PALEONTOLOGY

Life 2.7 Billion Years Old

Molecules synthesized only by living systems have been found in material which is 2.7 billion years old, indicating that life is a billion years older than previously thought.

➤ LIFE EXISTED on earth more than 2.5 billion years ago, nearly a billion years earlier than the previous date set for known living organisms.

This finding could mean the earth is even older than the some 4.5 billion years now believed. It could also mean that the life-like-looking materials reported found in meteorites are actually examples of living forms reaching earth as visitors from space.

If further tests show that such meteorite material results from biological processes, it will mean that man is not alone in the universe.

Such a discovery would confirm many scientists' belief that life originates wherever and whenever conditions are ripe.

Discovery of chemical molecules 2.7 billion years old produced by living systems on earth was made by Nobelist Dr. Melvin Calvin of the University of California, Berkeley, and an international team of scientists.

The early life molecules were found by means of a new technique that can be used not only on meteorites but also in searching for life forms in moon rocks and on the surface of Mars.

Previously the oldest age for life on earth was 1.9 billion years. This was established by paleontologists who dated fossils of algae in rocks from the Gunflint Iron Formation of Ontario, Canada.

In Nature, 206:446, 1965, the international team from the University of California reported finding two members of a class of hydrocarbon molecules in the Soudan Iron Formation of Minnesota.

The molecules are of a class called isoprenoids, which provide the architectural base for cholesterol and many other well known biological materials. They are known as pristane and phytane.

With the new chemical technique, there is little question about the origin of molecules, however old. Pristane and phytane known to be synthesized only by living systems, are used as biological "markers."

Besides Dr. Calvin, the scientists included Theodore Belsky, a U.S. graduate student; Dr. R. B. Johns, on leave from the University of Melbourne; E. D. McCarthy, a graduate student from Cambridge University; Dr. A. L. Burlingame of the University of California, and Dr. Wilhelm Richter, a post-graduate fellow from Austria.

The scientists are now planning to analyze South African rocks that are 3.4 billion years old for molecules made only by biological processes. Analysis for the presence of the two types of molecules includes a sequence of procedures in chromatography, molecular sieving, infrared spectroscopy and mass spectroscopy.

The Berkeley investigations into early life forms are supported by the National Aeronautics and Space Administration.

However, the belief that the earth is 4.5 billion years old may stand as a result of a new discovery.

Life Developed More Rapidly

Life may have developed on primitive earth perhaps 10 times more rapidly than previously believed possible.

This is the conclusion of Dr. Calvin and colleagues at the University of California Lawrence Radiation Laboratory in Berkeley, who reported discovery of a new "chemical mechanism" that they believe accomplished the speedup.

If the theory stands up, it will explain a situation that has been puzzling scientists for years. That is, either the earth is older than the currently accepted 4.5 billion years or else life had to develop faster than the 4 billion years heretofore assumed necessary.

The mechanism reported in Nature 206: 707, 1965, is one by which complex molecules, necessary to form the stuff of living cells, could have been formed from simpler cells in water solution considerably faster than by previously known reactions.

The work was an extension of research last year by the Berkeley scientists. At that time, they joined together simple compounds into complex molecules. This they did by placing the small molecules with dicyandiamide, a simple carbon-nitrogen-hydrogen compound, in a water solution at room temperature. At an early stage in the earth's history, these compounds and conditions presumably existed.

Last year, the rate of formation seemed comparatively slow.

But in this newer report, Dr. Calvin and his colleagues said that by using a chemical known as dicyanamide there was a "striking increase" in the rate of formation of large molecules from small ones.

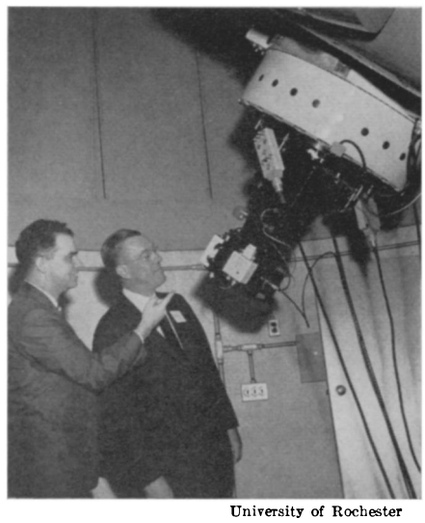
The simple amino acid glycine was converted into chain-like molecules or polymers containing several glycine units at rates up to 10 times higher than with the previous method.

The research was reported by Dr. Dean H. Kenyon and Gary Steinman along with Dr. Calvin. They say it could help account for life developing during the first two billion years in the earth's history.

The chemical technique used in the discovery that life existed on earth more than 2.5 billion years ago is an important supplement to other means of tracing the origin and evolution of life. It is the only method now known of establishing life's earliest beginnings.

Before about 600 million years ago, living systems apparently did not have hard skeletons but were all soft. The lack of bone structure, plus the great heat and pressure that ancient rocks have experienced during many hundreds of millions of years, makes identification of fossilized life forms very difficult by traditional methods.

• Science News Letter, 87:339 May 29, 1965



University of Rochester

STAR PHOTOGRAPHER—Donald C. Schmalberger (left), assistant professor of astronomy at the University of Rochester, and Dr. George M. Clemence (right), senior research associate at Yale University Observatory, examine the 24-inch reflecting telescope at the University of Rochester's new C. E. Kenneth Mees Observatory.

ASTRONOMY

Newest Telescope in U.S. Dedicated at Rochester

➤ THE NEWEST TELESCOPE in the United States, a 24-inch reflector for photographing stars accurately, is now in operation at the University of Rochester in Rochester, N.Y.

Director of the stellar probes to be made with the new telescope is Dr. Stewart Sharpless, formerly of the U.S. Naval Observatory in Washington, D.C. The 24-inch instrument will be used to study the structure of galaxies, the gas and dust between stars, and the evolution of variable stars. The telescope, installed in a 20-foot dome, has a focal length of 27 feet and weighs about 2,500 pounds.

At the dedication of the telescope Dr. G. M. Clemence of Yale University Observatory said the telescope would also have "special importance in training students of astronomy."

The C. E. Kenneth Mees observatory is located on Gannett Hill in Bristol Hills, 40 miles southeast of Rochester. A grant for $102,300 from the National Science Foundation is being used to equip the observatory. Supporting contributions came from the Eastman Kodak Company and the Mees family.

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