

# Beetles are coming to eat all our trees: Their eyes may be the key to stopping them

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Credit: Brigham Young University

The Emerald Ash Borer is eating its way across America. Next stop? Utah.

This iridescent jewel beetle, responsible for the death of more than 50 million ash trees in the United States, has blazed an absolute path of destruction west since its discovery in Michigan in 2002. ([See the map here.](#))

Recently the pest has been detected in neighboring Colorado, and just this spring it was confirmed in Nebraska and Texas. Researchers at BYU

have been doing more than just watching the migration patterns—they've been studying the creature in hopes of helping to slow it.

"So far there is no way to control them," said Nathan Lord, a BYU postdoc working under biology professor Seth Bybee. "Many jewel beetles are pest species, causing millions of dollars of damage to trees and crops yearly. The Emerald Ash borer is one of them and they've killed most of the ash trees in the east."

In an attempt to stop these beetles from spreading, other scientists began to note that the Emerald Ash Borer was specifically drawn to purple traps more than the typical black or green traps. In furthering this research, Lord wanted to know why this beetle was drawn to purple and what the beetle could actually see.

Lord, Bybee, and chemistry professor Barry Willardson used a Next-Generation sequencing approach to sequence all the genes expressed in the eye of several jewel beetle species. They revealed molecular complexity in the proteins underlying jewel beetle color vision, suggesting these colorful beetles have found a work-around for the loss of blue receptivity.

"Beetles do not technically have the machinery to see 'blue' in the way that most other organisms do," Lord said. "To get around this, the jewel beetles probably evolved separate copies of their UV and green opsin genes, modified those copies to make them sensitive to blue light and, voila! A modified sensitivity in a different way."

So how does Lord and Bybee's research help with the quick moving beetle migration? Because the Emerald Ash Borer relies on color vision to find mates and trees to live in. Lord's research is pinpointing the diversity of proteins underlying their [color vision](#), what jewel beetles are

using as visual signals and how they are using them. As a result, opsins could potentially be shut down and the jewel beetles would then not be able to find their home or mate.

Bybee said discovering an animal that has duplicated the UV opsin gene is an exceptional element of this research, which appears in academic journal *BMC Evolutionary Biology*.

"This appears to be a rare event among animals and we're excited to investigate it further among [jewel beetles](#) and across all beetles to see if we can figure out how novel this type of duplication really is," Bybee said. "There is a lot of work still to be done.

**More information:** Nathan P. Lord et al. A cure for the blues: opsin duplication and subfunctionalization for short-wavelength sensitivity in jewel beetles (Coleoptera: Buprestidae), *BMC Evolutionary Biology* (2016). [DOI: 10.1186/s12862-016-0674-4](https://doi.org/10.1186/s12862-016-0674-4)

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