

## ASTRONOMY

# Water Vapor on Venus

The presence of water vapor on earth's sister planet Venus has raised the possibility that some form of life may exist there—By Ann Ewing

► "DIRECT EVIDENCE" of water vapor on Venus, earth's sister planet, has been reported, raising the possibility that some form of life may exist there.

Dr. John Strong of Johns Hopkins University, Baltimore, who made the discovery, charged that too many people have a "closed mind" concerning the existence of life forms on Venus and say that this is impossible, terming the planet a dead world.

Dr. Strong said he is now convinced the question is "wide open." Many scientists believe the very high temperatures of 600 degrees Fahrenheit, measured by radio waves from Venus, rule out any possibility of life on that planet.

What forms such life might take is not known.

The discovery of water vapor was made on an unmanned balloon flight that carried sensitive instruments for measuring infrared light high into earth's atmosphere. The instruments measured the amount of water vapor in a beam of the sun's infrared light that passed through the cloud layer on Venus to the reflecting layer and back out again, then traveled to earth.

Because the balloon-carried instruments were 87,500 feet high, they were above all

but an insignificant amount of the water vapor in the earth's atmosphere. The amount of water vapor detected for Venus was established with an accuracy of five percent, Dr. Strong told SCIENCE SERVICE.

If the water measured were condensed, it would form a layer only a few thousandths of an inch thick.

Dr. Strong said that a previous measurement of water vapor on Venus, made on a manned balloon flight in 1959, was only 80% accurate.

He pointed out that since it is known carbon dioxide exists on Venus, proof of water vapor "forces us to re-examine every previous calculation made concerning the possibility of some sort of life existing on the planet."

Cloud-mantled Venus is the brightest planet in the sky and the nearest to earth, 26 million miles at its closest point. It is called earth's sister, or "twin," planet because it measures 24,200 miles around the equator compared to 24,900 miles for earth, and has a comparable density.

Some scientists have suggested that Venus might be entirely covered with oceans that might contain life without bones or supporting structures, such as jellyfish.

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would act as a catalyst in the fusion reaction. A heavy quark, with a charge two-thirds that of an electron, dropped into a deuterium gas could theoretically seize two deuterons, hold them together until fusion occurs, then seize another pair and promote another fusion, not being used up itself.

If it happened, all this would occur hundreds of times faster than the wink of an eye.

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General Electric

**FLUX PUMP**—Dr. Theodor Buchhold, senior engineer of General Electric Company, raises an electric flux pump and superconducting magnetic coil from a container of liquid helium. The fist-sized pump, which has no moving parts, can convert a small input of alternating current into a large output of direct current at temperatures near absolute zero.

## PHYSICS

## Solar Simulator Used To Test Space Materials

► A SOLAR SIMULATOR that duplicates the sun's intense light from short ultraviolet through visible to infrared has been developed to test how materials react in space.

It will give an exact laboratory replica of sunlight in space over a circle four feet in diameter. The system was developed by engineers at Spectrolab, a division of Telectron Electronics, Inc., Sylmar, Calif.

F. M. Benning of Spectrolab told the Institute of Environmental Sciences meeting in Philadelphia that an earlier version of the new solar simulator had been used successfully to reproduce space sunlight over a smaller circle.

Materials can now be evaluated in the laboratory before flight, saving substantial time and money.

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## PHYSICS

# Nuclear Zoo Minus 'Quarks'

► THE NUCLEAR zoo is missing its "quarks," a California physicist believes.

A quark is not an animal out of Alice in Wonderland or the sound a duck might make. It is a made-up word used by the late James Joyce and now borrowed by a physicist to describe a particle he believes should exist in the nuclear zoo.

The nuclear zoo is the term given to the strange particles that inhabit the cores of atoms. Recently physicists have been able to classify these nuclear inhabitants into families on the basis of a theory called the "eight-fold way."

An extension of this highly-successful theory, developed independently by Dr. Murray Gell-Mann of California Institute of Technology, Pasadena, and Dr. Yuval Ne'eman of Israel, calls for three quarks. However, if the quarks are hiding deep within the atom, they have not yet been found, despite the most careful searches to snare them.

If quarks existed, each would have a charge either one-third or two-thirds that of an electron, the negative carrier of electricity. The electron charge has been considered a basic unit, and no fraction of this charge was believed possible. However,

Dr. Gell-Mann thought that the truly basic building blocks of the universe might be three closely related particles he calls quarks.

An experiment recently concluded at Brookhaven National Laboratory by physicists from Brookhaven and Yale University has shown that elementary particles with a charge only a fraction as large as an electron probably do not exist. However, quarks could exist and have very large masses.

The scientists who conducted the searches for quarks, Dr. Robert K. Adair of Yale University and Drs. Lawrence B. Leipuner, William T. Chu and Richard Larsen of Brookhaven, reported their negative results in Physical Review Letters, 12:423, 1964.

The Brookhaven experiment was designed to detect quarks by measuring their charge. Charged particles cause light to be emitted when they pass through some materials.

Particles with a charge of one-third cause only one-ninth as much light as a particle with one electrical charge. It was this feature of quarks that was used to show that quarks did not exist within the limits of the detecting equipment.

If quarks existed, they could have an important economic value because they