BIOPHYSICS

Bacteria "Eat" Electrons

A new bioelectric cell which could supply power for vehicles in space and light for cities on earth proves bacteria do not eat solid foods.

➤ A RADICAL new fuel cell harnesses electricity produced when bacteria "eat" electrons. It shows for the first time that these tiny microbes actually use electrical charges instead of solid foods.

Developed for powering space vehicles and lighting cities, fuel cells have used certain bacteria fed with organic wastes to produce chemicals which make electrical energy. But Drs. Joseph A. Sutton and John D. Corrick of the U.S. Bureau of Mines in Washington have discovered that bacteria, drawing electrons from living or lifeless matter, can be used for power. And bacteria can do it while separated from the food source.

The unique "bioelectric cell" now under study is divided into two compartments, each containing a non-reacting electrode or terminal and filled with a weak acid solution. Inorganic materials, such as fool's gold (pyrite), in one side reacts with the acid, freeing electrons and hydrogen.

The electrons are "called" through a wire by bacteria in the second compartment. These consume the electrons and produce water as a waste product. Usable electric current is generated by the electrons passing through the wire.

"So far our cell has not produced the amount of electricity that other cells have," Dr. Corrick told SCIENCE SERVICE. "We haven't wanted to," Dr. Sutton explained. The scientists are primarily interested in the principle, not the application.

The cell was designed for exploratory-type experiments separate from their regular duties. The Bureau of Mines is applying for a patent on the method but so far no money or time has been spared for large-scale studies.

Two reasons why the bioelectric cell may prove better than the popular biochemical fuel cell are that it should not generate heat during the process (a drawback to present fuel cells in space work) and that the electrodes do not break down or corrode, thus giving the cell an extremely long life.

Prior to their fuel cell, electricity could not be produced by microbes from inorganic materials alone and there was no direct method for determining how many electrons were transferred from inorganic substances to biological organisms, Dr. Sutton explained. The measurement of these transfers may aid medicine in the study of electrical activity of living cells.

Until now it has only been believed that bacteria used the electric particles instead of the organic or inorganic materials for energy.

As proof that bacteria actually use electrons, the two biochemists showed that the membrane and salt bridges were used to separate the organisms from the ferrous sulfate which supplies the electrons through chemical reaction with sulfuric acid. Electricity can only be produced if the iron and bacteria are separated by a membrane or salt bridge, they said.

Since all bacteria use electrons, the two scientists said, almost any type of bacteria could be put in the cell and "fed" the correct number of electrons from any substance. The process should work with any "food" or electron source.

The long-range goals of this research are many, Dr. Sutton said. Lighting mines, operating mining equipment and selectively separating metals from solution are only three goals which might prompt the Bureau to act on the project. But safer and longer-lasting space power cells and the promise that any type of waste material could power factories and cities using only harmless organisms may be even more important.

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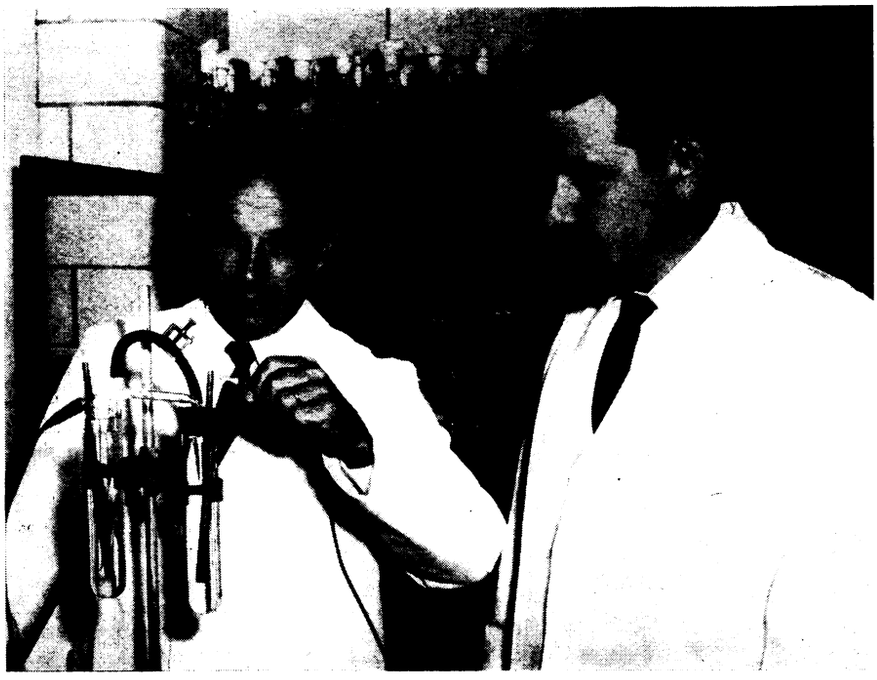

BACTERIA FOR POWER—Drs. Joseph A. Sutton (at left) and John D. Corrick, developers of the new bio-electric cell, in a laboratory at the U.S. Bureau of Mines, College Park, Md.

NECROLOGY

Marjorie Van de Water Dies After Long Career

➤ MISS MARJORIE VAN DE WATER, 61, staff writer of SCIENCE SERVICE died at her home, 3015 Blueford Rd., Kensington, Md., August 2. Death was caused by cerebral embolism.

The exciting and increasingly important field of psychology has been covered for the American people by Marjorie Van de Water since 1929 when she joined the SCIENCE SERVICE staff after having been a laboratory aid at the National Bureau of Standards, a research assistant at the National Research Council, and a research assistant at the U. S. Civil Service Commission.

She was a life time member of the National Association of Science Writers and in 1959 was awarded the science writer's prize of the American Psychological Foundation for her career of distinguished popular interpretation of psychological science. Marjorie Van de Water had covered almost every meeting of the American Psychological Association since the Toronto meeting in 1931, as well as many of the regional meetings of this science.

During World War II she, together with Prof. E. G. Boring, made an unusual contribution to the war effort in a new type of book on "Psychology for the Fighting Man," a wartime best seller with a half-million circulation. A second book was similarly prepared for the returning serviceman.

She is survived by her sister, Mrs. Jean H. O'Neill, of Stuart, Fla., who was with her at the time of death; a brother, Donald G. Van de Water, Stuart, Fla.; nephews, Dr. Malcolm Van de Water, Jupiter, Fla., and Hugh O'Neill, Stuart, Fla.; nieces, Mrs. W. L. Pearson of Miami, Miss Patricia O'Neill of University of Florida, Gainesville, Mrs. Isaac Elkins, Stuart, Fla., and Patricia Shumway of Los Angeles. Also surviving are grandnephews and grandnieces.

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