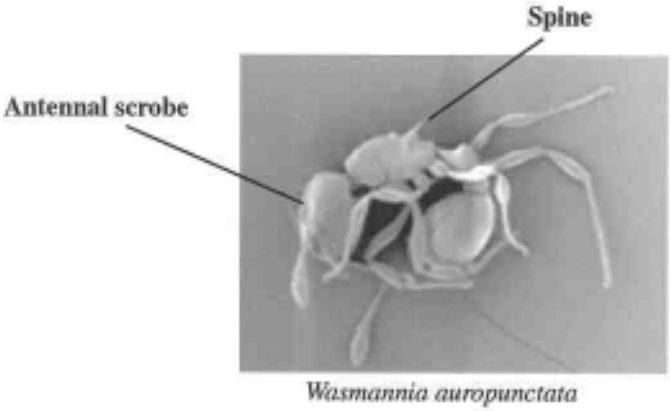
**Bi-colored ant**
*Monomorium floricolor*

**One-colored ant**
*Wasmannia auropunctata*

5a. Propodeum is smooth, no spines present **NOT WASMANNIA**
5b. Propodeum with a distinct pair of spines present.....6




6a. Antennal scrobe (groove) absent, propodeum spines short and stumpy *Tetramorium simillimum*
6b. Antennal scrobe (groove) present, propodeum spines long and pointy **Wasmannia auropunctata**



*Wasmannia auropunctata*

**Short, stumpy spine**


*Tetramorium simillimum*

**Long, pointy spine**


*Wasmannia auropunctata*

***Image Credits***
•*Walter Nagamine, Hawai'i Department of Agriculture (1a/b* Pheidole megacephala, Wasmannia auropunctata; *2b, 4b, 6b* Wasmannia auropunctata)
•*Neil Reimer, Hawai'i Department of Agriculture (2a* Solenopsis papuana, Ochetellus glaber; *4a* Monomorium floricolor*)*
•*Hirotami T. Imai and Masao Kubota (2b* Solenopsis geminata*)*
•*E. W. Huddleston, A. A. Laplante, and S. S. Fluker, "Pictorial Key of the Ants of Hawaii Based on the Worker Forms,"* Proceedings of the Hawaii Entomological Society, *Vol. 20, No. 1, 1968, pp. 71-79 (3a/b* line drawings, color added*)*
•*M. R. Smith,* House Infesting Ants of the Eastern United States*, Technical Bulletin No. 1326, Agricultural Research Service, U.S. Department of Agriculture, 1965, reprinted in Bert Holldobler and Edward O. Wilson,* The Ants*, Harvard University Press, Cambridge, Massachusetts, 1990 (5a* Solenopsis*)*
•*M. R. Smith, "A Generic and Subgeneric Synopsis of the United States Ants, Based on the Workers (Hymenoptera: Formicidae),"* American Midland Naturalist*, Vol. 37, No. 3, pp. 521-647 reprinted in Bert Holldobler and Edward O. Wilson,* The Ants*, Harvard University Press, Cambridge, Massachusetts, 1990, (5b* Cardiocondyla*)*
•*Dennis Kunkel Microscopy, Inc., ©2001 (6b* Wasmannia auropunctata*)*
•*American Natural History Association (6a* Tetramorium simillumum*)*

# Finding the Little Fire Ant

No ants are native to the Hawaiian Islands, yet a total of 44 ant species have been recorded here. All of these species were accidentally introduced by humans. Some ants are especially good at "hitching a ride" with humans, expanding their range by traveling in goods and cargo being shipped around the world. These species are known, fittingly, as "tramp ants."

Among the ants that have not yet made their way to Maui is one tramp species known as the little fire ant (*Wasmannia auropunctata*). The little fire ant is native to Central America and the northern part of South America. This species gets its name from its powerful sting that can feel fire-like to the person or animal on the receiving end of the sting. The little fire ant could be a big problem for three main reasons:

- It is very destructive to native ecosystems in areas that it has already invaded,
- It is a serious nuisance to humans and domestic animals, and
- It has a good chance of getting to Maui. Indeed, the little fire ant may already be here.

*Scanning electron microscopy image of* Wasmannia auropunctata
*(Photo: © Dennis Kunkel Microscopy, Inc.)*

## Why we don't want the little fire ant on Maui

### Effects on native ecosystems and species

The little fire ant has invaded several areas around the world. It is a destructive, pervasive, tramp ant species that occurs in very high densities. Little fire ants have a relatively powerful sting, will defend themselves and their nests, eat a wide variety of prey, and are extremely voracious predators of "invertebrates," (animals without backbones).

The little fire ant wreaks havoc in the native ecosystems it invades. It often completely takes over an area, eliminating other ants and attacking and preying on native invertebrates, and even vertebrates such as reptiles and mammals. In the Galapagos Islands, for example, little fire ants have been reported to attack the Galapagos tortoise, a highly endangered species. The ants attack the tortoises' eyes and reproductive organs, damaging their vision and leaving them unable to reproduce. On the Pacific islands of New Caledonia, this ant has dramatically decreased populations of several animals, including geckos and lizards. The little fire ant may also sting the eyes of mammals, perhaps because they are attracted to the moisture. Mammals with eye damage believed to be caused by little fire ants include elephants and domestic cats, both in Gabon (Africa).

Little fire ants eliminate or reduce populations of invertebrates and vertebrates either directly, by preying on them, or indirectly, by outcompeting them for resources (such as food, nesting habitat, or territory). Little fire ants

tend to have severe impacts on native invertebrate communities, eliminating some species, reducing the abundance of others, and reducing invertebrate diversity overall.

There are no native ants on the Hawaiian Islands, so as ant species make it to the islands and become established, they may pose a signficant threat to our native ecosystems. Hawaiian native plants and animals have evolved over millions of years without having to defend themselves against the predatory abilities of ants like the little fire ant.

*Little fire ants sometimes congregate on plants. (Photo: Ellen VanGelder)*

## Effects on humans and domestic animals

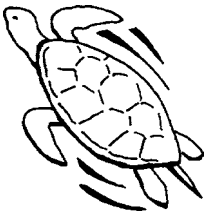
The little fire ant has painful stings, a defensive nature, and the tendency to occur in dense populations. That adds up to bad news for humans and their domestic animals. It is difficult to enjoy being outdoors in areas where they have invaded. Little fire ants sting when they are rolled on or touched, or when people or animals come into contact with the plants in which the ants are nesting or feeding. People get stung while gardening, picking fruits or flowers, or enjoying other outdoor activities. An individual ant can deliver multiple stings, and often several ants attack at once. This ant is also known to move into homes in search of food, seriously annoying inhabitants with their stings. Different people react differently to this ant. Some people feel a painful sting followed by an itch that goes away in a few minutes. With other people welts may develop on the skin where they were stung, and the itch may last for several days.

## Why the little fire ant has a good chance of getting to Maui

Like other tramp ant species, this ant often gets to new places by stowing away on goods (particularly nursery plants) that are shipped from infested areas. This species is currently "on our doorstep," having recently become established on the island of Hawai'i. The little fire ant became established in areas around Hilo by stowing away in nursery plants imported to the island from another country or possibly from Florida. Now, since nurseries on the Big Island often ship plants to neighbor islands, there is a good chance that the little fire ant could get to Maui.

In fact, the little fire ant may *already* be on Maui. It was not discovered on Hawai'i until March of 1999. However, entomologists studying the little fire ant believe the ant may have been on the Big Island for as many as five or six years before it was discovered.

When the little fire ant was discovered on Hawai'i, the Hawai'i Department of Agriculture required that all nursery plants shipped from infested areas of the Big Island be inspected for the ant before being shipped. If the ants are found, the nursery stock is either treated with insecticide before shipping or not shipped at all. But if the ants have been on the island since around 1994, there is a chance that infested nursery stock was shipped from the Big Island without anyone knowing the ants were there. It is reasonable to think that the little fire ant could have made it to Maui by now, from its neighbor island or from another location.





For this species of ant, as with many "pest" species, the key to avoiding its destructive effects on Maui is to prevent it from getting here in the first place. This is done through a series of precautions and inspections called "quarantines." The Hawai'i Department of Agriculture has instituted a little fire ant quarantine on agriculture and nursery items destined for uninfested areas of the state. However, if the ant already occurs on Maui (and right now, nobody knows if it does or not), it is very important to find it soon, before it develops large, well established populations. There is a much better chance of eradicating them or controlling their spread if we find them when populations are still small.

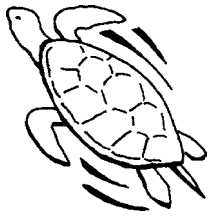
It is in the best interest of all of us to find out as soon as possible if the little fire ant has reached Maui—and if so, where it occurs. You can help find out. In this activity, you will collect ants near your school, home, or any place else you visit on the island. You will take these ants back to the classroom or laboratory to identify whether they are (or might be) *Wasmannia auropunctata*, the little fire ant.

## What you should know about the little fire ant

Before heading out into the field to survey for this species, you need to learn a little bit about the little fire ant (*Wasmannia auropunctata*). Here is a brief description:

- The little fire ant is a tiny (about 1.5 mm long) ant that is light orange in color.
- Little fire ants move very slowly compared to other ants, and with their small size it is sometimes even difficult to tell they are there — people mistake them for little specks of dirt.
- Little fire ant workers—the ants you are most likely to see and collect— are "monomorphic" (mono = one; morph = shape or type). That means they look alike. They are similar in size, shape, and color.
- This ant is both "terrestrial" (ground-dwelling) and "arboreal" (tree-dwelling), and can survive in a wide variety of habitats. They nest almost anywhere, including on the ground (under logs, sticks, rocks, or debris) and in plants or trees (under the bark or in crevices of the plant).

*Little fire ants gather on a bait stick. You'll be collecting ants in this way. (Photo: Ellen VanGelder)*





- Because the ants move very slowly, it is easy to avoid getting stung while surveying for them. In fact, little fire ants often stand relatively still, or simply fall off the bait stick when you disturb it (for example, by picking it up). Many other species, on the other hand, will frantically run up and down the stick if it is disturbed or picked up.
- As with many other "tramp" ant species, the way the little fire ant disperses naturally is via "budding." This means that the newly mated queens travel on foot to a new location within a few meters of their birth colony. This makes the spread of their populations easier to track, and it makes the populations easier to control or eradicate than species that have queens that fly.