

Earth May Have Comet-Like Tail

Astronomy

STREAMING out from the earth on the side away from the sun there may be a sort of comet-like tail, which we sometimes see as a faint patch of light called the "Gegenschein" or "counter-glow." This is the suggestion just made by Dr. E. O. Hulburt, of the Naval Research Laboratory, in a report to the American Physical Society on the nature of the zodiacal light.

This light can usually be seen on a dark, clear night after twilight has gone. It appears as a faint beam of light extending upward from the western horizon along the ecliptic, the path of the planets. In the spring, when the ecliptic is almost vertical in the evening, it can best be observed. Near the horizon it is brighter than the Milky Way. In the early morning, before dawn, it can also be seen, extending upwards in the eastern sky. The generally accepted theory of its

origin, in recent years, has been that it is caused by sunlight reflected from a mass of tiny bodies, each moving in its own orbit around the sun. The "Gegenschein," seen in a dark night sky as a faint patch of light directly opposite the sun, was supposed to be due to a concentration of these small particles about a million miles from the earth on a line with the sun and the earth, as a result of the gravitational attraction of these two bodies.

Dr. Hulburt, however, revives an old theory, that the particles originate in the earth's own atmosphere. He points out that outbursts on the sun, which give rise to magnetic storms and displays of the northern lights, also affect the zodiacal light. On this account, he suggests, it seems as if the zodiacal light is not mere reflected sunlight, but that the particles themselves first absorb the light, and then re-emit it. Physically, this is quite a



Dr. E. O. Hulburt of the U. S. Naval Research Laboratory

different process from reflection.

According to Dr. Hulburt, collisions of atoms and molecules high in the earth's atmosphere cause some to be ejected from the influence of the earth with a speed of about seven miles a second. They reach levels of some 40,000 miles above the surface of the earth where they are partly broken into ions by the action of the sun's ultra-violet light. Here they are acted upon by three forces: the gravitational attraction of the earth, the magnetic attraction of the earth and the pressure of light from the sun. This arranges them into a ring, oblong in cross-section, surrounding the earth. It is this ring that gives off the zodiacal light, suggests the physicist.

"The ring is perhaps 50,000 kilometers (31,000 miles) distant on the daylight side of the earth," he said. "On the night side the ring stretches out to great distances of 100,000 or 1,000,000 kilometers (62,000 or 620,000 miles). At its far end ions continually stream away in the direction of the sun's rays, so that the ring merges into a sort of comet's tail which may be the Gegenschein."

At the rate at which the atoms would escape from the earth, Dr. Hulburt estimates that about a millionth of the atmosphere would be ejected in a million years.

One point which his theory does not explain, he admits, is that about 15 per cent. of the zodiacal light is polarized, that is, the light vibrations are only in certain particular directions, instead of being indiscriminately in all directions, as in ordinary sunlight.

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Fellowships Awarded

General Science

TWENTY-FOUR new National Research Council fellowships, together with ten renewals of fellowships previously granted, were granted to young American scientists at a recent meeting of the officers of the Council. These fellowships are among the most prized of all scientific awards open to the younger generation of scientists, not only because of the prestige they carry but because they confer cash as well. The sum granted to any individual is not fixed, but is adapted to his needs, and is supposed to enable him to conduct research for one year without depleting his own funds or compelling him to resort to routine jobs to support himself.

Four of the newly appointed fellows expect to carry on their advance work in foreign lands. They are F. R. Immer, W. M. Krogman, C. H. McConnell and L. T. Steiger. The remaining twenty will study at universities and research institutions in this country. They are O. D.

Anderson, George S. Avery, Jr., G. W. Beadle, Harold W. Beams, Alden S. Crafts, L. W. Gellermann, F. L. Howard, W. E. Lammerts, R. K. Meyer, Dorothy K. Postle, Daniel Raffel, Hugh M. Raup, T. C. Schneirla, Eleanor H. Slifer, C. V. Smythe, Olive G. Stull, J. H. Tiffin, T. Elliott Weier, Gene Weltfish and John S. Yerakis.

The reappointed fellows are Frederick Bernheim, Carleton S. Soon, Eileen W. Erlanson, G. LaVerne Freeman, Anna H. Gayton, D. A. Johansen, T. J. B. Stier, Donald Keith Adams, Paul R. Gast and Dietrich C. Smith.

The appointments at the recent meeting were all made in the field of biology, psychology and anthropology. Other awards are made in medicine, physics and chemistry. A further group of appointments in biology will be made about May 1. Applications for these should be in the hands of the committee by April 1.

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