

Guided Research

Natural Selection Today

The battle is on against bedbugs—those nasty little critters that invade your home and can give you painful, itchy bites. These pests were nearly vanquished from Earth in the 1940s by the use of the pesticide DDT, but now they are back. And those that survived the onslaught of DDT have developed a resistance to pesticides.

The DNA of bedbugs tells an interesting story about change and adaptations for survival. At one time, bedbugs fed on bats as much as they fed on humans. Although bats and humans live completely different lifestyles, that was not always the case.

Bedbugs started out as cave dwellers, feeding on bats. Early humans made homes in caves and became a new food source for the bedbugs. But technology changed everything, and soon humans were building houses. Humans also sleep at night, and bats nod off during the day. So, bedbugs that fed on bats and bedbugs that fed on humans began to diversify.

The bats that followed humans from caves to houses had to change their sleep schedule. Even as bats began to move into barns and bat houses, they brought their own brand of bedbug with them, and evidence suggests that the populations of bedbugs never mixed.

Evidence further suggests that the two groups continue to diverge. For example, the bedbugs that maintained their feeding relationship with humans now carry a genetic variation that makes them resistant to pesticides. This is not the case for the bat-feeding bedbugs.

Researchers are now studying bedbugs to learn how they develop resistance to pesticides. Several genes have been identified that may be related to this phenomenon. Many of these genes give rise to proteins in the insect's exoskeleton. This makes sense, because bedbugs are exposed to pesticides through contact with their exoskeleton.

For now, humans will have to rely on bedbug-sniffing dogs and a variety of pesticides, many of which lose their effectiveness as these pests continue to adapt by developing resistances to them.

FIGURE 22: Bedbugs show evidence of recent evolution. New traits include a thick, waxy exoskeleton that repels pesticides and a more efficient process for making its natural chemical defenses.



Language Arts Connection

Research another species whose evolution interests scientists. Gather evidence to explain how this species' traits have changed, why these traits are beneficial, and how this species might continue to change in the future. Be sure to cite specific textual evidence to support your claims. Finally, present your findings in the form of an essay, slideshow, or poster. Include a list of sources in the format specified by your instructor.

Evidence is anything that helps in forming a conclusion or judgment. When drawing evidence from informational texts, ask yourself these questions:

- Are the facts verifiable—that is, can they be proven true?
- Are the opinions from an expert or experts on the topic?
- Is the evidence relevant to the topic?
- Is there enough evidence to answer all reasonable questions?

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