

## ASTRONOMY

# Jupiter's Belts Hazardous

THE PLANET Jupiter has a radiation belt much more hazardous for space travelers than the earth's radiation belts, two California Institute of Technology scientists have found.

The radio energy from the Jupiter belt is one hundred trillion times that expected from the earth's belt, calculations have shown. Venkataraman Radhakrishnan of India and Dr. James A. Roberts of Australia, both working currently at the Radio Observatory of the California Institute of Technology, report the extent and polarization of Jupiter's radiation belt in *Physical Review Letters*, 4:493, 1960, official publication of the American Physical Society in New York.

The belt is about 255,000 miles above the surface of the planet, which itself is about 85,000 miles in diameter. Jupiter's radiation at a frequency of 960 megacycles is due to the fact that high speed electrons trapped in the planet's magnetic field emit radio waves as they spin back and forth along the line of magnetic force. This mechanism is known as synchrotron radiation.

Unexpectedly high radio emission from Jupiter at a wavelength of ten centimeters, or slightly less than four inches, was first

detected by scientists at the Naval Research Laboratory, Washington, D. C. Their findings were later confirmed at other short wavelengths both at Caltech and the National Radio Observatory, Green Bank, W. Va. Synchrotron radiation from a belt resembling the earth's was immediately suggested for the origin.

Proof for this mechanism was found in the detection of linear polarization of the radio emission and the region of the emission. Both measurements were possible because of the unique radio antennas erected under the direction of J. G. Bolton, director of Caltech's Radio Observatory in Owens Valley, California.

The radio telescope consists of two 90-foot steerable antennas mounted on a railroad track a third of a mile long. Individually, these antennas are the largest of their type in the United States and second in the world only to the 250-foot dish at Jodrell Bank, England.

For certain observations the two antennas may be used to simulate the effect of a single dish equal in diameter to the distance between them.

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## PHYSIOLOGY

# Fluid-Filled Sac for Space

A FLUID-FILLED SAC, like those in which unborn babies develop, may make an ideal space capsule, two pathologists, Drs. B. Black-Schaffer and G. T. Hensley of the University of Cincinnati College of Medicine report. They have just completed experiments with mice showing the value of immersion in fluid as a protection against acceleration on blasts off into space.

To simulate conditions found in the serous fluid of the amniotic sac, the protective enclosure in which the unborn baby develops, the researchers chilled baby mice until their heart beats, respiration and metabolism stopped—a state of suspended animation—and immersed them in a briny solution in transparent bags. The mice were then put in a centrifuge that spun them at various speeds.

Writing in *Archives of Pathology*, May, 1960, published by the American Medical Association, the researchers report they found that immersed mice could survive stresses of acceleration that killed other mice, also in a state of suspended animation but not immersed.

Pointing out that the exploration of outer space will require the transit of vast distances over periods of time equivalent to geologic eras, the pathologists state that a possibility exists of circumventing this space-time obstacle. They refer to Einstein's theory which states that with increasing uniform velocity time slows relative to an observer on earth.

The doctors explain that "this property of uniform velocity begins to assume significance for space travel at a speed approximating that of light itself, 186,300 miles a second. With this relative clock measuring the passage of time, man could attempt the exploration of outer space if a means could be found of protecting him against the great forces generated in the short time during which such velocities should be attained."

The experiments are a step toward solving the problem, the researchers claim, in that they proved that mice when immersed are protected against an accelerative stress leading to a constant speed of 14,500 miles a second. They conclude that a constant velocity of this figure would result in a slowing of the space traveler's time relative to that of earth by one percent.

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## SURGERY

# New Palate Operation Prevents Fuzzy Speech

A NEW SURGICAL technique to close and lengthen a cleft palate in a single, one-hour operation was said to prevent the fuzzy speech patterns that sometimes follow palate operations.

Drs. Richard B. Stark and Clayton R. DeHaan of St. Luke's Hospital in New York City described their new technique at the American Association of Plastic Sur-

geons meeting in Milwaukee, Wis. They said they lengthen the palate by transferring to it a flap of mucous membrane and muscle from the pharynx.

The doctors reported that the flap prevents a leakage of air into nasal passages. This leak, which causes indistinct speech, often follows conventional palate operations in which the cleft palate is closed but not lengthened.

The two surgeons said they have now used the technique on 22 babies. They advised that palate operations should be performed before a child has begun to speak. Early surgery prevents the difficulty of retraining a child to speak. The surgeons said it also may prevent hearing difficulties, a common problem among children with cleft palate.

The two surgeons' palate operation is believed to be the first of its kind. Palate closing and palate lengthening have formerly been separate operations, with the lengthening operation following the closing operation when fuzzy speech resulted.

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## MEDICINE

# Live Oral Polio Vaccine Proved Safe and Effective

THE DEVELOPER of the Sabin live oral polio vaccine has told scientists that his vaccine has been proved safe and effective in tests with millions of persons, but whether public health authorities will use the vaccine is a question "only the future can answer."

Dr. Albert B. Sabin of the University of Cincinnati said tests on millions of persons in 1958 and 1959 have provided evidence of the vaccine's safety.

He said the test data indicate how programs should be designed to not only eliminate the disease but the virus itself in large parts of the world. Dr. Sabin made his remarks in a speech prepared for the International Conference on Live Poliovirus Vaccines in Moscow.

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## VIROLOGY

# Viruses Grow Better In Heavy Water Medium

VIRUSES MULTIPLY better in cells grown in heavy water, or deuterium oxide, than they do in cells grown in ordinary water.

Dr. David Kritchevsky of the Wistar Institute, Philadelphia, told a New York Academy of Sciences conference in New York that a weakened polio virus strain, known as the CHAT strain, grows well on monkey kidney cells when the medium contains water that is 40% to 50% deuterium oxide. Where there is no heavy water, the virus does not thrive.

The CHAT virus was also grown on experimental tumor cells, called HeLa cells, Dr. Kritchevsky said. When the water contained 25% deuterium oxide, the virus burst, or the number of viruses emerging from a cell infected by a single virus when the cell bursts open, was five to ten times greater.

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