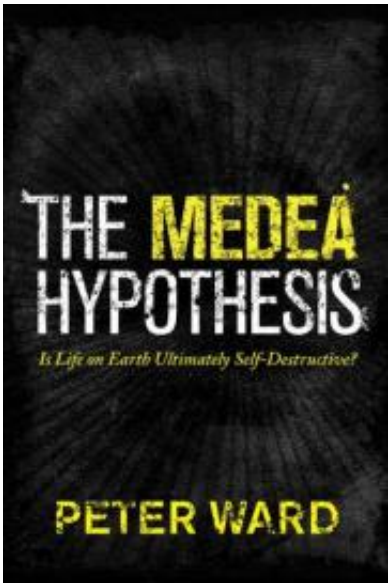
New book suggests Earth perhaps not such a benevolent mother after all

May 20 2009, by Vince Stricherz



The cover of "The Medea Hypothesis." Credit: Princeton University Press

(PhysOrg.com) -- In the past 50 years it has become commonplace to think of Earth as a nurturing place, straining mightily to maintain equilibrium so that life might continue and flourish.

The Gaia hypothesis, named for the ancient Greek goddess of Earth, even put forth the idea that our planet behaves as a kind of giant organism, with its complex systems finely tuned to compensate when one system gets out of kilter.

But actually it is the Gaia view that is out of kilter, says Peter Ward, a University of Washington paleontologist who has looked closely at conditions that existed during numerous mass extinction events in Earth's history.

In a new book, he suggests the planet ultimately is inhospitable to life, and that life itself might be the primary reason. Rather than Gaia, he invokes the darker Medea from Greek mythology.

"The Medea hypothesis says life is already shutting down Earth as a habitable planet. Not just the diversity of life, but the actual biomass," Ward said. "Life keeps evolving, and there are unintended, often negative, consequences."

"The Medea Hypothesis: Is Life on Earth Ultimately Self-Destructive?" was published in April by Princeton University Press. In the 208-page book, Ward argues that humans have to use engineering to manage their environment or face potential extinction if the Earth is left to manage itself.

"The engineering I'm talking about is not girders and sky shields. It's engineering microbes to take over food production and energy production," he said.

Microbes have undergone evolution, a sort of natural engineering, throughout Earth's history, he said, and humans have the ability to guide such changes to clean the environment, for example, or regulate carbon dioxide in the atmosphere.

Like Gaia, Medea is a mythological character, though she is decidedly much darker in nature. Medea was married to Jason at the time he pursued the Golden Fleece but, according to legend, he left her and in revenge she killed their two children.

Ward, a UW professor of biology and of Earth and space sciences, says numerous mass extinctions show that our planet behaves in somewhat the same way. For example:

- The evolution of oxygen-producing organisms twice plunged Earth into ice ages as carbon dioxide, crucial for photosynthesis, was stripped from the atmosphere.

- The evolution of the first true animals caused extinction of most stromatolites, layers of microbes living in sediment in the oceans' intertidal zones. The result was somewhat more complex life forms, but a vastly smaller volume of living matter.

- The evolution of the first forests 400 million years ago is considered one of the great events in Earth history. But tree roots pushed into subsurface rocks, exposing them to increased weathering. The weathered elements again stripped carbon dioxide from the atmosphere and plunged the Earth into a 90 million-year ice age.

"The irony is that we have way too much carbon dioxide right now, but we should stash it in a bank because we're going to need it," Ward said. "The end of life as we know it is when we reach just 10 parts per million of carbon dioxide in the atmosphere."

Currently, carbon dioxide is at 380 parts per million and rising, creating a greenhouse effect that most climate scientists say will greatly increase temperatures around the world, with some severe consequences. For example, with the melting of mountain and polar ice sheets, the world's most-productive agricultural land will be submerged and humans will struggle to find food, Ward said.

He noted that throughout Earth's history, carbon has been stripped from the atmosphere and stored in trees, rocks, even the oceans. He said those processes will continue until atmospheric carbon dioxide drops to 10 parts per million, a point at which no plants can live. Once plants are gone, within 20 million years the oxygen will plummet to 1 percent of the total atmosphere and life as we know it will end.

"Then you've gotten to a point where it will be forever impossible to get diversity of life back. It will be forever impossible to regain an oxygen-rich atmosphere. That's not Gaia. It's the opposite of Gaia," he said.

He notes that of 15 mass extinction events in Earth's history, only the one 65 million years ago that brought an end to the age of dinosaurs was likely caused by a comet or asteroid crashing into the planet's surface. The others all resulted from Earth's own processes.

"There's no Gaia. There's just this dumb, blind life. It tries out all kinds of new things that are good for new kinds of life but are detrimental to everything else that exists. The innovations lead to disaster," Ward said.

He added that, contrary to recently popular beliefs, the planet likely would not somehow "heal itself" if all humans were suddenly removed. Instead, he said, humans are the key to saving the planet and, in the end, are perhaps the only true Gaian force.

"We're not renting. We're the owners, but there can be a cost to the rest of nature of our ownership," Ward said. "There is an easy fix - the only fix is intelligence. Knowing that there is a problem is what will get us out of it. We're the only ones who can put our hands on the controls."

Source: University of Washington (news : web)