

GEOLOGY-NUCLEAR PHYSICS

Earth Is Getting Warmer

Contradiction of the theory that the earth is cooling off is based on the amount of radioactivity measured in meteorites.

► **CONTRARY** to the popular belief that the earth is cooling off, it actually is warming up.

Dr. Harold C. Urey, University of Chicago distinguished service professor of chemistry and Nobel-prize winner, advanced a new theory on the origin and development of the earth at the meeting of the National Academy of Sciences at Rochester, N. Y. His "warming-up" hypothesis is based on the amount of radioactivity measured in meteorites.

Heat at the earth's center is generated in part by the dropping of the metallic components toward the center, but largely by radioactivity. Since it is impossible to penetrate far enough into the earth's center to determine the heat, the temperature has been calculated by measuring the radioactivity of meteorites, which are believed to be similar to the earth's core.

The earth was formed, according to Dr. Urey's chemical hypothesis, from a conglomerate of metallic iron and rock. The iron, melted by the heat during a period of more than a billion years, fell to the center of the earth to form the earth's core.

The earth's crust, affected by this phenomenon, was formed into mountain ranges. As more metal moves from the outer crust to the earth's core, at intervals of approximately 200,000,000 years according to Dr. Urey's estimates, other mountain ranges will be formed.

The more common belief on the development of earth, had been that the iron of the earth sank to the center while the earth was very hot. It was believed that the iron formed the core of the earth and the solidification of the crust of the earth began from the core outwards, with convection in the molten earth being the effective means for the transfer of heat.

"If radioactivity found in the surface rocks is representative of an average sample of the whole earth," Dr. Urey said, "comparatively rapid heating of the earth must result."

Rough calculations show, he points out, that the gravitational energy stored which would be dissipated in the formation of the present core of the earth is greater than the radioactive heat that has been generated in two billion years from all radioactive materials. The iron flowed to the center of the earth through channels opened by the wetting of the stone phase by the iron phase, generating a large amount of heat. This leads to convection in the outer mantle

of the earth and the formation of mountains.

Metallic iron also played an important role in the formation of the earth's atmosphere and similarly in determining the atmospheres of Mars and Venus according to the Nobel-prize winner.

With a somewhat lower temperature for Mars and a somewhat higher temperature for Venus, he accounts for the water and carbon dioxide supplies of the minor planets.

Dr. Urey also accounts for the difference in density of the moon and earth by postulating a decreasing temperature between the beginning and final phases of the formation of the earth and her satellite so that iron was not in the initial preplanetary

cloud but was present in the final cloud. Earth, 80 times larger than the moon, accumulated the iron particles faster than the moon.

The hypothesis of the metallic state leads to an initial structure of the earth with a core of moon-like material surrounded by a layer of silicate and iron phase.

The core did not move for some billion years until the radioactive heat melted the iron and decreased the solidity of the silicates of the original solid earth.

Dr. Urey suggested that the primordial core rose to the surface during the Pre-Cambrian times (more than one and a half billion years ago) and first produced continental land and probably the Pacific basin, and now forms the outer iron fore-mantle of earth some 230 miles thick.

The iron of the primordial mantle moved to the interior, producing increased temperatures at depth which generated convection currents, which have produced folded mountains, continental drift and glacial periods. The same phenomena, he believes, are taking place on Mars, but in a less modified status.

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ASTRONOMY

Comet Dust Sifts to Earth

These fragments promise to yield valuable data on matter from outer space. A world-wide search for them was suggested.

► **SIFTING** into the earth's atmosphere a about 850 miles per hour or less are little fragments of comets that promise to give astronomers valuable samples of matter from outside the earth.

Dr. Fred L. Whipple of Harvard College Observatory, Cambridge, Mass., told the National Academy of Sciences meeting in Rochester, N. Y., about these "micro-meteorites" which are so small that they can smash into our air without being burned to nothing.

A world-wide search for this meteoric dust was suggested. It could be captured in the upper air through airplane flights, recovered from melted snow of remote polar regions or discovered in the depths of the ocean or layers of the earth formed in past geologic ages.

These particles are very small, the largest being about a ten-thousandth of an inch. Because they are so tiny their large surface compared with their weight allows them to get rid of the heat that is caused by hitting the air molecules. Thus they do not burn in a flash of light like the larger meteorites seen in the night sky. They fall to earth as fine dust.

The comet dust can be identified because it is sharp edged instead of being rounded like volcanic material, wind blown particles

or fine material from power plants and other earthly fire. Even the small fragments of the larger meteorites or fireballs should be fused and smooth.

Investigations have been made so far on micro-meteorites by Drs. D. K. Norris and Frank Hogg of Toronto and Dr. H. E. Landsberg of the U. S. Weather Bureau.

There is hope, Dr. Whipple said, that micro-meteorites found in the geological layers can tell us about the history of the solar system. He suggests that deposits of the Cretaceous era should be searched for evidence as to whether the solar system was filled then with more fragments of planets and other cosmic material, as some astronomers have theorized.

For his researches on meteorites, Dr. Whipple was presented with the J. Lawrence Smith medal of the National Academy of Sciences, one of the highest awards of American science.

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In the 20-year period from 1926 to 1946, some 6,500,000 acres of America were planted in *forest trees* by public and private agencies and individuals; about two-thirds of these planted acres are classed as successful.