ASTRONOMY

'Red Spot' Explained

➤ A GIANT METEORITE crater hollowed out on the not-so-solid surface of Jupiter may be the cause of that planet's mysterious marking known as the "Great Red Spot."

Scientists have previously suggested that mountains anchored to Jupiter's surface were responsible for the puzzling semi-permanent feature, first seen some 300 years ago and charted for the last 100.

However, a large depression would produce the same visible result as a mountain range, Dr. S. K. Runcorn of England's University of Newcastle-upon-Tyne reported in Washington, D.C.

Dr. Runcorn said the Great Red Spot was actually a stagnant column of gas several hundred kilometers thick. He told the American Physical Society meeting that Jupiter's atmosphere flows around this stagnant column. Laboratory experiments with rotating fluids have shown that the formation of such a column above a depression is possible.

The Jovian atmosphere consists mainly of clouds of hydrogen, methane and ammonia. Dr. Runcorn reported that its core is mainly hydrogen under such high pressure that it is in the metallic stage. The core is about three-fourths of the planet's radius, compared to about one-half for earth's core.

Since the Great Red Spot is linked to Jupiter's mantle, its rate of movement across the planet, averaging about nine hours, 55 minutes and 40 seconds during the past 100 years, is associated with motions in the core.

The evidence for a fluid core for Jupiter, with an associated magnetic field, came from recent attempts to explain the Great Red Spot in terms of a stagnant column in the atmosphere.

Dr. Runcorn also reported that Mars does not have a core. The Martian planet has a higher surface density than the top of earth's mantle, he said, suggesting that iron is still distributed throughout Mars as it was in the earth before the heavier iron settled toward the center to form the core, a process called differentiation.

• *Science News, 89:335 May 7, 1966*

ASTRONOMY

Hunt for Quarks Goes On

➤ RADIO WAVES picked up here on earth from far-distant objects in space could be used to discover whether the suggested building blocks of all matter in the universe, called "quarks," actually exist.

The radio-wave method of detecting quarks, now unseen but theoretically possible nuclear particles, was reported to the American Physical Society meeting in Washington, D.C., by Drs. C. S. Shen and T. K. Kuo of Purdue University, Lafayette, Ind.

The existence of quarks, of which many scientists are not convinced, was first suggested about two years ago by Dr. Murray Gell-Mann of California Institute of Technology. Unlike ordinary protons or neutrons, the constituents of atomic cores having either no charge or unit charges, quarks are charged in fractions.

If they exist, 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 unit has been thought possible.

Drs. Shen and Kuo have calculated that if quarks exist, they should emit radiation, some of which would be at radio wavelengths, in a manner similar to the way the hydrogen atom does. Sensitive radio telescopes such as the 300-foot antenna at the National Radio Astronomical Observatory in Green Bank, W. Va., could be used to detect such emissions.

The scientists' calculations show that the radiation from quarks could be picked up even if quarks are only one hundred thousandth as numerous as hydrogen in a galaxy. The quark radiation should have a wavelength of 106 centimeters, or about 42 inches. That of the widely studied hydrogen emission is 21 centimeters.

Strongly emitting radio galaxies, such as Cygnus A, would be the best regions to search for the quark radiation, Drs. Shen and Kuo believe. The puzzlingly bright objects known as quasars would be even better, but they are too far away. However, radio galaxies are thought by some to be the remnants of quasars.

Therefore, the scientists reasoned, radio galaxies should be among the most promising sources in which to look for traces of quarks, since matter there should be highly concentrated and energetic.

Quarks have been estimated to have a mass ten times that of a typical nucleon. It has been calculated that, because of this mass, a proton would have to be accelerated to at least 200 billion electron volts to produce a quark, an energy nearly seven times as great as from today's accelerators.

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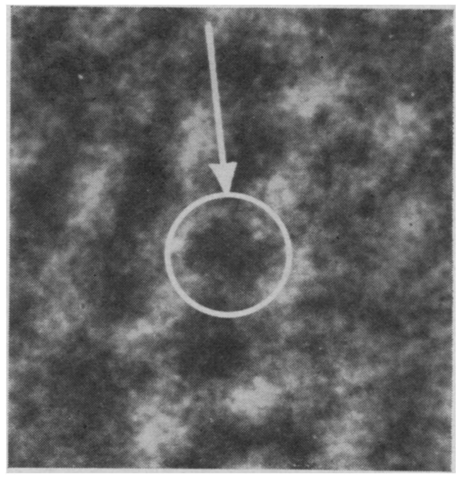

Bell Telephone Laboratories

CARBON ATOM GROUP—The circled area in this photograph is a hexagonal cell of carbon, magnified 214,000 times, directly observed and identified by R. D. Heidenreich of Bell Telephone Laboratories who used a modified Siemens electron microscope with a resolution of two angstroms.

PHYSICS

Individual Carbon Atoms Seen Through Microscope

➤ INDIVIDUAL ATOMS of carbon, gathered in clusters only 23 billionths of an inch across, have been seen through an electron microscope.

A six-sided carbon cell, made up of three carbon crystal cells or 10 atoms, was seen and photographed by R. D. Heidenreich of Bell Telephone Laboratories, New York.

Magnified 214,000 times, the hexagonal cell appears as a small, dark blur. While the existence of this form of carbon was not unknown, this is the first time that it has actually been observed.

To obtain a layer of carbon thin enough to reveal individual atom clusters, Mr. Heidenreich evaporated a tiny bit of carbon onto a piece of plastic, and then dissolved the plastic from underneath it. However, the remaining film of carbon was many atoms thick, so the image seen through the microscope included underlying and adjacent cells.

When it is possible to make even thinner films, resulting images will be clearer and have better contrast. An almost two-dimensional sample will be necessary to make single atoms visible.

Visual observation of patterns of atoms will be particularly useful to molecular biologists dealing with chemicals combined into huge, supermolecules, Mr. Heidenreich believes.

More and more electronic devices are being made with microelectronics. Examination of atom patterns can contribute greatly to the design of the semiconductor films that are vital in such devices.

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