

ASTRONOMY

"Young" Galaxies

Watch-shaped groups of stars, with long spiral arms may eventually develop into compact globular clusters of suns, Dr. Harlow Shapley states.

► WATCH-SHAPED groups of myriads of stars, with long spiral arms like those of a fiery pin-wheel, may be "young" galaxies that will eventually develop into compact globular clusters of suns, Dr. Harlow Shapley, director of the Harvard College Observatory, stated upon receiving the Franklin medal, the highest award of the Franklin Institute.

"The suggested direction of evolution is the reverse of that proposed by Sir James Jeans many years ago, who assumed that the spheroidal galaxies, through rotation, become flattened and develop spiral arms," Dr. Shapley said in presenting his alternative tentative hypothesis as to how galaxies evolve.

Spiral galaxies, like our own Milky Way system, contain many clouds of stars and star-dust, Dr. Shapley explained. Differential rotation within such galaxies would gradually tend to eliminate these clusters and clouds. Thus, as they develop, the spiral galaxies should become free of such non-uniformities and take on the smooth structure characteristic of the spheroidal galaxy.

Like our own Milky Way, the wheel-shaped galaxy contains many supergiant stars. Stars which cluster together in elliptical and spherical systems, on the other hand, are almost never supergiants. Since it is at present believed that the life of a supergiant star is relatively short, the existence of supergiants would indicate that the spirals are less developed, Dr. Shapley said, unless such supergiant stars are still being born.

"New studies made with the South African reflector of the Harvard Observatory," the Director stated, "suggest that there are truly transitional types between the open and the compact star clusters—a phenomenon that had not been evident from the studies of the globular clusters of our own galaxy."

Our own Milky Way is about 100,000 light years in thickness, Dr. Shapley pointed out. Remeasurement of the distances of about 30 of the 100 globular clusters of our galaxy established the thickness of the haze of stars and clusters that surrounds the flattened watch-shaped main body of the galactic system.

Giant globular clusters are about as bright and of the same general structure as the nuclei of some of the spiral galaxies. From comparisons of the greatest of globular clusters and the smallest of the spheroidal galaxies, we believe that clusters like the southern hemisphere groups of stars, Omega Centauri and 47 Tucanae, Dr. Shapley said, are organically related to such galaxies as the companions of the great Andromeda Nebula, our nearest neighbor.

The study of globular star clusters has made four major contributions to the study of the sidereal universe, Dr. Shapley pointed out:

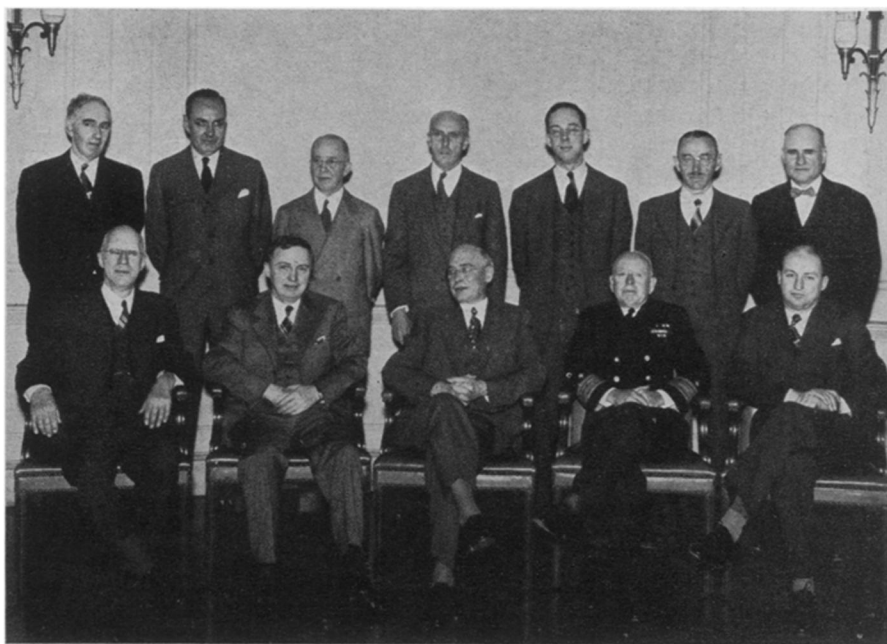
"The first developed rapidly at the Harvard Observatory about fifty years ago when Professor S. I. Bailey began his extensive work in the discovery and study of variable stars in the brighter globular

clusters. Eventually a dozen workers entered the field. The 'cluster-type Cepheids' were linked up with the regular or classical Cepheids into the period-luminosity relation, which has provided us the yardstick for measuring our galaxy and others.

"The second somewhat revolutionary discovery concerns the candle-powers and colors of stars in globular star clusters. The distribution of the cluster stars among the various candle-powers and spectral classes (colors) was found to be distinctly different from that of stars that surround the sun. Later this globular cluster distribution was found to be characteristic of the nucleus of our galaxy and the nuclei of other spiral galaxies like the Andromeda Nebula; and similar also to the distribution in the great spheroidal galaxies.

"Through their non-symmetrical distribution in the sky, globular clusters gave us our first clear indication that the center of our galaxy is very distant in the direction of Sagittarius.

"The high radial velocities, frequently more than a hundred miles a second, have shown that the clusters, perhaps like high-latitude Cepheid variables, have a peculiar part in the structure of the



FRANKLIN INSTITUTE MEDAL DAY DINNER—Back row, left to right: Dr. Rupen Eksergian, Levy Medal; Dean Gilmore D. Clarke, Brown Medal; Sanford L. Cluett, Longstreth Medal; Dr. Henry B. Allen, Secretary and Director, Franklin Institute; Greer Ellis, Certificate of Merit; Walter J. Coppock, Certificate of Merit; Dr. Zay Jeffries, Clamer Medal. Front row: Prof. Lewis F. Moody, Cresson Medal; Dr. Harlow Shapley, Franklin Medal; Charles S. Redding, President, Franklin Institute; Rear Adm. Stanford Hooper, Cresson Medal; Edwin A. Link, Potts Medal.

galaxy, unlike that of neighboring stars or the stars of the Milky Way."

Other medals awarded were the Cresson Medal, the Potts Medal, the Levy

medal, the Clamer Medal, the Brown Medal and the Longstreth Medal. (*See SNL*, March 31.)

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setts and Spring Hill College near Mobile, Ala., and of the U. S. Coast and Geodetic Survey at Ukiah, Calif., and Tucson, Ariz.

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PSYCHOLOGY-SAFETY

Disabled Have Accidents

Excessive number of accidents occur among workers with certain types of impairments, especially hearing defects. Efficiency equal to able-bodied.

► WORKERS with physical disabilities have more accidents than able-bodied workers, although the two groups are about equal in production and efficiency, Dr. Verne K. Harvey and Dr. E. Parker Luongo, medical director and assistant medical director of the U. S. Civil Service Commission, report, (*Journal, American Medical Association*, April 14).

Their findings are based on a study made in preparation for the responsibilities the Commission will have in placement of disabled veterans.

The job performance of 2,858 physically impaired workers and of 5,523 able-bodied workers, both male and female, of similar age, experience and occupational characteristics was compared. The workers were employed in 43 establishments of the War and Navy Departments in various parts of the country.

An excessive number of accidents occurred among workers with certain types of physical disabilities. Workers with hearing defects had accidents at the most frequent rate and at the highest severity rate of all impaired workers.

The other types of impairment which accounted for an excessive number of accidents were deformities of shoulder and hip, amputation of fingers and visual defects.

A psychologic factor plays an important part in accident proneness. This is true of both able-bodied and physically impaired workers. It is more significant, however, among workers with certain types of physical defects.

Fatigue may be important in this connection. The study showed that physically impaired workers given to frequent accidents also had frequent short absences for illness. Those who most often report minor illness may get tired more easily and be more likely to have accidents. Workers with arrested tuberculosis had the highest average number of days lost because of sickness but the lowest rate for frequency of accidents. This may be because a large number of them take

sick leave as a precautionary measure, having been taught while under treatment for tuberculosis to avoid fatigue.

Among significant findings of the study was the fact that less than one-tenth of the impaired workers were given special considerations with regard to transportation, lunch and rest periods, hours of work, methods of remuneration, special equipment or reporting time.

"The commission will continue," the report concludes, "to stress the need for, and within the limits of its authority, aid in the development of adequate health and safety programs for federal employees, so that disabled veterans and other impaired workers will be judiciously placed in positions where they may function proficiently and safely."

Science News Letter, April 28, 1945

SEISMOLOGY

Two Earthquakes Recorded Weekend of April 14-15

► TWO EARTHQUAKES shook the earth's crust at widely separated spots under the ocean bottom, during the weekend of April 14-15, seismologists of the U. S. Coast and Geodetic Survey determined, from data transmitted telegraphically through Science Service.

The first epicenter was off the coast of Kamchatka, in the region of latitude 55 degrees north, longitude 161 degrees east. It was a strong shock, originating at 10:35.1 p.m., EWT, on Saturday.

The second quake, which was of only moderate intensity, had its epicenter off the west coast of Mexico, below the mouth of the Gulf of California, in approximately latitude 23 degrees north, longitude 108 degrees west. Time of origin was 3:50.5 p.m., EWT, on Sunday.

Observatories reporting were those of the Jesuit Seismological Association at St. Louis University, Georgetown University, Weston College in Massachu-

Grass will grow on rocky road shoulders if from 5% to 10% of clay soil and some fertilizer are added.

The deepest oil well drilled up to the present time is a 16,246 foot hole at Taft, Calif., in which some oil was found at the 11,000 foot depth but none below; it took 17 months to drill the well.

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