ASTRONOMY

Moon's 'Seas' Held Water

The moon's seas may have once contained water if a new theory that the moon originally consisted of a mixture of dust and ice is true—By Walter Wingo

➤ THE "SEAS" of the moon at one time really held water, a Government geologist believes.

Dr. Charles R. Warren of the military geology branch of the U.S. Department of Interior's Geological Survey, Washington, D.C., has developed a theory that the moon originally consisted of a mixture of dust and ice like the head of a giant comet.

In a report to members of the Geological Society of Washington, Dr. Warren suggested that if his theory is true, then the dark areas of the moon's surface may have contained water for a brief period some three billion years ago.

The parent body of the moon had a composition similar to that of a comet's nucleus, "but it was much bigger and heavier," Dr. Warren said.

"This proto-moon must have been formed in the cold of interstellar space, either outside the solar system or before the sun heated up about 4.5 billion years ago."

When the icy, dusty conglomerate approached the sun, the ices began turning into gases and streaming away, just as they do in comets. The sheer mass of what was to become the moon, however, held the dust together so it piled up many miles thick.

"It was perhaps three billion years ago," Dr. Warren suggested, "that the orbit of the comet-like mass brought it close to the earth so that it became captured as a satellite.

"During the first orbits around the earth, tremendous tides were raised in the moon. Tidal friction generated heat that vaporized large quantities of the remaining ice, forming an atmosphere around the moon," Dr. Warren said.

The atmosphere formed faster than it could stream away, he said, and hence air pressure continued to rise. Eventually, there was enough air to permit liquid water to condense.

A pumice-like material called "impactite" floated on the ancient lunar seas, he said. This impactite is what now makes the "maria' areas of the moon appear dark.

Such material, Dr. Warren said, would provide a "reasonably firm foundation" for the landing of space vehicles.

He agreed with theories that water in the form of gas much thinner than the water vapor in the earth's atmosphere can be obtained on the moon by drilling wells.

• Science News Letter, 85:133 Feb. 29, 1964

CHEMISTRY

New Possible Compounds

➤ THREE WAYS of making a chemical compound previously believed impossible to create have been suggested. The methods involve the breakup of radioactive atoms.

Equipment to make the "impossible compound," helium difluoride, is now being assembled in San Ramon, Calif. If the experiment is successful, chemistry textbooks will have to be rewritten.

This will be the second revision required within two years, due both times to the fact that the noble gases were thought incapable of forming compounds of any kind. In 1962, the two elements—xenon, a noble gas, and fluorine—were found to react to make compounds, the first discovered being stable xenon tetrafluoride.

Now three California scientists have proposed that fluorine could be made to react with helium under conditions of radioactive change. This could have "dramatic implications," they reported in Science, 143: 674, 1964.

Many chemists consider synthesis of helium difluoride a "far-out" idea, just as they once thought it was impossible to create xenon tetrafluoride.

Until 1962, chemistry students around the world were taught that the noble gases—helium, neon, argon, krypton, xenon and radon—did not combine with any other element to make a compound. Since 1962, not only xenon but also radon and krypton have been reported to form compounds.

However, chemists have thought even since 1962 that helium would not combine with another element. Drs. George C. Pimentel and Richard D. Spratley of the University of California, Berkeley, and Dr. Alan R. Miller of Aerojet-General Nucleonics, San Ramon, Calif., urge that their three methods of making helium difluoride be tested.

Dr. Miller is starting to check on one method, the radioactive decay of tritium, triple-weight hydrogen, in a crystal of potassium difluoride. The other ways they suggest are the radioactive breakdown of lithium-6 and bombardment of fluoride with alpha particles, which are the nuclei of helium atoms.

Discovery of helium difluoride would require a new theory of how chemical compounds are formed, just as creation of xenon tetrafluoride did.

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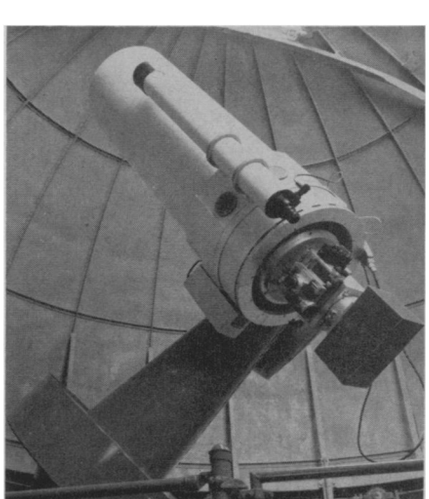

University of Chicago

NEW TELESCOPE—The new 24-inch rotatable reflecting telescope of Yerkes Observatory, University of Chicago, is shown fully installed and ready for the study of the invisible magnetic field which coils around the Milky Way galaxy.

ASTRONOMY

New Telescope Will Map Galaxy Magnetic Field

➤ A NEW TELESCOPE installed at Yerkes Observatory will map the magnetic field that coils around the billions of stars of the Milky Way galaxy in which the sun, earth and other planets are located.

Although the magnetic field itself is invisible, it leaves its mark on starlight passing through the cosmic dust trapped in it. These dust particles cause the previously random light packets to vibrate in a single direction, or become polarized.

By analyzing the polarized starlight after it has passed through the Milky Way's magnetic field, the depth and intensity of the field can be charted.

Dr. William A. Hiltner, director of Yerkes Observatory, Williams Bay, Wis., operated by the University of Chicago, designed the new 24-inch telescope.

• Science News Letter, 85:133 Feb. 29, 1964

METALLURGY

New Thin Film From Rare Metal Niobium

➤ A NEW METHOD of making a film of a rare elemental metal, niobium, that at supercold temperatures conducts electricity without any loss in current, has been developed commercially by National Research Corporation, Cambridge, Mass.

As thin as a millionth of an inch, the niobium film will be used as a shield for magnetic fields. It will allow the manufacture of a computer no larger than a human brain. Shields for nuclear gyroscopes for space navigation will also be made from the metal.

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