ASTRONOMY

Earth's Growth Stunted

Theory of arrested growth in youthful period of four planets closest to the sun is advanced by Purdue physicist. They include Mercury, Venus, Earth and Mars.

➤ THE four planets closest to the sun—Mercury, Venus, our own earth and Mars—never quite grew up. Their growth was stunted when they were young. They took on weight, but failed to balloon in size like Jupiter and the other planets farther away from the sun.

This picture of the creation of the solar system is advanced by Dr. D. ter Haar of Purdue University's Department of Physics.

The solar system did probably start from a sun surrounded by a gaseous envelope just as the German philosopher, I. Kant, thought, Dr. ter Haar reasons. Likewise the six planets that have satellites began as bodies with extended atmospheres.

Atmospheres Around Planets

When they were being created, the outer planets were surrounded by atmospheres, but the inner planets had practically none. As a result, today the outer planets such as Saturn and Jupiter are surrounded by extensive satellite systems while the inner planets possess only a few of the known satellites.

The original solar envelope contained between one-tenth and five-tenths of the solar mass, the Purdue physicist calculates.

Three distinct steps followed in the creation of the planets by condensation are reported to be:

1. The formation of nuclei for further condensation.
2. The growth of these nuclei.
3. The capture of additional light compounds by gravitation. The planets are pictured as growing much faster during the last stage when they captured numerous gas molecules than during the first two.

The first two stages, Dr. ter Haar figures, are similar to the formation of drops of moisture in a supersaturated vapor. The temperature determines which compounds are supersaturated at a given density.

In the gaseous disk from which the planets were created, the temperature decreased with increasing distance from the center. Consequently, in the regions nearer to the sun fewer compounds took part in the initial condensation phases than in the outer regions of the solar system.

"It now turns out," Dr. ter Haar states in the journal, *Science,* (April 23) "that in the regions of the solar system where the terrestrial planets are found, only inorganic compounds will condense. In the regions of the outer planets, however, both organic and inorganic compounds can condense. It is very remarkable that the change-over from inorganic to organic compounds lies just in the region between the inner and outer planets."

Two results follow, Dr. Ter Haar calculates. First, there will be fewer condensation nuclei in the inner parts of the system than in the outer parts. Secondly, the specific density of the condensation nuclei in the inner regions will be higher than that of the nuclei in the outer regions. From this alone, we could expect heavy, small inner planets and light, large outer ones.

The inner planets grew more slowly than the outer planets during the first two stages. Therefore the outer planets may well have reached the third stage before the envelope surrounding the sun had dissipated very much. But by the time the inner planets had reached the size that gravitational effects would be important, the gaseous envelope had practically dissipated and appreciable further growth was impossible.

Third Stage of Growth

In the building up of the outer planets, about 20 times as much matter in the sun's gaseous disk took part as was used in the formation of the inner planets. By failing to grow up fast enough, these were cheated out of the third stage of their growth, that of acquiring lighter gases by gravitational capture.

A qualitative analysis such as this, Dr. ter Haar reports, shows that the theory advanced by Kant in the middle of the eighteenth century is stronger than was suspected. It is thus rather satisfying to find, he says, that the differences between the inner and outer planets can be explained by the Nebular Hypothesis, the simplest possible explanation of how the solar system came into being.

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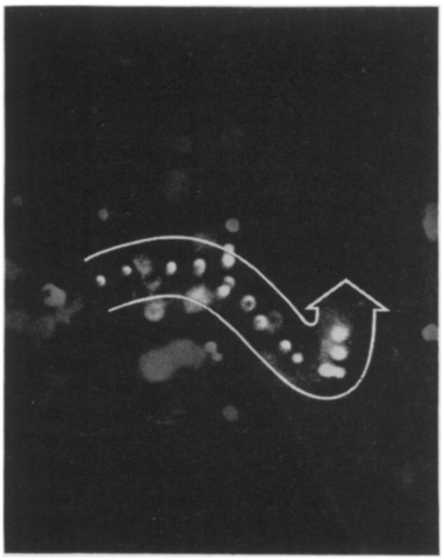

ELUSIVE ELECTRON—The first definite tracks of electrons, particles that make up atoms, are shown in this picture, developed after an electron sped through the emulsion, striking silver grains in its path. This shows an enlargement of a 13-grain track. X-rays, filtered through lead, were used to start the electrons flying into this new type of Eastman plate.

PHOTOGRAPHY

Electron Tracks Captured On New Photographic Plate

➤ ELECTRONS, known as particles of electricity, are the commonest of the fundamental bits of matter, and scientists work with them daily.

Yet only now have electron tracks been definitely photographed. Eastman Kodak scientists announced that tracks about two thousandths of an inch long—less than the thickness of this piece of paper—have been captured in a special photographic emulsion.

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GENERAL SCIENCE

Three Medals Awarded at National Academy Meeting

➤ THREE medals were awarded in absentia to scientists at the annual meeting of the National Academy of Sciences.

Dr. Alexander G. Vologdin, a corresponding member of the Academy of Sciences of the U.S.S.R. and a distinguished scientist of the Paleontological Institute in Moscow, received the Charles Doolittle Walcott bronze medal and award for 1947 for his researches on the