WATCH A VIDEO
www.scholastic.com/superscience

BONUS SKILLS SHEET
www.scholastic.com/superscience

Ants at War!

Insects use chemical weapons to fight for territory in the southeastern United States

An army of small brown insects in Florida munches on a delicious grasshopper. The insects are called imported fire ants—and something is about to interrupt their tasty meal.

A second group of ants wants that grasshopper too. These ants are named tawny crazy ants for their orange-yellow color and the quick, jerky way they move. The tawny crazy ants attack!

A battle begins. The imported fire ants use their stingers to spread deadly **venom**. But the tawny crazy ants have venom too. They spray it from pores in their abdomens.

When the battle ends, the tawny crazy ants are victorious. They feast on the grasshopper.

In recent years, fights like this one have been raging across the southeastern U.S. Usually, imported fire ants win clashes with other insects. So how are tawny crazy ants defeating them? Scientists in Texas recently found an answer.

These ants, called tawny crazy ants, don't sting. But they do invade areas in huge numbers.

Moving In

Imported fire ants are originally from South America. They were accidentally brought to the U.S. aboard ships in the 1930s. Since then, they've made themselves at home all across the Southeast.

The fire ants have bugged people and animals with their painful stings. They also eat huge numbers of insects, spiders, and centipedes, which leaves birds and other animals with less food.

Tawny crazy ants also came from South America, likely on ships. They were first spotted in the U.S. in 2002. Like imported fire ants, tawny crazy ants are an **invasive species**.

The crazy ants do even more damage than the fire ants. That's partly because they invade in much greater numbers. They also push out fire ants from the areas they inhabit. Without fire ants, the crazy ants have less competition for food. They can multiply faster and eat even more.

Chemical Weapons

Scientists wondered how tawny crazy ants were conquering imported fire ants. Fire-ant venom kills most insects. How could the crazy ants survive it?

Edward LeBrun is an ecologist at the University of Texas. One day, LeBrun was watching tawny crazy ants fight imported fire ants in a field in Texas. That's when he noticed something strange. After being smeared

words to know

venom—a poison produced by an animal and delivered to another animal, often by biting or stinging

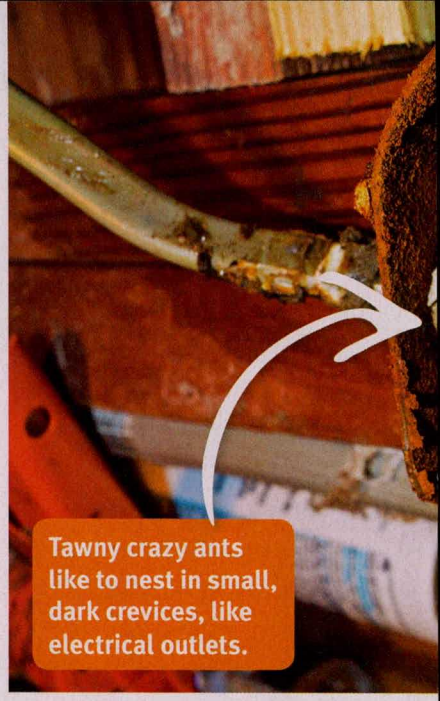
invasive species—organism that is not native to an area and can harm native organisms

acid—a substance that tastes sour and tends to eat away at other substances

chemical reaction—a change that produces new substances with different properties than the original substances had

pesticide—a substance used to kill pests

Tawny crazy ants can hitch rides on garbage bags, cars, or even people's clothing.



Tawny crazy ants like to nest in small, dark crevices, like electrical outlets.

with fire-ant venom, the crazy ants retreated. Then they coated their bodies with their own venom before returning to the fight.

LeBrun wondered if the crazy ants were using their venom as a defense. "I thought, 'Wow, can they counteract fire-ant venom?'"

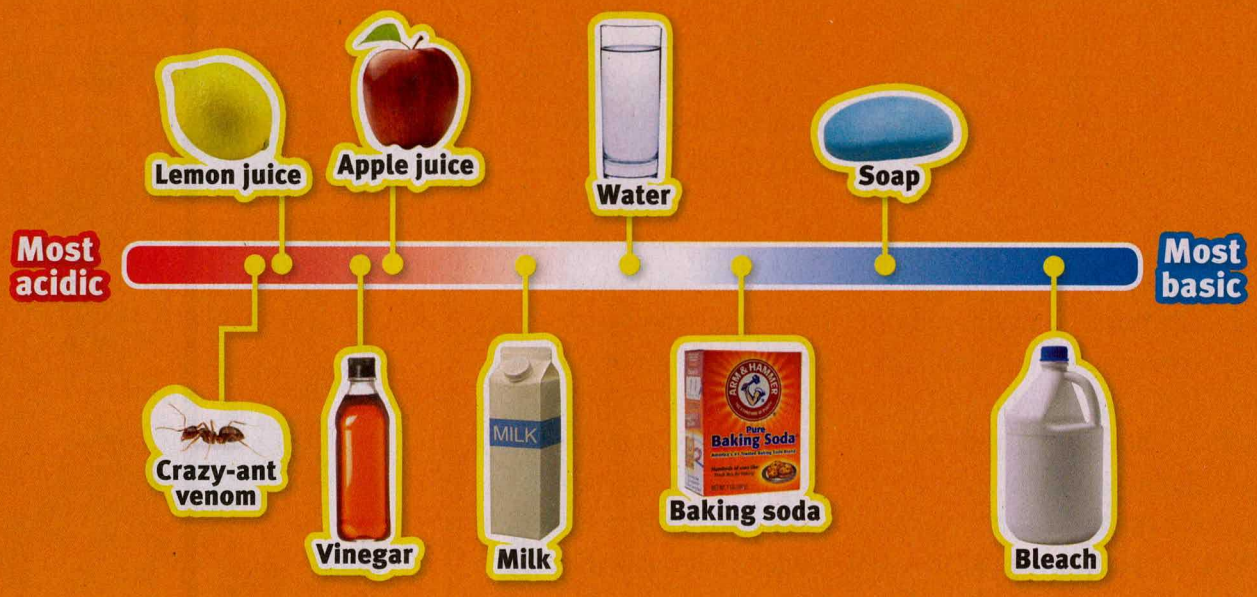
LeBrun knew that crazy-ant venom contains a type of **acid**. When acids combine with other substances, **chemical reactions** can occur. LeBrun suspected that the acid in crazy-ant venom might react with fire-ant venom to make it less deadly.

So LeBrun set up an experiment. He pitted pairs of imported fire ants and tawny crazy ants against each other in his lab. He allowed some of the crazy ants to use their venom. But he used nail polish to block the pores of other crazy ants so they couldn't use their venom.

Once a crazy ant was hit with fire-ant venom, LeBrun removed it from the fight and watched what happened. Almost all of the crazy ants that were able to spread their own venom on their bodies survived. But most of the ants with blocked venom pores died. That meant that the crazy ants'

Acidic Ants

Tawny crazy ants' venom contains a type of acid. Acids and their counterparts, **bases**, react easily with other substances. The more acidic or basic something is, the more strongly it reacts. In the scale below, acids are on the left, and bases are on the right. Water is **neutral**—neither an acid nor a base.



venom really was protecting them from fire-ant poison.

Ant Invasion

The crazy ants' chemical defense has helped them take over areas once dominated by fire ants. Unfortunately, the crazy ants have proved even more irritating to people than fire ants.

"Fire ants stay in your yard," says LeBrun. But crazy ants like to make nests in people's houses. And a few ants can quickly breed to become millions or even billions.

Once tawny crazy ants move in, it's very hard to get rid of them. They aren't interested in the bait used for most **pesticides**, so ant traps have little effect on them.

People were once happy that another insect was replacing fire ants, but not anymore, says LeBrun. "They want their fire ants back."

—Maggie Mead

Acid Contest

hands-on science

Which acid is strongest?

Observe: Tawny crazy ants use acid to fight. Many liquids, such as lemon and apple juice, are acids. When an acid combines with a base, a **chemical reaction** occurs. Certain chemical reactions create gas.

Ask a Research Question: How could you determine the strength of different acids by using a base?

Form a Hypothesis Based on This Question: How does the strength of an acid affect its reaction with a base?

Materials: measuring spoons • three 7-ounce plastic cups • baking soda • lemon juice • white vinegar • apple juice • ruler • pencil and paper

Procedure:

1. Carefully add 1/4 teaspoon of baking soda to each plastic cup. Baking soda is a base.

2. Apple juice, lemon juice, and vinegar are acids. Use the chart on page 12 to predict which acid will have the strongest reaction when you combine it with the baking soda. Write down your prediction.

3. Measure out one tablespoon of apple juice. Hold the ruler up next to one of the cups of baking soda. Then pour the juice into the cup.

4. Observe any changes in the cup. If there are bubbles, use the ruler to measure how high they rise. Record your observations in a table.

5. Repeat steps 3 and 4 with the remaining liquids and the other two cups.

Results: What happened when you combined each acid with the base?

Conclusions:

1. Did a chemical reaction occur when you combined the acids with the base? How did you know?

2. Which liquid had the strongest reaction with baking soda? Which had the weakest?

3. What might happen if you were to combine baking soda with an acid even stronger than the acids you tested?