

ASTRONOMY

Milky Way Questions

Study of the astronomically-young Milky Way system may reveal whether our galaxy is a spiral galaxy with pinwheel arms.

► IS OUR Milky Way system a spiral galaxy, with pinwheel arms extending out from the brilliant center cluster of stars and luminous gases? Is the stellar system to which our sun belongs still in the process of being created? Questions such as these were raised at the Lowell Institute lecture in Boston by Dr. Bart J. Bok of Harvard College Observatory. He considers them among the outstanding problems which Milky Way astronomers will attempt to solve during the next quarter of a century.

All stars that are within reach of modern telescopes, with the exception of those obviously belonging to spiral nebulae and similar systems outside our own, are part of the Milky Way system, Dr. Bok pointed out. The general shape and outline of the system is known with a fair degree of certainty. The visible band of the Milky Way marks the central plane of the system.

The total mass of all stars in the system is probably around one hundred billion times the mass of our sun. But the stars are only half the story. The interstellar gas and cosmic dust in the spaces between the stars have a total mass just about equal to that of all stars together.

Our sun is far from the center of the system. The best current estimate places the sun 176 million billion miles from the central star clouds. The system is highly flattened, with a diameter 20 to 50 times as great as its thickest part.

The Milky Way system rotates around a central axis, moving at right angles to the galactic plane. Our sun and all the stars near it move around the center at a speed of about 150 miles per second. It takes our sun about two hundred billion years to complete one galactic revolution.

Exhaustive study of the stellar population in a dozen Milky Way fields may go far toward settling once and for all the question of the shape of the system to which our sun with its planets belongs. Modern Schmidt-type telescopes, equipped with suitable large prisms, are the instruments best suited for determining whether our system is a spiral galaxy, Dr. Bok pointed out.

Large reflectors, like the 200-inch soon to be completed, by their ability to penetrate to the faintest stars can supplement the Schmidt by supplying complete data for small areas of the sky.

The distribution of star clusters, novae and other luminous objects, supported by the evidence from galactic rotation, places the center of our Milky Way system unmistakably in the direction of the Sagittarius star cloud. An exhaustive study of this section of the heavens has not yet been made. It can be done effectively today and must be done promptly, Dr. Bok emphasized.

Present indications are that our Milky Way system cannot have been as it is today for more than three to ten billion years. In other words, the age of our galactic system is put at between 15 and 50 galactic revolutions. We learn this from stellar motions, from the ever-present spendthrift stars that burn away rapidly their internal energy supplies, from calculations on the stability of clusters and from the observed recession of distant galaxies.

The relative youth of our Milky Way system affects all our thinking on variations in stellar population and on the interrelation between stars and interstellar matter. The abundance of interstellar matter and its tendency to aggregate in clumps of all kinds and sizes may be the best available evidence that our Milky Way system is still in the process of being built up.

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MEDICINE

Cancer Cells Change Species To Become Hybrid Units

► WHEN CELLS become cancerous they change their species and become hybrid cells. They are then quite independent of the cell organization in the body of which originally they were a part.

This theory of how cancer arises is presented by Dr. Robert G. Green, University of Minnesota Medical School cancer researcher, in *Science* (Jan. 24).

Whether cancer is caused by coal tar chemicals, by X-rays, ultraviolet radiation or radium, or by a virus, the mechanism of the cancer production seems to be basically the same, Dr. Green states.

Studies of the virus associated with breast cancer in mice led Dr. Green to this theory of the mechanism of cancer production. He found in these studies evidence suggesting that not only is the virus intimately associated with the cancer cell but also that the association is concerned with the species character of this cell.

The mouse breast cancer cell appears to be a mouse cell with a substituted virus species, from the immunological findings.

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