ASTROPHYSICS

Two Neutron Stars Seen

A new chapter in astrophysics has been opened by the discovery, high above the atmosphere, of two new intense X-ray sources believed to be neutron stars—By Ann Ewing

➤ TWO SOURCES of intense X-rays have been discovered in the heavens from a rocket flight. The sources are believed to be neutron stars, the National Academy of Sciences meeting was told.

The brightest X-ray source is in the constellation of Scorpius, the scorpion; the weaker one coincides with the Crab Nebula. The X-rays can be detected only when instruments are flown high above most of earth's atmosphere.

The sources were found by Drs. H. Friedman, S. Bowyer, E. T. Bryam and T. A. Chubb of the Naval Research Laboratory's E. O. Hulburt Center for Space Research in Washington, D. C. A new chapter in astrophysics was opened by this discovery, the scientists said.

The intensity of the Scorpius X-ray source is "remarkable," Dr. Friedman reported to the meeting. He said it probably was a star with a mass about that of the sun, but with its matter packed so tightly that its diameter is only 10 miles. This means each cubic inch weighs about a billion tons. Such a neutron star would have a central temperature of a billion degrees and a surface temperature of ten million degrees.

The two neutron stars so far discovered are no more than 1,000 to 2,000 years old.

The Crab Nebula is the remains of a supernova explosion observed in 1054 A.D., when it suddenly appeared in the sky with a brightness exceeding that of Venus. The visible nebulous material is the expanding wreckage, a gas shell expanding at 780 miles per second.

Dr. Friedman said that a crucial experiment to show that the Crab X-ray source is a neutron star is planned for July 7. The rocket has to be launched within a 15-second "window" late in the afternoon. If this cannot be done, the next opportunity to perform the same experiment will be in eight years.

The X-ray source will be scanned to see what happens to the radiation intensity when the moon passes between Crab and the rocket's instruments.

• Science News Letter, 85:291 May 9, 1964

New Earth Core Theory

➤ A RING of dense rock, 300 miles thick, lies between a fluid outer core of the earth and the heart of the earth, an Australian scientist told the meeting of the National Academy of Sciences in Washington, D. C.

This is a new theory about the structure of the earth's core, an area about 4,400 miles in diameter in the center of the earth.

U. S. Geological Survey

PORTABLE SEISMOGRAPH—Donald B. Hoover of the U.S. Geological Survey operates the portable earthquake recording system he developed for the study of small earthquakes and geophysical field work. The recorder can be placed anywhere and will operate unattended for ten days, storing up earthquake data automatically which is then played back later in the laboratory.

Our planet is composed of an outer crust of rock and soil about three to 40 miles thick. Underneath this crust lies the mantle, which is fluid hot rock extending for about 1,800 miles into the earth. In the middle lies the earth's core.

This central core is the subject of new theories put forth by Dr. K. E. Bullen of the University of Sydney, Australia.

The earth's core is denser and more solid than the mantle, geologists generally agree. It is made up of a fluid outer core, a transitional region and an inner core.

The inner core, about 800 miles in radius, has for many years been considered to be more rigid than the outer core.

This interpretation is based on the fact that seismic waves, generatetd by earthquakes, more through this inner region at a faster rate than they travel in the outer core.

Further calculations of Dr. Bullen show this inner core is surrounded by a solid region that gradually becomes less rigid toward the center of the earth.

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Earth-Asteroid Collision

➤ AN ASTEROID could collide with the earth "tomorrow" or 14 million years from now.

However, automobile traffic is a greater hazard than an asteroid collision, Dr. Edward Anders of the University of Chicago believes.

He calculated the orbits of the eight Apollo asteroids, which cross earth's path through space, to determine how likely one is to collide with the earth within the next 100 million years. His calculations showed that most members of the Apollo group have strayed from the asteroid belt.

Dr. Anders said his private hope was that if one of the asteroids should hit earth, it would do so during a period of calm in international relations. The impact would look "remarkably like" the explosion of a very large bomb, he told a news conference in Washington, D. C.

The eight Apollo asteroids were seen only during one orbit and are now lost, Dr. Anders reported to the National Academy of Sciences meeting.

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Virus Reproduction Study

➤ SCIENCE is a step closer to conquering the viruses that cause diseases in humans, animals and plants through a study of virus reproduction just reported.

Dr. K. K. Reddi of New York University School of Medicine said that his team of researchers has concluded that the place where tobacco mosaic virus is made is in the center, or the nucleus, of the host cell.

Tobacco mosaic virus, called TMV for short, has given tobacco a claim to legitimate fame in the scientific world. This virus infecting the tobacco plant was the first virus to be isolated in crystalline form and chemically identified. Dr. Wendell Stanley was awarded a share of the Nobel Prize in Chemistry in 1946 for this 1935 achievement, which produced a tremendous impact on virus research.

The infective nature of viral nucleic acid was first discovered in TMV, information later extended to other plant and animal viruses, and of great value in understanding their properties.

TMV is a molecular parasite. It is a rod-shaped particle about 100,000th of an inch long, consisting of 95% protein and 5% nucleic acid. Its nucleic acid is RNA, or ribonucleic acid, which in TMV is the sole repository of genetic information.

Dr. Reddi and his coworkers explored the biochemical events within the cell following infection with TMV. They found that the reproduction of RNA within the host cell does not proceed by way of cellular DNA, or deoxyribonucleic acid, which controls the synthesis of the RNA present in the normal healthy cell.

Viral infection of a cell means the introduction of a foreign genetic code, Dr. Reddi said at the meeting of the National Academy of Sciences in Washington, D. C. Competition for the control of the cell's metabolic machinery goes on between cellular and viral nucleic acids after the foreign code is introduced.

The infecting virus uses cellular mechanisms for synthesis of its own kind after changing the host RNA to a less complex compound.

Much remains to be discovered about the biochemical events that take place within the host cell following infection with TMV, Dr. Reddi said, and the "unsolved problems are full of exciting possibilities."

This study is supported by a Research Career Development Award and a research grant of the U.S. Public Health Service.

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Blue of Blue Ridge

➤ THAT BLUE HAZE of the Blue Ridge Mountains or the hazy days of summer are partly caused by the sweet and pungent odors of plants.

The blue summer haze is remarkably like the smog hanging around our big cities, Drs. R. Rasmussen and F. W. Went of Washington University, St. Louis, reported to the National Academy of Sciences annual meeting in Washington, D. C.

The organic volatile substances that fill our air with blue-gray haze are composed partly of gasoline vapors around the cities, but most of them in the country come from the odors which make plants smell and which man uses as turpentine and in perfumes.

By analyzing air far removed from industrial activities, in spots such as the Smoky Mountains, the Ozarks and the Rocky Mountains, the scientists found that plants were the sources of most common volatile substances in the air, such as isoprene, alpha-pinene, beta-pinene, limonene and myrcene.

Concentrations of these volatiles vary, rising during the day and decreasing during night, the scientists said.

Laboratory and field experiments show that these plant volatiles are changed to submicroscopic particles by sunlight or a strong light from a carbon arc in the presence of nitrogen oxide or iodine vapor.

• Science News Letter, 85:292 May 9, 1964

GENERAL SCIENCE

NAS to Form National Academy of Engineering

➤ THE NATIONAL ACADEMY OF SCIENCES, which has existed since the days of Lincoln, has taken steps to form a National Academy of Engineering.

A committee of 25 of the nation's leading engineers, picked by Dr. Frederick Seitz, NAS president, will seek a Congressional Charter for the proposed Academy.

Committee officers are: chairman, Dr. Augustus B. Kinzel, vice president for research, Union Carbide Corporation; vice chairman, Dr. Eric A. Walker, president, The Pennsylvania State University; and executive secretary, Dr. Harold K. Work, director of the research division and associate dean, school of engineering and science, New York University.

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GENERAL SCIENCE

Five New Trustees For Science Service

➤ FIVE NEW TRUSTEES have been elected to the governing board of SCIENCE SERVICE, Inc., the non-profit institution for the popularization of science founded in 1921.

The National Academy of Sciences has named to the board its former president, Detlev W. Bronk, president of the Rockefeller Institute, New York.

The American Association for the Advancement of Sciences has nominated Dr. Athelstan F. Spilhaus, dean of the University of Minnesota's Institute of Technology and director of the U.S. Science Exhibit at the Seattle World's Fair, and Dr. Bowen C. Dees, associate director of the National Science Foundation, Washington.

Dr. Eric C. Walker, president of Pennsylvania State University, prominent in organizing the National Academy of Engineering, was elected upon nomination of the National Research Council.

Edward W. Scripps II joins the board as a representative of the E. W. Scripps Estate.

Ralph B. Curry, editor of the Flint, Mich., Journal, was reelected.

The other trustees of SCIENCE SERVICE are: Dr. Wallace R. Brode, Washington, D. C., chemist; Dr. Henry Allen Moe, Clark Foundation, New York City; Dr. Harlow Shapley, Harvard College Observatory; Dr. Benjamin H. Willier, Johns Hopkins University biologist, and Dr. Leonard Carmichael, psychologist, just retired as Secretary of the Smithsonian Institution; also O. W. Riegel, director, Lee Memorial Journalism Foundation, Washington & Lee University; Gordon B. Fister, associate editor, Call-Chronicle of Allentown, Pa.; Edward J. Meeman, editor emeritus of Memphis, Tenn., Press-Scimitar, and Ludwell Denny, Scripps-Howard Newspapers.

The officers of SCIENCE SERVICE are: President, Dr. Carmichael; vice president and chairman, Mr. Scripps; treasurer, Dr. Brode; and secretary, Dr. Watson Davis.

• Science News Letter, 85:292 May 9, 1964

Questions

ASTRONOMY—How much did the rotation rate of Jupiter slow in 1961? p. 290.

BIOLOGY—What factor is missing in the blood of human hemophilia victims? p. 295.

GEOPHYSICS—What is the new theory about the structure of the earth's core? p. 291.

PHYSICS—What is the most effective sound for use as a warning signal? p. 294.

PUBLIC HEALTH—What deadly parasite is housed in the snail "*Australorbis?*" p. 302.

ZOOLOGY—How large is the heart of a sea urchin? p. 297.

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