ASTRONOMY

Our Galaxy Biggest Known, 100,000 Light Years Across

New Method Gives Independent Confirmation of Estimate; Nearly Quarter-Billion Years Required for Rotation

WE ARE big town folks after all, astronomically speaking. The nebula or galaxy of which our sun is a not-too-prominent member is the biggest one astronomers know anything about. Most of the other nebulae are considerably smaller, though the famous spiral nebula in Andromeda is almost as big as our own, Dr. J. S. Plaskett, director of the Dominion Astrophysical Observatory at Victoria, B. C., stated in his address before the meeting of the American Association for the Advancement of Science, Pacific Division.

Ideas Have Expanded

Ideas of the size of our galaxy have grown with time. Dr. Plaskett told of the expansion of the estimates, from the estimate of Herschel in the late 18th century until today. Herschel considered the universe to be only 6,000 light years in diameter and 1,100 light years thick. Most recent estimates make it 100,000 light years across, with a thickness ranging from 5,000 to 10,000 light years.

This measurement, which was arrived at by analysis of the color of incoming light from the stars, has just been checked by Dr. Plaskett, who used a new method depending on the rate of rotation of the whole galaxy. His results, announced for the first time at the meeting, are in close agreement with the measurements as given.

Dr. Plaskett painted a word-picture of the galaxy:

"The main feature of the galaxy is the great flattened disc of stars and star clouds containing probably over 90 per cent. of the mass of the system. This disc of stars is about 100,000 light years in diameter, with a thickness of scarcely more than 5,000 light years near the boundary, which is practically circular in outline, and increasing to perhaps 10,000 light years near the center, where, from analogy with external systems there may be a spheroidal enlargement some 15,000 light years or more in thickness.

"While the star density rapidly decreases at these limits, there appear to be scattered stars extending perhaps to 15,000 light years beyond the periphery and a proportional amount above and below the central disc. This central disc of stars is surrounded and approximately outlined by the globular clusters, having a practically spherical distribution.

"There can be no reasonable doubt that the discoidal shape of our stellar system is produced and maintained by its rapid rotation in its own plane. The presence of this rotation has been so conclusively demonstrated from the motions of stars and other celestial objects in the system, and it seems such a universal property of external systems that it can no longer be doubted that the galaxy is in rotation in its own plane.

"The rotation is not like a solid body, where stars nearer the center would rotate more slowly than those farther out. On the contrary, the rotation is more like planetary motion, where the inner planets rotate much more rapidly than the outer ones. The rotational speed near the sun is about 275 kilometers (175 miles) a second, but so vast is the stellar system that it will take 220,000,000 years to complete one revolution.

One-Third Unorganized

"From the dynamical consequences of the rotation it is learned that the total mass of the system is 165,000,000,000 times that of the sun. As the number of stars probably present could not make up this mass, it appears likely that the deficiency in mass will be readily made up by the absorbing matter which a probable density and distribution would give at least one-third of the mass of the whole system.

"While the dimensions, structure and dynamical organization of the stellar system have been fairly definitely stated, the proposed model should only be considered as a preliminary attempt at the solution of this difficult yet very important astronomical problem. In view of the changes in viewpoint in the past 20 years, one would be very rash to predict that even approximate finality had been reached. It can only be hoped that the concept developed, which has a certain unity and completeness, may make a useful introduction to more complete knowledge," Dr. Plaskett concluded.

AS OTHERS SEE US

The Great Spiral in Andromeda, not quite so large as our own galaxy, but apparently very much like it in general shape and composition.

Desert Lake

Driest place in the United States now, the Mohave Desert once contained a great freshwater lake. And there is evidence that human beings lived on its shore terraces, for stone tools have been found there.

The history of lakes that are now deserts was told by Dr. Ernst Antevs, research associate of the Carnegie Institution of Washington.

Other vanished western lakes were Lake Lahontan in Nevada, and Lake Bonneville in Utah, of which the Great Salt Lake is a dwindled fragment. All these lakes existed during the closing stages of the pleistocene Ice Age.

After the glaciers had melted away from the northern part of the continent there ensued an exceedingly dry period, drier even than the climate of the West today, Dr. Antevs stated. This in turn was succeeded by a change for the better, which, according to geological evidence, came about 2,000 B. C. During this time several new lakes, including Owens Lake in California and Abert and Summer Lakes in Oregon, came into being.

Not only lakes but arroyos or deep, usually dry gullies, have been examined for evidences of climatic changes by Dr. Antevs. Arroyo formation in the modern West has come as a result of over-grazing by the white man's flocks and herds, he says. But there are arroyos pre-dating Columbus, and these, Dr. Antevs has

concluded, were due to prolonged droughts that killed the protecting cover of vegetation and permitted erosion for a time.

Water from the Black and Mediterranean seas, pouring out through the Strait of Gibraltar, spreads itself out through a large part of the Atlantic Ocean, Dr. H. U. Sverdrup, director of the Scripps Institution of Oceanography, stated.

The water from the Mediterranean, easily detected because it is saltier than ocean water, is found at levels between 4,000 and 6,000 feet below the surface, said Dr. Sverdrup. It spreads out through the entire North Atlantic, crosses the Equator, and can be traced past South Africa. At still greater depths water from the North Atlantic flows south, and along the bottom water from the Antarctic flows north as far as the middle of the North Atlantic.

In general, the California scientist reported, the oceanic circulations of the Atlantic and the Antarctic are better known than the water movements in the Pacific and Indian oceans.

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PUBLIC HEALTH

Parran Endorses $200,000,000 Anti-Tuberculosis Campaign

SURGEON GENERAL Thomas Parran, Jr., of the United States Public Health Service endorsed a $200,000,000 drive by the National Tuberculosis Association for the complete eradication of the "white plague" in the United States.

The plan for tuberculosis control, worked out by a committee headed by Homer Folks, executive secretary of the State Charities Aid Association of New York, was adopted by the association at its thirty-fourth annual meeting in Los Angeles.

The suggested program, to start in 1939, would require $140,000,000 for the construction of 40,000 hospital beds for tuberculosis patients. Funds for this job, it was indicated, would come from a variety of sources, including state governments and Federal funds from such sources as the Works Progress Administration, which has already provided hospitals and equipment totaling nearly 10,000 beds.

Industry Blamed

The unwillingness of industry to reemploy ex-tuberculous persons may force the adoption of an expensive Federal and state pension system, Edward Hochhauser of New York's Altro Workships, an institution for providing work for arrested cases of tuberculosis, warned.

Speaking before the National Tuberculosis Association, Mr. Hochhauser termed such a refusal to rehire former sufferers from the "white plague" unsound economically and sociologically.

Tuberculosis no longer should be looked upon as a permanently disabling disease and more attention must be paid to rehabilitation work, it was said generally before the association, holding a symposium on handling of arrested or cured cases.

Scoring industry's unwillingness to employ these people, Mr. Hochhauser declared:

"The testimony of industry can now be added to that of sheltered workshops. Responses from several hundred employers indicate that a very substantial number of employable tuberculous go back to their old jobs or some readjusted job with their old employer, many on part time.

"Sheltered workshops and colonies for patients have demonstrated that men and women may gradually return to normal work with partial or complete self-support."

Asks Social Security

A plea for Social Security relief for the families of tuberculosis victims was made by Homer Folks.

Speaking at a luncheon meeting of the National Conference of Tuberculosis Secretaries, Mr. Folks called suitable relief for the families of sufferers an essential factor in work remaining to be done in eradicating the disease.

Wants Control for Homeless

Some form of Federal control for homeless, transient tuberculosis sufferers who spread the disease in the communities they visit was urged.

Thousands of homeless men and women, ill with the "white plague," are a constant menace to healthy communities throughout the country, Dr. Halbert L. Dunn of the U. S. Bureau of the Census, declared.

Arizona, Colorado and New Mexico, meccas for sufferers from tuberculosis, face particularly acute problems in dealing with the disease, Dr. Dunn stated, because of the large number of out-of-state sufferers who flock there.

The Federal control suggestion was made by Dr. H. E. Kleinschmidt, director of health education of the association, and James G. Stone and Zdenka Buben of Los Angeles. The transient problem is complicated. Dr. Kleinschmidt added, because of the difficulty communities have in caring for their own residents.

"The non-resident is scorned and shoved from place to place," he continued. "What communities do not seem to realize is that the tuberculosis wanderer sows the seeds of his disease in countless stable communities.

"The only hope of solution lies in some form of Federal control or cooperation for the footloose patient, who, although he has forfeited his rights of residency, is yet an American citizen."

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PALEONTOLOGY

Earth's Earliest Edens Untroubled by Serpents

SNAKES are a comparatively new thing under the sun. In the Age of Reptiles, that ended only 50 or 60 million years ago, they were almost unknown. Only the last of the dinosaurs, that lived in Cretaceous times, ever had a chance to see snakes, and those were of the earliest models and probably not numerous at that. At least, their fossils are exceedingly rare today.

Data on the relative recency of snakes are included in a new monograph on Fossil Snakes of North America, written by Charles W. Gilmore of the U. S. National Museum and published by the Geological Society of America.

Snakes really began to get down to business on this planet at about the same time that mammals started their long climb to domination. Newcomers together, the snakes and we.

The first snakes were non-poisonous, resembling modern blacksnakes and boas in that respect. Venomous species did not appear, so far as the present record shows, until upper miocene time, roughly from 13 to 18 million years ago. First rattlesnakes began buzzing in the