



GEOLOGY

Moon Material On Earth

Strange glassy objects called tektites and impactites found on the earth's surface, believed to be lunar debris, have been dated as falling millions of years ago by a new technique.

► MATERIAL BLASTED off the moon's surface by the impact of giant meteorites has dropped upon the earth on at least three separate occasions in the geological past.

Strange glassy objects—called "tektites" and "impactites"—are found by the thousands in sites scattered across the earth.

One theory is that tektites are solidified droplets of lunar material melted and splashed into space when large meteorites crashed into the moon. Impactites are thought to be products of the impact of large extraterrestrial objects against the earth.

Evidence linking the formation of tektites and impactites was provided by a new technique for dating geological specimens, discussed by Drs. Robert L. Fleischer and P. Buford Price of General Electric Research Laboratory, Schenectady, N. Y., at the New York meeting of the Geological Society of America.

The research showed impactites were formed at the same time as the three major groups of tektites. Although tektites may have plunged to earth shortly after their solidification, they are too small to have smashed impactites into existence. Thus the tektite falls must have been accompanied by much larger objects from the same source.

The scientists concluded that more lunar material may be present on earth than was realized previously.

The new dating technique uses trace amounts of uranium that are found in nearly all rocks, including tektites and impactites. Uranium atoms undergo natural fission at a known rate, splitting into fragments of roughly equal size. As the fission fragments move apart in the rock, they

leave a trail of damage a few atoms in diameter.

Drs. Fleischer and Price, working with Dr. Robert M. Walker, have learned how to "develop" these damage trails chemically, much as the chemical action of a photographic developer is used to bring out the image of an exposed film.

In this simple technique, the fission tracks are etched out to the point where they become visible under the optical microscope. For a given concentration of uranium, the older the rock, the more tracks are found.

The new dating technique was tested on tektites of known age, dated previously by the potassium-argon method, based on the rate at which atoms of radioactive potassium decay into atoms of argon.

The new dating technique was applied to impactites which contained either too little radioactive potassium or too much contamination in the form of bubbles to be dated by the potassium-argon "clock." The results showed that impactites found in the Libyan Desert in North Africa were formed at the same time, 34 million years ago, as tektites found several thousand miles away in the United States.

Impactites found on the island of Tasmania in the Pacific Ocean were about 700,000 years old, the same age as tektites found throughout the Far East. Earlier, using the potassium-argon "clock," other scientists had demonstrated that impactites found in Germany were as old, 15 million years, as tektites found in Czechoslovakia.

In another portion of the dating work, the time of arrival on earth of Far Eastern tektites was measured by counting tracks in the outer rims.

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Moon History May Be Clue to Ancient Rocks

► THE HISTORY of the moon and earth relationship ages ago may solve questions about puzzling rocks deposited on earth.

Geologists have tried to discover how widespread sheet-like rocks were deposited over large portions of the earth hundreds of millions of years ago. These rocks were deposited at the bottom of shallow seas that once washed over vast areas long ago—some of them covering the United States from east of the Rockies to the Atlantic.

A remarkable number of short-termed oscillations of the earth's surface created the shallow seas, reported Lawrence K. Lustig of the U.S. Geological Survey, Department of the Interior.

But what caused the oscillations?, he asked many of the nation's top earth scientists at a four-day meeting of the Geological Society of America.

He then stated that the answer may well lie in the history of the earth-moon system.

Referring to laws of gravity and planetary movements, Mr. Lustig said that "the separation of the earth and moon may have increased through geologic time from an initial distance of 9,000 miles to its present 240,000 miles.

"The tidal forces, therefore, upon the earth, were proportionately greater in intensity and frequency and might have caused the buckling of the earth which resulted in shallow seas covering areas of our continent."

Mr. Lustig believes that increasing distances between the earth and moon throughout geologic time may be of "fundamental importance in the interpretation of ancient sedimentary environments."

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Construction Upsets Base

► BUILDING CITIES of rock above the ground is disturbing the rock foundation below the ground.

City planning should include geologic mapping plus "geologic guidance at all levels of land-use planning," advised John McGill, U.S. Department of the Interior's Geological Survey. He said that smaller, steadily growing municipalities should also benefit from geologic assistance.

Concern for ground stability in today's growing cities was expressed by geologists attending the 75th anniversary meeting of the Geological Society of America.

More intelligent use of land and water in the Los Angeles, Calif., area has resulted from geological studies. Yet urban expansion in the San Francisco area has resulted in using more "marginal" land such as dangerous slide areas and active fault zones, pointed out Dorothy H. Radbruch of the U.S. Geological Survey office in Menlo Park, Calif.

"Many buildings have been constructed on the historically active San Andreas and Hayward faults," she said.

Future tragedies can be avoided by intelligent analysis of surrounding land before the construction starts.

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