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‘Remnants of Ancient Life’ Review: The Microscopic Past

To follow scientists on the trail of fresh discoveries about the prehistoric world and the origin of life, think very, very small.

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By David P. Barash

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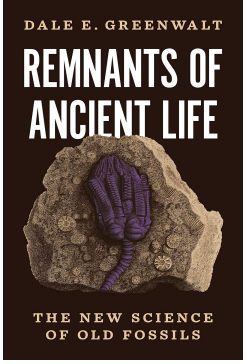
For most of us, the word “fossil” conjures up old bones, dinosaurs and museums. Dale E. Greenwalt’s “Remnants of Ancient Life: The New Science of Old Fossils” offers a fascinating corrective. Mr. Greenwalt, a researcher at the Smithsonian Institution’s National Museum of Natural History, is no stranger to dinosaurs and their ilk, but his focus is on prehistoric insects and the biochemistry of ancient life forms. It is the latter research—the burgeoning study of ancient biomolecules—that is the most exciting “new science” highlighted in the book’s subtitle.

Remnants of Ancient Life: The New Science of Old Fossils

By Dale E. Greenwalt

Princeton

288 pages



Fans of the film “Jurassic Park” will remember the role of a fossilized blood-engorged mosquito in re-creating that movie’s saurian stars. That was fiction, but a similarly preserved mosquito, analyzed by Mr. Greenwalt, became “fleetingly famous—at least as famous as a fossil insect can be in our dinosaur-centric world.” Fossil DNA is now increasingly studied, along with ancient proteins, crucial pigments and other biomolecules. The result has been nothing less than a revolution in paleontology, a whole new arena of study and insight, added to the long-used research tool of comparative anatomy. “Remnants of Ancient Life” is an eye-opening guide to this new world of understanding, one that encompasses chemistry along with biology.

At present, the oldest genome samples we have go back almost two million years, while the oldest protein sequences dated thus far stretch back nearly four million. Although the prospects are dim of decoding biomolecular details of nucleic acids from really deep time (measured in the hundreds of millions of years), all sorts of antediluvian molecules are coming into view, including but not limited to plant cellulose, arthropod chitin (from their exoskeletons), mammal keratin (bones and hair) and ancient animal pigments (feathers and skin). From these and other biomolecules, scientific sleuthing has been deducing a world of information. Mr. Greenwalt assures us that “by the time you finish this book, you will never think of a fossil in the same old way again.” How true!

Unlike familiar fossils in which rock has replaced organic material, or where living things have left impressions in mud, it is now possible to examine molecules as they functioned in situ. Accordingly, there’s a lot of chemistry here—then again, there’s a lot of chemistry in life, ancient no less than modern. And the research horizons are wide: Martian rovers are even now hunting for biomolecules in the surface soil, in an attempt to reveal clues to the presence of life on the Red Planet. And the identification of prehistoric diseases which, as Mr. Greenwalt points out, once was a favorite activity of pathologists with time on their hands, is now an active field of research, thanks to the availability of primordial biomolecules indicating microbial pathogens.

“Remnants of Ancient Life” is written largely in the first person, taking us to the author’s primary field site in northwest Montana, where rockslides, twisted ankles and dicey stream crossings make for some 21st-century adventure. Among the notable insights provided by these current exploits are how biomarkers identified in long-gone microbes provide what is essentially a time-lapse thermometer