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Prehistoric Beetles Sported Hotrod Colors

Many beetle fossils have color, but they are a far cry from the flashy shades these insects once wore.

By Jennifer Viegas
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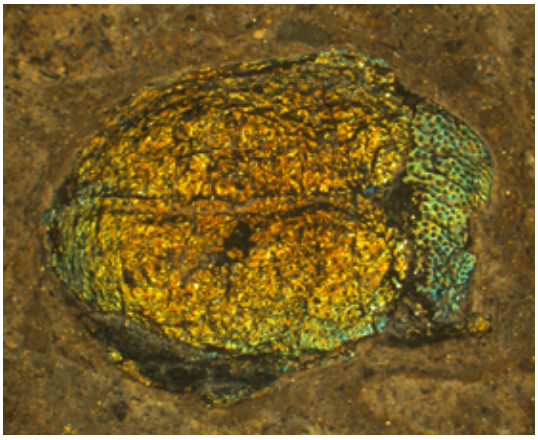
THE GIST

- Scientists were able to reconstruct the original colors of prehistoric insects.
- It's now known that prehistoric beetles sported vivid, metallic hues.
- Color can leave behind structural and chemical evidence in fossils, permitting the reconstructions.



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The original color of this 47-million-year-old beetle was reconstructed using microscopic details preserved in the cuticle. Click to enlarge this image.
Maria McNamara

Fossils tend to offer a black and white view of the past, but new research on prehistoric beetles brings the insects' flashy metallic colors back to vivid life.

The findings, published in the journal *Proceedings of the Royal Society B*, add to the growing body of evidence that non-avian dinosaurs, Dino Era birds, prehistoric fish, early insects, and more were literally very colorful creatures.

The colors within fossils may not always be visible to the naked eye. Researchers, however, are now able to reveal the long-lost hues by studying the structural and chemical bases of the individual's original color. Many beetle fossils do exhibit colors, but they are a far cry from the hotrod shades these insects once sported.

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"Our results show that the colors of the fossil beetles we studied changed during the fossilization process," lead author Maria McNamara told Discovery News.

"In particular, the colors have been shifted towards the red end of the spectrum -- not completely, but enough to make, for example, a formerly blue beetle more green, and a formerly yellow beetle more orange," added McNamara, a postdoctoral research fellow in the Department of Geology and Geophysics at Yale University.

She and her colleagues made the determination after studying fossil beetle specimens dating from 15 to 47 million years ago. The beetles once lived in what are now Idaho (U.S.), Germany, and other locations.

The beetles' flashy yellow, green, blue, red, and other metallic car-like hues were due to structural color, meaning color that results from interference of light. The ocean is blue, for example, because water absorbs colors in the red part of the light spectrum, leaving behind blue.

The fossil beetles achieved their light manipulation, not with water, but with "very fine layers, millionths of a meter, in the outermost levels of the beetle cuticle," McNamara explained.

Such color depends on two variables: the structure itself and the refractive index of the beetle's cuticle, meaning how much light is bent, or slowed, as it passes through a material.

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Extremely high magnification of the beetle remains showed that the structure of the beetles' cuticles did not change during fossilization, so the color changes were instead due to changes in the cuticles' refractive index.

"These findings will allow the former presence, and original hue, of metallic structural colors to be identified in diverse fossil insects, thus providing critical evidence of the evolution of structural color in this group," the researchers concluded.

Gengo Tanaka, a researcher at Japan's Gunma Museum of Natural History, has also studied color in fossilized beetles and believes that McNamara and her team "broke a milestone in paleontology" given the future possibility of recreating past structural colors in now-extinct species.

Andrew Parker, a research leader at both Oxford University's Green Templeton College and The Natural History Museum, London, is another leading expert on color in the prehistoric world.

"I am very keen to see studies that add details of color and vision to the geological time scale" Parker told Discovery News. "This informs us that the myriad interactions involving color that we see today -- the arms race between predators and prey, and the signaling to a potential mate within conspecifics -- extend back through time."

The big question, though, is how far back can this scenario extend. In other words, when did the world become such a colorful place?

"The answer is to the origin of eyes in a fast moving predator that can have a major influence on the dynamics of an entire ecosystem" Parker answered. "That appears to be about 520 million years ago, with the new visually-guided predator probably triggering the Cambrian explosion."

He added, "After that, other innovations would have impacted the visual arms race, such as the evolution of flight in both predators and prey, so it is important to fill in as many gaps in the timeline of color and vision as possible. At this stage, we have mainly gaps!"

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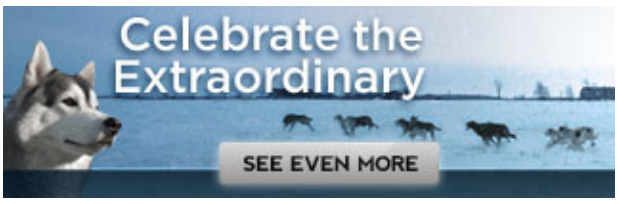

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