Physical Sciences Notes

BIOPHYSICS

Magnetic Field of Heart Measured

Magnetic forces created by changing electric currents in the heart muscle create a pattern that may back up the electrocardiogram as a diagnostic tool.

Techniques for measuring weak, alternating currents down to one-billionth of a gauss have been developed, Dr. David Cohen of the University of Illinois at Chicago reports in SCIENCE. Using careful shielding that excluded magnetic disturbances from outside sources, Dr. Cohen produced what he calls magnetocardiograms, which are symmetrical with electrocardiograms taken from the same subjects.

Electrocardiograms measure the minute electric currents put out when the heart muscle contracts and expands. Abnormalities in the currents indicate damage to heart muscles.

The changing currents create magnetic fields which sensitive equipment is now able to measure. Dr. Cohen said the magnetocardiograms may supplement ECG's because they give a more precise location of abnormalities.

CRYOGENICS

Superconductivity Upped Two Degrees

A substance that becomes superconducting at 20 degrees K., two degrees higher than any other material so far discovered, was described in SCIENCE by Dr. B. T. Matthias and six associates at Bell Telephone Laboratories.

The new superconductor is a combination of niobium-aluminum (Nb_3Al) and niobium-germanium (Nb_3Ge), formed in a particular crystal structure called beta-tungsten.

Superconductivity is a property of a number of substances in which electrical resistance apparently is zero at very low temperatures. Many superconductors have a critical temperature of around three degrees K. (minus 270°C.), but a number have been discovered that become superconducting at about 18 degrees. Previous attempts to raise that temperature had failed.

The beta-tungsten structure, which is typical of the high-temperature superconductors, is a complex molecule that has a tunnel formation when viewed from one direction but a random structure on the other two sides.

SELENOLOGY

Gamma Rays Measure Moon Surface

The moon's surface contains neither granite nor sizeable uranium deposits—at least where the Russian probe Luna 10 made its measurements.

In a report from the Vernadsky Institute of Geochemistry and Analytical Chemistry, published by the Smithsonian Institution's Astrophysical Observatory, five Russian scientists said gamma radiation measurements showed the moon consists of basic rocks such as basalt.

The report said only 10 percent of the gamma radiation measured by Luna 10 orbiter came from the decay of potassium, thorium and uranium. The rest came from cosmic rays and from radioactive isotopes that had been created by cosmic rays.

The Russian report compared the gamma radiation measured by Luna 10 with that of typical rock formations on earth, and concluded that the moon was most like basalt, although some parts might be meteoric rock. The radiation did not vary more than 40 percent from lunar highlands to lowlands. The measurements, made in April, 1966, analyzed the moon's composition to a depth of about 10 inches.

OPTICAL ASTRONOMY

World's Second Largest Telescope

The Australian and British Governments have finally agreed to proceed with building a 150-inch optical telescope in Australia at an estimated cost of some $11 million—the biggest scientific project so far on that continent.

Site of the new telescope will be at Siding Springs, about 80 miles north of Dubbo, New South Wales, already occupied by a field station of the Australian National University.

Operating costs, estimated at about $200,000 a year, as well as facilities, will be shared by the two Governments. Work on the instrument and buildings is expected to start within the year.

The telescope is scheduled to be operating by 1973, which is close to 20 years after the project was first suggested. To help meet the target date, the telescope will be of conventional design, based on a similar instrument under construction at the Kitt Peak National Observatory in Arizona.

The Siding Springs telescope will be the largest in the Southern Hemisphere, and one of the few larger than 100 inches in the world. The 200-inch atop Mt. Palomar in California is the world's largest.

ATMOSPHERIC

Dust Storms Reverse Field

The normal electric field between the earth and the ionosphere is reversed and greatly intensified during dust storms, recent experiments in West Africa show.

During the December-to-March Harmattan dry wind season, which causes dust storms over a million square miles in West Africa, measurements were made of the electric field existing between the earth and the atmosphere.

In fair weather, the field was about 100 volts per meter, since the upper conducting layers of the atmosphere have a positive potential with respect to ground.

During the dust storm, the field stayed the same during the night, but in the morning it fell to zero and then went sharply negative, reaching 4,500 volts per meter. During the day the negative field dissipated and returned to normal in the evening.

D. J. Harris, of Ahmadu Bello University of Zaria, Northern Nigeria, said the effect might come from the sun's heating the earth and causing turbulence in the air layers. He reported his observations in NATURE.