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## Moth's True Colors Shine After 47 Million Years

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By [Brandon Keim](#)

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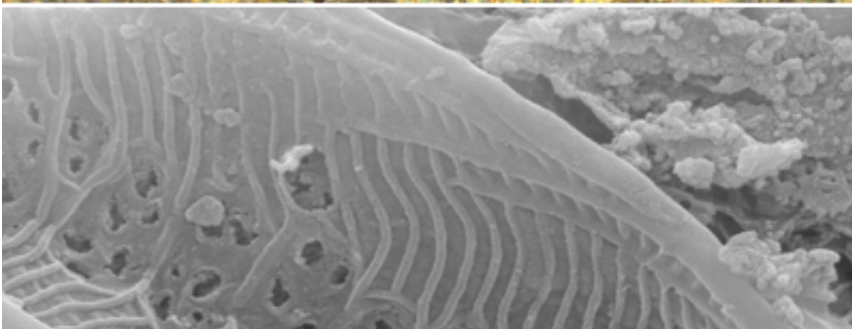
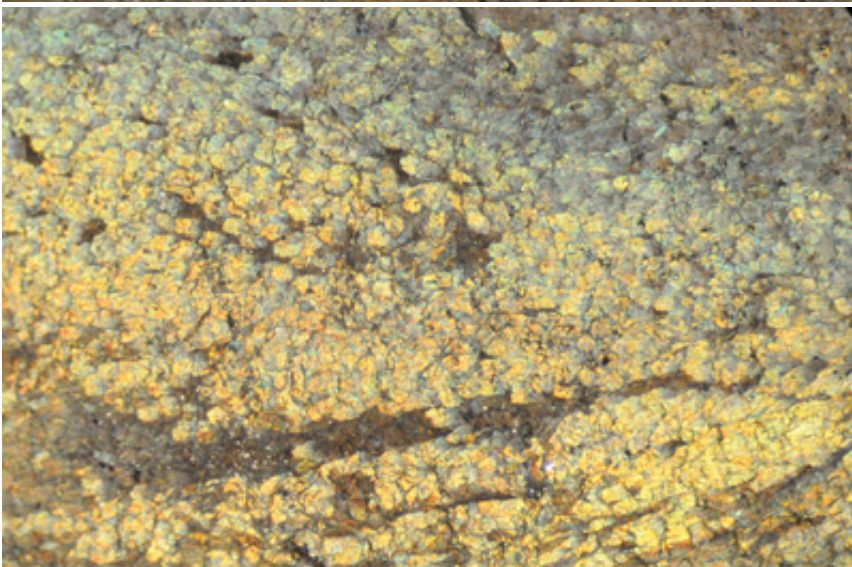
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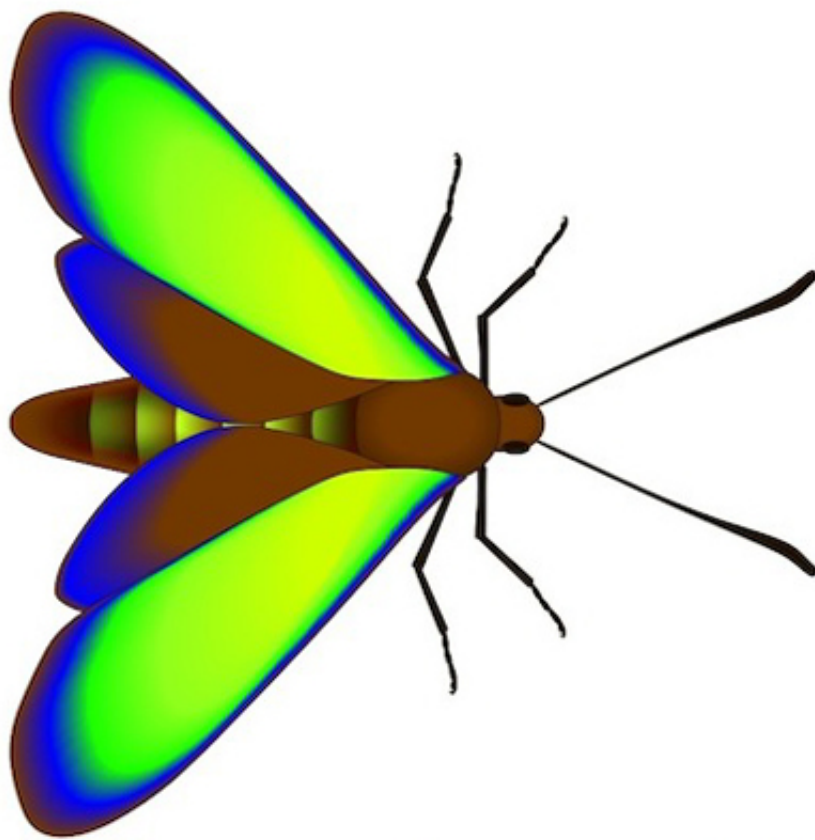
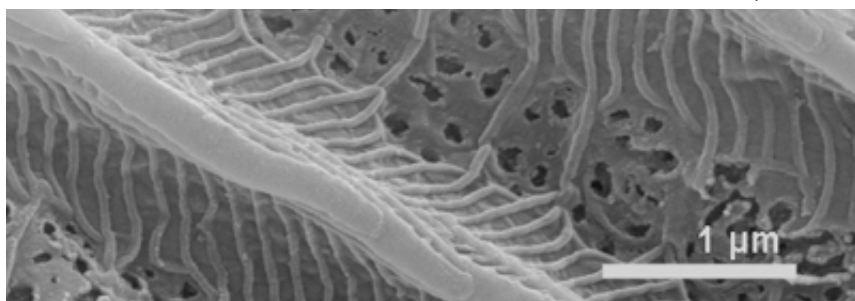
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Top to bottom: A detail of the moth wing; electron microscope analysis; and a computer rendering of the moth's true color. Images: McNamara et al./PLoS Biology

In this exquisitely preserved fossil moth is a glimpse of life's colors almost as they appeared 47 million years ago.

"Until now, we had no idea what colors ancient moths and butterflies had," said Yale University paleogeologist Maria McNamara.

The fossils' time-machined hues exist because moths and butterfly wings have what's known as [structural color](#). Rather than pigments, structural colors are created by light-warping nanoscale surface features; if fossilization occurs delicately enough, and the intervening eons are gentle, those structures can be reproduced and preserved indefinitely.

In one recent study, McNamara looked at [the colors of ancient beetle fossils](#). But compared to the moth fossil, which she analyzed in a Nov. 15 *Public Library of Science Biology* paper, colorful ancient beetles are common. "There are loads of beetle fossils with some evidence of color, but this had never been found for a lepidopteran at all," she said.

McNamara's team used an electron microscope to photograph the moth fossil's wing surface. Based on what's known from similar structures in living moths and butterflies, the fossil should appear yellow-green rather than slightly yellow-blue, a difference likely caused by subtle structural changes during fossilization.

The moth is believed to be an extinct ancestor of modern-day [forester moths](#), which possess a bright coloration that warns predators of their poisonous nature. The researchers suspect this

moth was poisonous, too.

Image: McNamara et al./PLoS Biology

Citation: "Fossilized Biophotonic Nanostructures Reveal the Original Colors of 47-Million-Year-Old Moths." By Maria E. McNamara, Derek E. G. Briggs, Patrick J. Orr, Sonja Wedmann, Heeso Noh, Hui Cao. PLoS Biology, Nov. 15, 2011.

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[Brandon](#) is a Wired Science reporter and freelance journalist. Based in Brooklyn, New York and sometimes Bangor, Maine, he's fascinated with science, culture, history and nature.

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**MyowintwintMaung Maung**

These moths sexes and human sexes evolutions are very interesting..Like those poison snakes in California get evolutions with their nature..

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**Storm Red**

I personally find it quite interesting that such a dull and boring creature that exists today, evolved from that exquisitely colored moth of ancient times. It is also quite strange that in a sense the moth has almost gone through reverse evolution, I say this because it went from being a wide range of colorful...well colors, to a dull brown moth. Now of course I understand that it's the idea of survival of the fittest, this being the moth's camouflage created by the brown and gray patterns, and its ability to help the moth hide from predators.

11/15/2011 08:38 PM 1 Like

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**Chris Mallory**

It appears that you may have a misunderstanding; there is not just one species of moth, there are hundreds of thousands of species, and many of them are incredibly bright and colorful. You may only be familiar with the drab species you find from time to time in your kitchen, but thousands of species rival butterflies in their vividness.

11/15/2011 11:14 PM in reply to Storm Red 9 Likes

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**Warrior\_For\_God**

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