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Fossil beetles show true colours

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At their brilliant best, the colours of beetles can make the insects look like they are made of some precious metal.

But when these beetles die and become fossilised, how much of that iridescent beauty is preserved?

It is a question that has been puzzling Dr Maria McNamara from Yale University.

Her microscopic **study of ancient beetles has shown** how any retained colours will be subtly altered. Blues in life will become greens in death, it seems.

It is a fascinating observation because it means scientists can say with greater confidence what a creature really looked like millions of years ago.

And that colour information could be very revealing about the way a particular beetle lived its life.

"These kinds of colours have lots of visual functions," explained Dr McNamara, who is also affiliated with University College Dublin.

"They might function in communication, for example, or in thermo-regulation. And so it's important to be able to reconstruct them properly so that we can say what those organisms were using the colours for in the first place," she told BBC News.

The spectacular colours we see in many beetles are the result of the way light interacts with the very fine layers of material that make up their cuticle, or exoskeleton.

Fabulously small structures in this chitin material will bend and reflect light to enhance particular wavelengths.

Dr McNamara and her colleagues examined the cuticles of a variety of fossil beetles ranging in age from 15 to 47 million years old.

The team used powerful analytical tools such as electron microscopes to determine how the light-controlling properties in these ancient remains had been affected by the process of fossil preservation, in which the atoms and molecules of tissues can be removed or replaced.

What the group found was that the structures were still present but that their chemistry, not unexpectedly, had been changed.

And the consequence of this chemistry alteration was to "redshift" colours to longer wavelengths. A live violet-coloured beetle would look blue when fossilised; a blue one would take on a green hue after being buried in the ground for millions of years, and so on.

"What actually happens is - the refractive index of the cuticle changes," explained Dr McNamara.

"This is a measure of how much the light is bent. This means the chemistry must have changed because the refractive index in a material will depend on what it's made from."

The researcher cautions that the degree of redshifting differed slightly from specimen to specimen, and that the beetles her team studied all came from similar lake sediments. Other types of sediment might show different results, she added.

The **study is reported in the Royal Society's Proceedings B journal**.

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