



Unit 4 Lesson 4: Six Bugs You'll Learn to Love

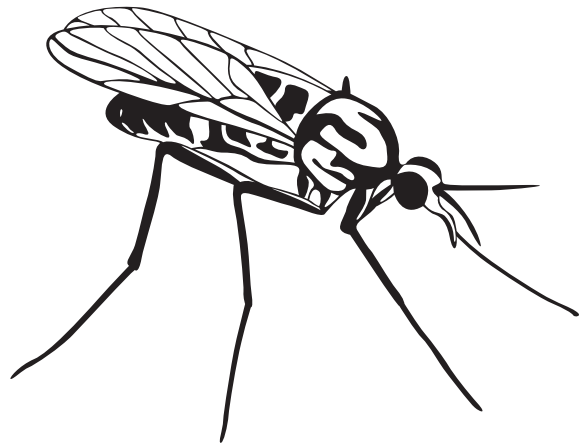
Handout 2

Mosquitoes

The tropical disease malaria is still a major health problem worldwide. It is extremely deadly if not properly treated and still kills nearly 3 million people each year, mostly in Africa.

Malaria can only be transferred by mosquitoes, perhaps the world's least popular insect. When females bite an infected person, parasites infect the mosquito, and then it infects the next person it bites.

Currently there is no vaccine, and tactics to fight malaria range from insecticides to drug treatments to simple mosquito netting. One day, mosquitoes may help combat the very disease they spread. Scientists are studying ways to genetically modify them so it's more difficult for the disease to grow in their digestive systems. The altered mosquitoes could be released into the wild to make and produce offspring less effective at carrying malaria.



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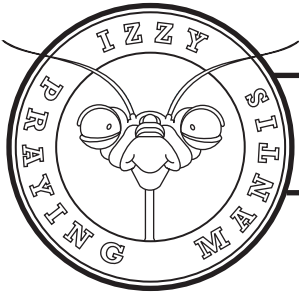
Honey Bees

Landmines are inexpensive weapons, according to the United Nations' Mine Action Service, but their cost to the world community is much higher. As many as 20,000 people a year are killed or injured by landmines, estimates the International Campaign to Ban Landmines. Mines can turn roads, farms, and other land into useless space. They frequently remain active decades after wars and other conflicts end. The United Nations estimates there are more than 100 million active mines, and new mines are buried more quickly than old ones are safely unearthed.

That's where honey bees come in. Although honey bees don't have noses, they do have a strong sense of smell. In fact, their sniffing ability appears to be even stronger than that of dogs! With the support of the Defense Department, which has funded a project to study potential uses for creatures such as lobsters and geckos, researchers have trained honey bees to associate the smell of TNT - short for trinitrotoluene, a highly explosive material - with food. By mixing traces of TNT by-products with sugar water, researchers have trained bees to seek and find explosives. Scientists then track the bees' flight. If they bring traces of TNT back to the hive, there's a good chance a landmine is nearby. The research is still in its early stages, but it could lead to honey bees being used to search for other compounds as well.



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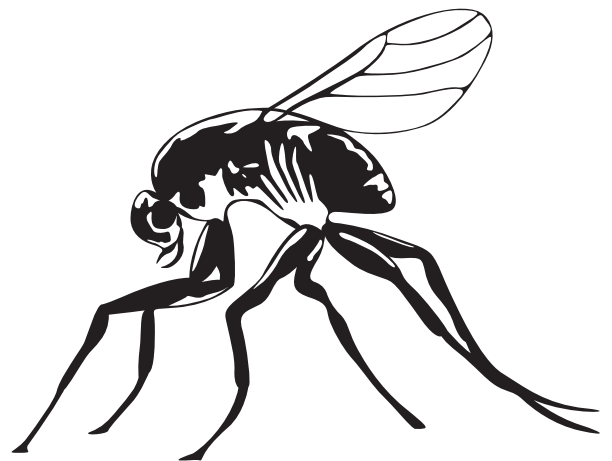
Phorid Flies

There are approximately 3,000 species of phorid - or humpbacked - flies, which scavenge for decaying plant and animal matter. The tiny bugs generally are considered pests, but they are actually doing their part to get rid of an even more dangerous insect, the fire ant.

The United States Department of Agriculture says fire ants, accidentally imported from South America in 1918, infest more than 300 million acres in 14 Southern and Western states and Puerto Rico. They have recently even been discovered in the state of Maine. Fire ants force farmers to use pesticides or risk attacks on livestock and wildlife as well as damages to farm and electrical equipment. They also sting humans, leaving behind clumps of painful red welts that can take two weeks to heal. South American fire ants have flourished in the United States without their natural predators, phorid flies.

These “ant-decapitating flies” are now being released in Florida and Texas, sending fire ants on the run. That’s nothing, however, compared with what happens when the flies catch them.

Phorid flies hover over the ants and in a split second—faster than you can watch, swoop down, briefly land on the ant, jab an egg into the ant’s head, and take off again. Phorid fly larvae use the ant head for food before emerging as adult flies from their dead host to find further victims. The head sometimes falls off even before the rest of the body dies.



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Jewel Beetles

Jewel beetles behave as though they are a kind of heat-seeking missile. When they detect a forest fire, they flock to the scene, because the females of the species like to lay their eggs in burned tree bark. The beetles find their targets by using two tricks: sensing the smoke that forest fires create, and sensing the heat they generate. Jewel beetles, which can detect chemicals found in smoke rising 50 miles away, have infrared sensors finely tuned to detect the heat given off by forest fires.

Scientists and the United States Department of Defense are interested in these natural heat-seeking sensors. Modern infrared detection systems, used mostly by the military, require powerful cooling systems that can make them expensive, complicated, and difficult to produce. Jewel beetles, however, don't require such systems, so the military hopes it can learn from the efficient way in which the insects sense infrared radiation, eventually creating man-made infrared sensors that are smaller, lighter, simpler, and easier to maintain.



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Cathedral Termites

There are 10 times more species of insects than plants worldwide. Since the dawn of time, humans have relied on the plant kingdom as a medical resource, from ancient herbal remedies to drugs discovered using modern techniques. Insects, however, have hardly been looked at in terms of their ability to provide us with medicine. Research has already turned up some promising leads, particularly from a type of insect better known for its appetite for destruction. The so-called cathedral termite isn't the kind that lives in and devours the wood in your home. Instead, this type of termite houses its colonies in enormous mounds that can be more than 23 feet high.

The body of the cathedral termite carries compounds that have shown the ability to kill infectious bacteria. These chemicals are part of a defensive secretion carried by the "soldiers" of the colony, who squirt it out of nozzles on their heads. Scientists hope that one day this finding can help produce antibacterial drugs. This capability is becoming increasingly necessary due to the large numbers of people who overuse antibiotics to the point that many are no longer effective.



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Stoneflies

Drinking water in the United States is not only plentiful but is among the safest in the world, according to the United States Environmental Protection Agency (EPA). However, we still have to monitor the quality of our water supply, especially given the diversity of the sources—including lakes, rivers, reservoirs, and wells—from which Americans get their daily supply.

For example, a healthy stream, according to the Water Environment Foundation, is a vibrant community in which moss, bacteria, and algae are food for the insects that are, in turn, food for fish. When pollution changes a stream's water quality, the organisms that depend on it for life can suffer—or die off.

Collecting insects from a pond or stream can show researchers how much pollution exists in the water and can be a useful indicator of the increase in pollution over time. Stoneflies, which are particularly sensitive to pollution, now are helping humans test water supplies. These long-antennaed, two-tailed bugs are a favorite food of coldwater fish such as trout, and the EPA considers the insects a leading indicator of a stream's oxygen supply. Researchers can track changes in the bug's populations. If they continue to dwindle (or disappear) over the course of several checks, they can clue us in not only to the presence of water pollution, but also to how quickly the quality of a given stream has degraded.



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