

NATURE'S LABORATORY

"At high tide the fish eat ants; at low tide the ants eat fish."

--Thai Proverb

Anyone who has been out picnicking knows that sooner or later, an invasion of ants is inevitable. The telltale file of miniature black soldiers threading their way toward your potato salad marks the end of your lunch and the beginning of theirs. Even though ants are considered nuisance species, they play an important role in nature, both in helping to break down organic matter and as food for animals higher in the food chain.

Ants might all look alike from our lofty vantage point, but if you get down on all fours and inspect enough individuals with a magnifying glass, you'll notice there are a number of different species. Species common to California include odorous house ants, which actually emit a pungent smell; pavement ants, which often take up residence in the nests of larger ants; and carpenter ants, one of the larger ants which prefer to nest in tree stumps or logs.

Another common species is the Argentine ant, an invasive species that hitched a ride to the United States aboard a coffee shipment from South America to New Orleans in 1891. Their success in displacing native ant species is linked to their numerical superiority, their ability to out-compete natives for resources, and the curious fact that there is no aggression between Argentine ant colonies. Instead, individual colonies act in concert as "supercolonies" of nests from which they can recruit foragers or aggressively attack and overwhelm neighboring native ant colonies.

Ants are social insects, living in colonies divided into three distinct castes – queens, males and workers. They build colonies or nests made of mazes of tunnels and galleries in wood or beneath the ground. Colonies can be as large as 300,000 to 500,000 individuals.

Hands On: To learn about how ants forage, try these experiments in the backyard. From the kitchen, you'll need to gather two soda bottle-caps, 2-3 cookies, some candy sprinkles, coconut shavings, and some concentrated sugar water.

First, locate an ant colony. Follow a scout ant until she returns to her nest, usually nothing more than a hole in the ground. At two points equidistant from the nest entrance (about two feet each), hollow out a shallow depression and place in each a bottle cap top-

downward so that the lip of the cap is at ground level. Try to set up the caps so that there are no, or an equal number of, obstacles between them and the nest.

For the first experiment, place a heap of fine cookie crumbs in each cap. Wait and watch. Scouts in search of food wander randomly until they find a cache. In time, a scout will stumble across one of the caps. When she finds the crumbs, she'll pick one up and return to the nest, trailing behind her an invisible pheromone, or chemical, trail for other ants to follow. As soon as she reaches the nest, or when another ant runs across her trail, ants will begin to follow the pheromones to the food source. This is called recruitment.

Within minutes, hundreds of ants will be streaming along the original scout's path, or trunk trail, carrying food back to the nest. When another scout finds the second cap, a second recruitment will happen, and the ant colony should soon balance their foraging efforts so that an equal number of ants visit each cap.

Now it's time to see how ants forage cost-effectively. For the same reason you don't repeatedly visit the grocery store over and over for every item on a grocery list, ants need to make sure their time spent foraging is spent wisely. Once there is a steady stream of ants visiting each cap, quickly remove one cap and replace it's contents with big cookie crumbs. Watch as the ants now try to handle this bigger food item. Where before each ant could carry the tiny crumbs, now two or three ants have to work together to break up and carry each big crumb. Since it is more involved to visit the big crumbs, the stream of ants visiting that cap should taper, while those visiting the fine crumbs should redouble.

Since ants seem to want to forage in the easiest and most cost-effective fashion, you can experiment with different food types to see what they prefer. Try different combinations of coconut shavings, cookies, and candy sprinkles in different sizes, or even at different distances from the nest. Or, try different concentrations of sugar water.

Once you've determined what food types and sizes the ants prefer, relocate a cap of the preferred food to a site twice as far away from the nest as the less-preferred food. How much farther will the ants forage for their favorite food, even when a less desirable food is right next door?

Don't stop there – lay obstacles, hide the foods, try altogether different foods, or run your finger across the trunk trail to disrupt the guiding pheromones. Place a marker alongside each trunk trail and count how many ants return with food in one minute. See what else you can learn about ants, or what the ants can teach you! Be creative, the possibilities are endless.

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