ASTRONOMY

Dwarf Stars' Growth

Spectroscope reveals, over period of months or years, how dwarf stars grow. Variations in the light from some is apparently caused by contact with interstellar dust clouds.

➤ THE GROWTH of dwarf stars by building up from dust particles in surrounding clouds can be watched by the spectroscopic "eyes" of giant telescopes.

The changes may, however, take months or years for astronomers to spot, Dr. Alfred H. Joy of the Mount Wilson and Palomar Observatories in California told the American Astronomical Society meeting in Boulder, Colo., in his address as retiring president.

Variations in the amount of light received from some dwarf stars in our Milky Way galaxy are apparently caused, Dr. Joy said, by contact of the stars with interstellar dust clouds. Because light from dwarf stars is very feeble, it is difficult to spot any except the nearest ones.

Another type of light variation, so far found only in nine stars, lasts for only a few minutes. In these stars, hot flares, covering only one or two percent of the surface, burst forth to increase the total brightness many times, but only for a very brief period. Hot flares of a similar type are frequently found near sunspots on the solar disk.

The spectrum, or rainbow of spread-out light, for such flares, Dr. Joy reported, shows temperatures as high as 10,000 degrees absolute. They are found in the small, red dwarf stars whose temperatures are cooler than that of the sun.

Previously, all variable stars had been considered to be stars of high luminosity whose light changes were accompanied by vast, but fairly regular pulsating movements and moderate changes in the temperature of the outer atmosphere.

Now, Dr. Joy said, it is certain that some of these variable stars are dwarfs, and that their light variations result from explosive outbursts covering limited areas of the star's surface.

A third type of dwarf variable may be two stars close together. One of them may have a shell that either expands or rotates at 450 miles per second, the other an atmosphere slightly cooler than that of the sun. At irregular intervals, the hot source blows up, increasing its intensity a hundred times.

Other types of dwarf variables include the novae, some of which can explode more than once. When they burst out, their brightness increases several thousand times. In the dwarf binaries, another type of variable, dark areas and bright prominences, similar to those of our sun, have been found.

Science News Letter, September 5, 1953

ASTRONOMY

Star Formation Theory

➤ A RUSSIAN astronomer's theory of star formation was examined and found partially wanting by Dr. Otto Struve of the University of California at the American Astronomical Society meeting in Boulder, Colo.

Russian Dr. V. G. Fesenkov's theory consists of two parts, the formation of stars in the galaxy at large, with which Dr. Struve was in general agreement, and the formation of star chains in filamentary gaseous nebulas, with which he disagreed.

The second part of the theory, Dr. Struve said, is "open to question." He has been unable to spot most of the star chains that Dr. Fessenkov uses as examples. In two or three filaments where chain-like formations appear to be present, they are few in number and probably of no "evolutionary significance," Dr. Struve reported.

Both parts of the Russian's theory make use of "tidal instability" on a large scale. This is similar for star formation to the tearing apart of a satellite when its distance from a planet is less than about three times the radius of the planet. It is believed that this was the mechanism by which Saturn's rings were formed.

In the case of a star at large in our galaxy which begins to form out of a cloud of dust and gas, the disrupting body is the entire Milky Way, whose mass is 100,000,000,000 times that of the sun. This mass causes tides in the condensation of dust and gas, and these tides tend to tear it apart. Working against this disrupting force is the gravitational attraction of the condensation upon itself, which tends to keep it from being torn apart.

The condensation in any nebula, Dr. Fessenkov believes, wins this tug-of-war if its density is such that there are at least 100 hydrogen atoms in each cubic centimeter. The Orion nebula, for instance, has a density of about 1,000 atoms per cubic centimeter. Therefore, stars very likely are being built by condensation in this nebula, and in such other dense clouds as the dark masses in Taurus, Scorpius and Ophiuchus.

The density that Dr. Fessenkov uses for formation of stars in the galaxy at large also accounts for the observed average distance between neighboring stars.

Science News Letter, September 5, 1953

NEUROLOGY

Human Body Defense Mechanism Investigated

➤ WHEN THE human body is under "attack," physically or mentally, a complex communications network is used by the brain to alert body defenses.

This network is being explored by University of California at Los Angeles and Long Beach Veterans Administration doctors, including Drs. Charles Sawyer, Sidney Porter, Sidney Roberts and Margaret Slusher.

There are four main stations in the network: sensory nerves—focus of the attack, which may be in the form of an injury to any part of the body; the brain; pituitary gland, and the adrenal system.

The research is concerned with how the network stations communicate with one another and what parts of the brain are involved in an attack, or stress, situation. Communications involve nerve fiber circuits and chemical messengers which travel in the blood stream.

Key network station in the brain has been identified as the hypothalamus. This brain center is apparently linked to sensory nerves by a nerve fiber circuit.

One source of communication between the hypothalamus and pituitary appears to be a chemical messenger which apparently travels through a vascular channel. This messenger stimulates the pituitary to send out ACTH, the familiar hormone now widely used as a therapeutic agent. ACTH goes to the adrenal glands and causes them to send out substances which aid the body in defense against stress situations.

Science News Letter, September 5, 1953

INVENTION

Patent Device That Detects Radiant Energy

➤ DRS. RALPH Bray, West Lafayette, and Karl Lark-Horovitz, Lafayette, Ind., received Patent No. 2,650,311 on a "radiant energy detecting method and apparatus," which they assigned to the Pudue Research Foundation, Lafayette.

Designed to detect relatively small changes in light or heat, the method involves directing radiant energy upon p-type semiconducting germanium. As the radiant energy grows stronger at the point-contact electrode, the back-resistance to current flow diminishes. Eventually a point is reached where current flows "backward" more easily than it flows "forward." A trigger device can be used to signal this change.

Science News Letter, September 5, 1953