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GRADUATE RESEARCH CENTER OF THE SOUTHWEST

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VITAL OXYGEN CAME FROM SOURCES WITHIN EARTH; HEAD OF RESEARCH CENTER REPORTS STUDY AT EDINBURGH SCIENTIFIC MEETING

UNIVERSITY OF EDINBURGH, SCOTLAND -- Earth's atmosphere came from its own sources, and its vital oxygen appears to have been the product of water, ultra-violet energy from the sun, and marine life.

These conclusions were reported here Thursday at The Faraday Society's general discussion on "Chemical Reactions in the Atmosphere". Dr. Lloyd V. Berkner, president of the Graduate Research Center of the Southwest at Dallas, Texas, presented the paper on "History of Oxygenic Concentration in the Earth's Atmosphere".

The report was one of 22 made by space scientists from Western Germany, Belgium, England, Ireland, Canada, and the United States. Their topics centered on main lines of interest and inquiry in world space programs.

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In the report of oxygen study, which was prepared jointly by Doctor Berkner and Dr. Lauriston C. Marshall of the Texas research center, a wide-spread evolutionary explosion in the waters of the earth was suggested as the key establishing presence of oxygen in sufficient quantities to support life ashore.

This event came near the beginning of the Cambrian era,

-more-

600 million years ago.

Within a span of a few million years, Doctor Berkner said, it is probable there was lush plant life ashore and that the first animal life had emerged from the oceans.

Before this could have happened, he reported, the earth's atmosphere was derived from volcanic outpourings, and contained hydrogen, nitrogen, carbon dioxide and water as its important parts.

Oxygen was first formed, the study showed, by photodissociation of water under the powerful ultra-violet rays of the Sun. But the amount produced was probably only one-hundredth of the quantity present in today's atmosphere.

This would be enough, Dr. Berkner pointed out, to maintain a thin layer of ozone (a molecular form of oxygen with three atoms instead of two) near the earth's surface. The protective "buffer", which would shield life from the destructive ultra-violet flux, was presumably too thin to offer protection on land, or in wide ocean areas.

The study attributes further rise of oxygen to photosynthesis in primitive cellular organisms, dwelling in protected, shallow pools or in sea depths of 20 to 30 feet.

When the rate of oxygen production by these organisms exceeded the breakdown imposed by the sun's rays, Doctor Berkner said, forming high-lying ozone layers, life in the oceans probably spread rapidly. At a critical level, about one-tenth of today's oxygen concentration, organisms could also change from a fermentation life mechanism to one of respiration, raising the energy needed to produce further oxygen by a factor of 30 to 40.

The current study reverses earlier geologic assumptions that primitive atmospheres contained high amounts of oxygen. This conclusion has been based, Doctor Berkner said, on extensive Earth-surface oxides related to pre-Cambrian (Proterozoic) deposits. It now appears, he pointed out, that low-level ozone formation would be the most effective form of oxygenation, to produce rapid oxidation of crustal materials.

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