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RESEARCH UNCOVERS 'NEW' LIFE FORM

Biologists working for NASA and the National Science Foundation have identified a "new" form of life on Earth, possibly dating back to the planet's first billion years.

The new form -- previously thought to be a type of ordinary bacteria -- is a methane-producing organism, representing a line of evolutionary descent that is totally separate from the two traditionally recognized lines -- animals and plants, and bacteria.

The organisms may be the oldest of life forms as well -- coming not only before plants and animals, but also before bacteria.

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The finding was made by a research team headed by Dr. Carl Woese, Professor of Genetics and Development at the University of Illinois, Urbana, an evolutionist and world expert on the genetic code.

"The organisms are a distinct new class, no more related to typical bacteria than to higher forms," say the researchers. "They are a third form of life on this planet."

Methane-producing organisms appear to be ideally suited to what scientists believe to have been the Earth's primitive atmosphere:

- They can get all their food and energy from very simple compounds such as carbon dioxide and hydrogen, the main gases in a primitive atmosphere.

- They do not use any of the complex chemicals most other organisms require as food, such as sugars and amino acids.

- Certain of the species grow best at high temperatures, in the range of 65 - 70 degrees Celsius (150 - 170 degrees Fahrenheit).

- They now can be found only in niches swept clean of oxygen, such as deep in hot springs at Yellowstone.

The researchers said the discovery creates new hope that science will ultimately find out a great deal about how life came about on this planet, and so be in a better position to also understand and discover life forms that may have evolved elsewhere in the solar system or beyond.

For a long time, many biologists have felt that all life on Earth came from a common ancestor. Over the past decade, a great deal of evidence supporting this view has accumulated. However, the nature of this common ancestor (except for its having to be quite simple) and the original branchings into the various lines of evolutionary descent were not known.

It is generally assumed that the two lines of descent that came from the common ancestor were represented by two basic types, the higher forms (animals and plants) and the lower forms (bacteria). That there might be a third form of life was an idea never seriously entertained by biologists.

For several decades, biologists have been working with a group of organisms that produce methane as their main waste product. But since the organisms are small, it had been taken for granted that they were ordinary bacteria. Until now, no one had suspected that these methane producers represented a line of descent from a common ancestor that is completely separate from the two traditionally recognized lines.

(According to presently accepted ideas, the Earth, along with the Sun and the other planets, was formed about 4.6 billion years ago. The earliest forms of life yet discovered on Earth -- bacteria and simple plants -- have been found in rocks laid down when the Earth was a billion years old or more. One billion years ago, wormlike creatures appeared, according to the fossil record, and 400 million years ago the first fishes waddled out of stagnant ponds onto the land. From these descended the reptiles, and branches of the reptile family gave rise to dinosaurs, birds and mammals. The ancestors of modern man appeared approximately two million years ago.)

Since the primeval evolutionary branchings probably occurred during the first billion years of the Earth's existence, there is no hope of finding a fossil record of them. They occurred before the oldest rocks on Earth were formed. However, the living cell in a sense carries a partial record of its past in its genes. And over the past two decades, scientists have developed ways of partially deciphering these ancient genetic texts. (The measurement is actually done by determining how different from one another two "versions" of the same "test" are; the greater their difference, the further back their respective lines of descent separated from each other.)

Through analysis of a particular very ancient and highly conserved portion of this genetic record, known as ribosomal RNA, they have been able to uncover evidence of events that occurred when the Earth was still relatively young -- during the first billion years of its existence. By this means, the genealogy of the methane-producing organisms was shown to be distinct from both the typical bacterial and the animal-plant genealogies.

Three to four billion years ago, the Earth's atmosphere contained no oxygen. Instead it is thought to have been rich in carbon dioxide, hydrogen and other gases. Our explorations of the Moon have revealed that its surface (and so by inference the Earth's) was extremely hot early in its history. Life would have begun when our planet had cooled sufficiently to support it, but was still far warmer than now. Woese notes that methane-producing organisms, are best suited to these kinds of conditions.

Woese believes that the recent findings may provide knowledge of one of the missing stages of evolution, the chemical stage which immediately preceded the stages of life as we know it. At present, an enormous gap exists in our understanding, according to the researchers.

Dr. Woese's principal collaborator in the study was Dr. George Fox, who has now moved to the University of Houston. The research team also included Linda Magrum, Dr. Woese's chief assistant, and Kenneth Luehrsen, David Stahl and Ramesh Gupta, his graduate students.

Dr. Woese's group collaborated closely with that of Prof. Ralph Wolfe, a microbiologist at Illinois. William Balch, a student of Dr. Wolfe, was also a principal in the studies.

A photograph to illustrate this news release will be distributed without charge only to media representatives in the United States. It may be obtained by writing or phoning:

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(NOTE TO EDITORS: A report on the research is being released simultaneously by the National Science Foundation.)