

A new view of fossils: The behavior of ancient life forms

June 15 2010



Millions of years ago a millipede dying in amber clutches and curls around her newly-hatched young in a protective pose, illustrating the types of behavior that can be studied in ancient life forms. (Photo courtesy of Oregon State University)

A new book by researchers at Oregon State University uses the snapshot-in-time miracle of amber to offer a pioneering viewpoint on all types of animal and plant fossils - not just what ancient life forms looked like, but how they functioned and behaved, especially at the moment of death.

All kinds of behavior, ranging from the nurturing protection of a mother, mating and reproductive instincts, to the behavior of pathogenic microbes can be observed in extinct life that's millions of years old, and was captured in oozing tree sap that later turned into the semi-precious stone amber. Other fossils besides amber, including those preserved in [sedimentary rock](#) deposits, were also used in the compilation.

The range of evidence, the researchers said, suggests a different view of evolution - that most behavior appears to be retained, and when it doesn't serve the long-term survival of the species, extinction occurs.

"What we're really seeing in these looks back in time is that the behavior makes the organism," said George Poinar, a zoologist at OSU and one of the world's leading experts in the study of life forms found in amber.

"Through fossils we can trace behaviors back many millions of years, and it appears they tend to persist, that primeval forms of behavior never really change," Poinar said. "Species may evolve physically, but [behavioral changes](#) are much less obvious and many species will go extinct because they cannot change the way they act."

The book, "Fossil Behavior Compendium," was written by Poinar and Arthur Boucot, a distinguished professor emeritus of [zoology](#) at OSU and expert on evolution, paleobiology and behavior of ancient life forms. Published by CRC Press, it is written for a general audience.

In one amber [fossil](#), a 100-million-year-old gecko shows the same sophisticated method of toe adhesion that allows it to walk easily on vertical and even inverted surfaces - a capability that served it well when it was skittering away from dinosaurs then, or is skipping through the jungles of Southeast Asia today.

The researchers track numerous types of behaviors and capabilities, from parasites that cause disease, to insects that use camouflage for defense and bugs that quickly lay eggs just before dying in amber.

Although not preserved in amber, they also consider human behavior, and observe that "from what we know of basic human behaviors, it is clear there has been no significant change since the beginnings of recorded history." This is found in sexual behavior and other instincts,

including aggression. From records of Neanderthal skull injuries presumably caused by their companions, the book notes evidence that "violence using weapons by hominids against members of their own species is hard wired."

Poinar also noted that a current illustration of the power of behavior may be provided soon in the Gulf of Mexico. Marine turtles will come into the Gulf to deposit their eggs on traditional beaches, even though they can detect oil in the water and there's a risk of at least localized extinction of some populations.

"There is much more to be learned from the study of fossils than just their structure," Poinar said. "Looked at in a new way, we can learn about the behavioral patterns of extinct organisms, often relate them to those of species still alive today, and provide a very different dimension to our study of the past."

Provided by Oregon State University

Citation: A new view of fossils: The behavior of ancient life forms (2010, June 15) retrieved 23 April 2024 from <https://phys.org/news/2010-06-view-fossils-behavior-ancient-life.html>

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