

SCIENCE NEWS

A DISTANT UNIVERSE OF STARS

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THE most distant object seen by man, another universe of stars, has been discovered and measured. Photographs made at the Harvard Observatory show that a faint and nameless luminous haze in the sky in the constellation of Sagittarius, the Archer, is another universe like ours, although perhaps smaller. Announcement to this effect will shortly be made in the bulletin of the Harvard Observatory by Dr. Harlow Shapley, director.

It takes light a million years to travel from the new universe to earth, Dr. Shapley estimates from his photographs. So far as is known, this is the most distant object ever seen by the eye of man. The most distant stars and clusters or nebulae in the universe known prior to this measurement are only about 250,000 light years away. The new universe is six quintillion miles away.

This object, known to astronomers only by its number in star catalogues, N.G.C. 6822, was first observed many years ago by the late Dr. E. E. Barnard, but only recently have pictures been made of it by the 100-inch reflecting telescope at Mt. Wilson, the largest in the world, and it is these photographs which have made possible the identification of this cloud of stars as a universe like our own. It is similar, these pictures show, as do others taken by Dr. Perrine, of the Cordoba Observatory in the Argentine, to the Magellanic Clouds, faint patches of light in the sky of the Southern Hemisphere, first seen by Magellan and now recognized as great stellar systems distinct from the Milky Way and our own stellar system although much smaller than it.

The study of the photographs made at the Harvard Observatory shows that N.G.C. 6822 covers an area in the sky less than one thousandth that covered by the large Magellanic Cloud. But this difference in size, as well as the extreme faintness of N.G.C. 6822, can be accounted for by its much greater distance in space. The photographs show that its most brilliant stars are little, if any, brighter than magnitude eighteen. It is only because thousands of stars are packed closely together that the object could be seen faintly in Barnard's telescope.

The angular dimensions and the brightness of some of the nebulae that belong to the new cloud have been estimated on the Harvard photographs and compared with similar objects in the Magellanic Clouds. Estimates of the distance of N.G.C. 6822 will be made more accurately when the variable stars found at Mt. Wilson have been thoroughly studied.

But as the matter now stands, this faint glowing haze, not to be seen with the unaided eye, hardly a pin-head of light in a telescope of moderate power, is now known to be far beyond the limits of our own universe of stars, or, as astronomers call it, "our galactic system," from the fact that it is bounded by the Milky Way or Galaxy. The greatest estimate of the diameter of our universe is 350,000 light years, and N.G.C. 6822, the faintest output

of infinity captured by the mind of man, is three times as far away.

The constellation Sagittarius, in which it is found, is now too near the sun to be visible. It can be seen during the summer, the constellation being the next to the east of Scorpio, the familiar "kite" of the southern sky in summer and containing the great red star, Antares.

SELECTION OF IMMIGRANTS

Science Service

NUMERICAL limitation and careful selection of immigrants, with a quota provision based upon the census of 1890, are advocated in the report of the Committee on Selective Immigration of the Eugenics Committee of the United States, made public to-day by Professor Irving Fisher, chairman of the Eugenics Committee.

Immigration is a long-time investment in family stocks rather than a short-time investment in productive labor, is the key-note of the report. A system of consular certificates for intending immigrants, based upon inspection abroad, mental tests for all with a score more than equal to the average American intelligence as a requirement for admission, and severe restriction of the present system of bonding aliens admitted on appeal, are also advocated.

A conviction that the census of 1890 should be used as the basis of any percentage law has been growing rapidly. Since there were fewer southeastern Europeans here in 1890 than in 1910, this provision would decidedly cut down the number of such immigrants. Immigrants from northwestern Europe furnish us with the best material for American citizenship. They have higher living standards than other immigrants, average higher in intelligence, are better educated, more skilled and better able to understand our form of government. A percentage limitation based on the 1890 census is sound American policy based on historical facts.

It is not a question of racial superiority of northwestern Europeans or of racial inferiority of southeastern Europeans. It is simply a question as to which of these two groups of aliens as a whole is best fitted by tradition, political background, customs, social organization, education and habits of thought to adjust itself to American institutions.

Experts have told us that had mental tests been in operation, and had the "inferior" and "very inferior" immigrants been refused admission to the United States, over 6,000,000 aliens now living in the country, free to vote, and to become the fathers and mothers of future Americans, would never have been admitted. It is high time for the American people to put a stop to such degradation of American citizenship.

The report relates the findings of Dr. H. H. Laughlin, assistant director of the Eugenics Record Office, who made a study of the "socially inadequate" groups in 445 institutions for defectives and criminals, and who reports that 44 per cent. of this institutional population

was either foreign born or had one or both parents foreign born. He also states that the immigrants from northwestern Europe, on the whole, contribute far less in proportion to this defective population than do those from southeastern Europe.

The original argument for the percentage law was economic. The fundamental reason for its continuance is biological. Mental tests are demanded of all immigrants.

No alien should be admitted who has not an intellectual capacity superior to the American average. Aliens should be required to attain a passing score of the median army Alpha test, or the corresponding score of other approved tests; these tests to be given in the native tongue of the immigrant. Aliens whose family history indicates that they come of unsound stock should be debarred.

Since, according to the report, a large percentage of bonded aliens admitted on appeal have violated their bonds and remain in this country, many of them as public charges, it is urged that aliens should be admitted on appeal over the heads of the medical examiners only in very rare and exceptional cases, and in such cases, cash bonds in substantial sums should be required.

Requirements of consular certificates to be made essential to admission should include a certificate from the local police that the intending immigrant had never been convicted of crime other than a political one. Certificates are advocated on the ground of both efficiency and humanity in that they would prevent the distressing scenes when immigrants are separated from their families and turned back at the port of entry.

Members of the Committee on Selective Immigration, presenting this report, include Madison Grant, chairman; Robert DeC. Ward, Charles W. Gould, Lucien Howe, Albert Johnson and Francis H. Kinnicutt.

MAGNETIC IRON DEPOSITS IN RUSSIA

Science Service

THE largest deposits of magnetic iron ore known to man have been discovered in Russia through the visit of Professor Dr. P. Lasareff, director of the magnetic division of the Physical Institute of Moscow, who is in this country as the guest of the American Society of Zoologists.

Lying near Kursk in European Russia, about midway between Moscow and Crimea, they extend for 150 miles, and at one point are 10 to 20 miles wide. The deposits take the form of a great subterranean mountain with its peak 450 feet under ground.

Magnetic observations made primarily for the advancement of science are responsible for the discovery.

For fifty years the compass needle has been known to act strangely in the vicinity of Kursk. The vertical dip at one point was over three times as great as that at the magnetic north pole where the earth's magnetism is felt most strongly.

In 1919 while civil war was still in progress in that region, Professor Lasareff, using only instruments constructed in the laboratory at Moscow, began a magnetic survey of the area for the Russian Academy of Sciences

of which he is a member. Investigations continued during the summers following, and gravitational measurements were added to the magnetic.

To measure the force of gravity, Professor Lasareff used the Eotvos balance, a very sensitive instrument invented in Germany, that will detect very small changes in gravity caused by masses in the earth's crust. It is said that this new device is so sensitive that it will detect a man thirty feet away.

Combining the gravitational and magnetic observations, Professor Lasareff was able to map the deposits of magnetic iron ore before they were discovered.

Diamond and churn drills were set at work at points designated and the huge ore body of magnetite was actually found. It lies about 450 feet under the surface and already the drills have penetrated over 500 feet without any sign of its exhaustion. The top portion of the deposit analyzes 40 to 45 per cent. iron, but deeper portions run over 50 per cent. So colossal is the deposit that Professor Lasareff would not attempt to estimate the quantity in tons. The next largest deposit known is in Norway and has a length of only about six miles.

After the steel churn drilling tool had penetrated the deposit of ore for about 100 feet it became so highly magnetized that it would attract and hold ten to twenty pounds of iron.

This summer Professor Lasareff will make an exploratory trip into Siberia and the same methods of investigation will be used.

Professor Lasareff believes that with the possible exception of the United States and Canada, Russia is the land of greatest promise for future natural resources.

HYDRO-ELECTRIC POWER

Science Service

HYDRO-ELECTRIC power development has entered into an era of unprecedented expansion, says a report on the subject to appear in the next issue of *Power*. Applications involving an estimated installation of 21,500,000 horsepower, permits and licenses for 7,500,000 horsepower, and 2,400,000 horsepower built or building is the three year record of the Federal Water Power Commission. Three years ago the aggregate installation of all water-power plants in the United States amounted to only 9,000,000 horsepower.

The largest project started last year was that of the Quebec Development Co., at Lake St. John on the Saguenay River, Quebec, Canada, where a total development of 1,200,000 horsepower is projected. The first development will be only 500,000 horsepower. Another large project is that of the Susquehanna Power Co., which will develop 360,000 horsepower along the river of that name. The West Virginia Power and Transmission Co. has a permit to begin work on the Cheat River in West Virginia which it is thought may yield 600,000 horsepower.

The tendency generally is said to be toward larger and larger units. A unit of 70,000 horsepower was put into service at Niagara Falls, and according to expert engi-

neers, plans for 100,000 horsepower units are on the drawing boards. It has been shown that workmen who direct the greatest amount of power receive the largest wages, the greatest average daily wage being in the United States where the *per capita* production of horsepower is greatest. To produce 70,000 horsepower by steam would require the continuous work of 1,500 men, from the time the coal was mined until it was fired under the boilers.

The world's available water power is calculated as about 440,000,000 horsepower. Nearly half of this is in Africa which has resources estimated at 200,000,000 horsepower. Seventy-five million horsepower are awaiting development in Asia, while the resources of Europe as 45,000,000 horsepower. Although the water power resources of all North America are only 60,000,000 horsepower, the development up to the present on this continent has been 53 per cent. of the total development in all the world.

PHOTOGRAPHS OF THE INNER BODY

Science Service

By the use of radium emanation added to blood serum, Drs. A. Kotzareff and L. Weyl, of Paris, have been able to obtain photographs of cancers inside the body, according to the report of the Paris representative of the American Medical Association. If confirmed, this new method gives promise of having far reaching effects on the clinical detection and treatment of cancer and other new growths.

The new method involves withdrawing from the body a certain amount of blood. From this blood, the serum is obtained. To this blood serum, a definite dosage of radium emanation is added. The radium treated blood-serum is then injected into the body. The radium emanations tend to locate in the most rapidly growing tissues, such as tumors of a malignant character like cancer. When a photograph of the body is made, the presence of the radium emanation manifests itself on the photographic plate.

When this method was applied to a pregnant guinea pig, it was found that after a certain period of time the radium emanations located in the embryo and disappeared from the remaining tissue. In the same way, it was found the emanations tend to locate in cancer and other rapidly growing tissues.

Medical men here are awaiting the results of using this new method in a sufficiently large number of verified human cancers to confirm the favorable experiments on animals.

MEASUREMENT OF THE SUN'S HEAT

Science Service

At La Quiaca on the northwest boundary of Argentina where, at 11,000 feet above sea level, the sun's rays beat down on a desert mountain region out of clear skies, the Argentine government will soon begin measurement of variations in the sun with a view to their use in practical weather forecasting. William H. Hoover, of the Astro-

physical Laboratory of the Smithsonian Institution, will leave New York on January 12 for Buenos Aires to install and operate the necessary apparatus.

There are two other stations now in operation making similar measurements. One of these is the Smithsonian station on Mount Montezuma, in Chile, and the other is located near Wenden, Arizona, on Mount Harqua Hala.

Indications have been found at these stations that weather is influenced in some way by variations in solar radiation. The new station will undertake experiments to determine the value of such variations for actual weather prediction. To measure accurately the changes in the amount of heat sent out by the sun, it is necessary to measure the radiation outside the atmosphere or the amount of heat which would reach the earth if there was no air on it.

To do this, the amount of sun's heat falling upon one square centimeter of the earth during the course of one minute is measured at different times of the day when the air mass is different. When the sun is overhead the absorption by the air is least, and it is greatest when the sun is near the horizon. These differences are plotted in the form of a curve and from this data the amount of radiation outside the atmosphere is calculated.

ITEMS

Science Service

ONE more step toward the isolation of the new vitamin X that controls reproduction has been taken by Drs. Herbert M. Evans and Katharine Scott Bishop, of the anatomical laboratory of the University of California. These physiologists found that if rats were fed on a certain diet of so-called "pure" food they are rendered sterile and will not reproduce. When they were fed also some such substances as lettuce, wheat embryo, alfalfa leaves, they became normal in their sex function. Dr. Evans has now determined that the substance, vitamin X, can be extracted from favorable food by alcohol and ether and that these extracts cure animals of proved sterility. That male rats as well as female are made sterile by lack of vitamin X has also been proved by laboratory work just completed.

EPIDEMICS in Russia showed a marked improvement during the first four months of this year, according to a report just issued by the Health Section of the League of Nations. No cases of plague have been reported since February and only a few isolated cases of cholera have been notified. Increasing incidence of malaria is probably the most serious feature of the present situation in Russia. Over a thousand cases of malaria were reported during three weeks in Moscow alone.

AMATEUR radio sending stations must remain quiet between 8 and 10:30 P. M. each evening and during local church services on Sunday morning, according to a Department of Commerce regulation just issued. But the governmental prohibition was anticipated by the national organization of radio amateurs, the American Radio Relay League, which has recommended to its members silent hours between 7:30 to 10 P. M. ever since broadcasting became popular.