

SCIENCE NEWS

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GIANT NEBULAE

Two clouds of white hot gases each so vast as to be capable of engulfing not only the solar system, but many of the nearest stars as well, have been found in two different parts of the sky, according to an announcement by Professor Harlow Shapley, director of the Harvard College Observatory. One is in the Great Magellanic Cloud, a luminous area in the constellation of Dorado resembling a detached piece of the Milky Way. It can only be seen from points in the southern hemisphere, but the other one is in the constellation of the Triangle which is visible in our northern skies in the early winter. It is connected with a spiral nebula, Messier 33.

Both of these objects have been known for some time, although they are only visible with a large telescope and are known only by their numbers in the new general catalog of such objects. The southern one is referred to by astronomers as N. G. C. 2070 and the other as N. G. C. 604. Determinations of their actual size, however, have only been made possible by recent determinations of their distances.

Professor Shapley himself measured the distance of the Large Magellanic Cloud by a study of photographic plates made at the Harvard branch observatory at Arequipa, Peru, and found it so far away that its light would take a hundred thousand years to reach us. The distance of the spiral, Messier 33, was determined last year by Dr. Edwin Hubble, of the Mt. Wilson Observatory, and it turned out to be about a million light years.

Using these measures of the distances, it is found that the diameter of N. G. C. 2070 is 264 light years and for N. G. C. 604 it is 198 light years, so that if the earth were placed at the center of either one, not only would the sun and planets of the solar system be included in it, but so also would a large number of the stars we see in the sky. Both objects are much greater than the more familiar gaseous nebulae, such as the one in Orion, which is only about three light years in diameter, less than the distance from us to the nearest known star.

THE GROWTH OF BACTERIA IN POLARIZED LIGHT

GROWTH and activity of bacteria can be speeded up by the kind of light supplied by the moon, T. F. Morrison, graduate student at Princeton University, has discovered through experiments on the kind of microorganisms that cause dead fish to shine in the dark. This work follows up and appears to confirm results obtained a couple of years ago by E. G. Bryant, in South Africa, who found that fish exposed to the moonlight spoiled more quickly than those kept in the dark.

In his experiments Mr. Morrison used an artificial moonlight, made by passing ordinary electric light through a polarizing prism. The waves in polarized light

vibrate in one direction only, instead of haphazardly at all angles as in ordinary light. Moonlight is known to consist very largely of polarized light; Mr. Morrison used "artificial moonlight" partly to avoid having to wait for a bright moon and then having to sit up all night, and partly because the artificial light could be subjected to laboratory controls.

He divided a culture of luminescent bacteria in three parts, one of which he placed under polarized light, or "artificial moonlight," one under ordinary light, and the third in darkness. In fifteen out of eighteen experiments he got results much more quickly under the polarized light.

Mr. Morrison does not yet offer to explain why polarized light should cause greater growth and activity than ordinary light or no light at all. His experiments, however, were inspired by the work of an English botanist, Miss E. S. Semmens, who found that the digestion of starch in plants is stimulated by either moonlight or artificial polarized light, and who has demonstrated that seeds germinate more rapidly under its influence. Mr. Morrison states that while there is no starch in bacteria, there are other chemical substances present that are related to starch, and that his results may be considered as parallel to those of Miss Semmens.

BROMINE FROM SEA WATER

COMMERCIAL methods of working the sea for treasure are being developed, and the tiny proportions of valuable materials in sea water may soon be a big item in the world's resources.

The expedition of the steamship *Ethyl*, which is to cruise in mid-ocean taking in millions of gallons of water and extracting 50 tons of bromine in a month, indicates that the vast ocean territory can be practically "mined." There are 86,800,000,000,000 tons of bromine in the ocean. The world's normal output of bromine has been less than 2,000 tons a year, of which America produces 900 tons. The American bromine has been produced chiefly from brine wells in Michigan and Ohio.

But American chemists have devised a method of extracting the pound of bromine hidden in 30 tons of sea water without the necessity of evaporating this huge amount of water. As a result the *S. S. Ethyl* has been made into a floating chemical factory and will be sent out to operate far from the shore away from sand and other floating impurities.

The United States' output of bromine has been considered at a maximum, but it has still been insufficient to meet the large demands resulting mainly from our own increasing consumption in the manufacture of tetraethyl lead, the fluid used as an anti-knock addition to gasoline. Prices of sodium and potassium bromides have more than doubled since January, 1924, due to the increasing need for bromine in medicine, photography, the moving pic-

ture industry and in production of the ethyl fluid of motor fuel.

Although bromine is not present in the ethyl anti-knock solution as actually used in motor fuel, it plays an important part in its manufacture by entering into chemical combination with the ethyl portion of the compound. Most of the bromine is used over and over again, but the Ethyl Gasoline Corporation, in view of the shortage of the chemical, found it necessary to develop a new source of supply.

Of the 35 parts of solid matter contained in 1,000 parts of average sea water, about two tenths of one per cent. is magnesium bromide. The percentage of bromine itself in the water is only about seven thousandths of one per cent. Sea water contains 32 of the 92 known elements, all of which are supposed to have been washed into the ocean by fresh water streams that leach the soluble constituents from the soil.

The small quantities of gold in sea water have attracted chemists for many years and Professor Fritz Haber, famous German chemist, is the latest scientist to work seriously on a process for its extraction.

PITHECANTHROPUS ERECTUS

PROFESSOR HANS WEINERT, of Berlin-Potsdam, who has compared his own data with the measurements of the famous skull of *Pithecanthropus erectus* recently published by its discoverer, the Dutch physician Eugene Dubois, states that the revised data place this most ancient of man-like creatures in the long-headed class, popularly supposed to comprise only the aristocracy of races.

Although the skull-top, thighbone and bit of jaw, the only relics so far discovered of *Pithecanthropus*, were found over thirty years ago, Dr. Dubois has until within the last few days given out only preliminary results of his studies, and has permitted very few scientists to see his specimens. Dr. Weinert, however, has been one of the few privileged to study them, and has made careful measurements. The new figures show that the width of the skull is less than three fourths of its length, which places it in the "long" classification.

Dr. Weinert also reviews the controversy as to whether *Pithecanthropus* was really a man or simply a large ape. He inclines to the opinion that the creature was truly human, though on a low level. The three loose teeth that have been found, and the roots of the teeth in the jaw fragment, are all of a human rather than an ape type, though rather large for a man.

More important, however, is the size of the brain. The portion of the skull in Dr. Dubois's hands has a capacity of 570 cubic centimeters. This is estimated to be about two thirds of the capacity of the original brain cavity, which would thus be approximately 900 cubic centimeters. This is nearly double the size of the gorilla's brain, which is 500 cubic centimeters, but nowhere near the size of a modern man's, which runs from 1,200 to 1,600. Only the smallest brains among the pygmy races are as small as 900 cubic centimeters, and *Pithecanthropus*, though not so tall as a modern man, was no

pygmy. Sir Arthur Keith, the British anthropologist, sets 1,000 cubic centimeters as the lowermost brain size that can be called human. With an estimated 900 and a little scientific charity, *Pithecanthropus* just makes the grade. And still he is a long-head.

DEVICE TO RECLAIM MOTOR OIL

No longer will motorists need to discard the oil from their crankcases and buy a fresh supply regularly if a new apparatus for reclaiming it developed at the Research Laboratory of the General Electric Company comes into wide use. Three years of experimentation by Charles Van Brunt and P. Schuyler Miller have at last culminated in success, it has been announced, and it is expected that the new apparatus will soon be in commercial use, as it has already proved its practicability.

When in ordinary use the oil in an automobile collects all sorts of impurities, such as road dust, products from the combustion of the gasoline, and many other substances which diminish the oil's efficiency, but if they can be removed the oil is as good as ever. In fact it is better than when it was fresh, because the most easily decomposed components are broken down when the oil is first used and are removed by the reclaiming process.

The method used involves two steps, first the oil is clarified by shaking with a small amount of water glass and other chemicals, and then it is allowed to pass in a thin film over a heated plate. A continuous reclaimer has been developed which has a capacity of nine gallons a day and with its use the oil for 30 machines, each with a capacity of five quarts, can be kept in use indefinitely. One of the inventors has used the same oil in two different cars for three years, traveling during that time a total of 16,000 miles. The oil is still in use and promises to remain so indefinitely.

Several other investigators have reported success in reclaiming old automobile oil by other processes within the past few months and commercial utilization of these advances in chemistry is predicted.

THE POPULATION OF THE UNITED STATES

ALTHOUGH the population of the United States is now at the high water mark of 114,311,000 people, the advance over last year was less than the average for the last five years, according to the estimates of the National Bureau of Economic Research, and the opinion is that the once rapid advance has now definitely slowed up.

That the regular increase in the population has not been due to immigration but to the excess of births over deaths is shown by figures covering the last sixteen years. In that period there were over 41 million births and about 22 million deaths, or an excess of 19 million births. About 5½ million were added by immigration, bringing the total increase to about 24 million. Of this number, immigrants formed little more than a fifth.

Both the birth and the death rates in the United States are falling, but the death rate is falling faster. Ten years ago the birth rate was 26.2 for each thousand per-

sons while to-day it is 23.3, a decrease of 11 per cent. At the same time the death rate has decreased from 13.4 per thousand to 11.7, a decrease of about 13 per cent.

In 1924, 2,645,000 babies were born and 1,333,000 persons died, or one death was compensated by two births. If the number of births and deaths remains stationary in 1925, as is very likely, ten babies will be born every two minutes and 5 persons will die in the same time.

Further studies by the bureau showed that employment has again shrunk to the pre-war level, and that there are now 38 persons out of every 100 who earn a salary or wages. But children, women and others not working for money are almost as numerous as this class. Employers and men and women in business for themselves make up only $8\frac{1}{2}$ per cent. of the population, and the actual number is now less than it was in 1915. It is held that the growth of large corporations has kept down the number of independent business men.

EXCAVATIONS IN MONGOLIA

THE Russian archeologist and explorer, P. K. Kozlov, head of the Russian Geographical Society's expedition to Tibet, has recently returned to Leningrad with an extensive collection of treasures of an ancient civilization. Many of these relics date from the second century, B. C., and bear traces of Indian, Byzantine and Greek influence.

The chief excavations were carried out in the mountain chain of Noin-Ulla, southwest of Kentei, in Mongolia. Here the expedition discovered burial mounds, most of them nearly level with the ground; a few were two to three meters high in rectangular form with funnel-like central depressions. Excavations revealed rectangular burial chambers, about five meters long and four meters wide, each chamber containing a smaller chamber with a wooden coffin. The wall, ceilings and floors of both the inner and outer chambers were constructed of logs, squared, planed and joined.

Among the relics discovered in the burial chambers were bronze ornaments, vases, glasses, wooden articles and primitive fire-making apparatus, consisting of small boards pierced with holes in which heat was generated by rapidly rotating sticks. Silken fabrics were found of great artistic and scientific interest, resembling fine gauze, with beautifully woven designs. Some of these fabrics, at present on exhibition in Leningrad, having been cleansed and treated, appear almost new. Rich ceramics were discovered bearing inscriptions which revealed the epoch to which they belonged—the Han dynasty, dating at least 200 years B. C. The gem of the discoveries is considered to be a tapestry, representing an elk attacked by a winged griffin, and showing Greek influence.

Gold ornaments indicated Indian, Persian and possibly Greek influence. They include a ring, bearing the head of a mythological animal with a stone set in the forehead, and a horse resembling those depicted on Scythian vases.

The excellent preservation of these relics is attributed to the fact that the tumuli were from thirty-five to fifty feet deep, at which depth the temperature was practically constant at the freezing point, and had not changed for centuries.

The expedition also brought back important botanical and zoological collections which have been distributed among the appropriate museums.

Study of these relics reveals that two thousand years ago there flourished in the plains of Mongolia a people whose art bears traces of their contact with Hellenic culture. The excavations were carried on in the Sudzuk Valley, about 120 versts from Urga, and only fifteen miles from the great caravan route.

ITEMS

THE traditional jealousy between California and Florida evidently has even affected the weather, for the storm resulting in the tornado which passed near Miami and resulted in the loss of several lives and the destruction of a million dollars' worth of property on April 5 was a California product, according to C. L. Mitchell, of the U. S. Weather Bureau. "This storm presented several unusual features," said Mr. Mitchell. "On March 30 it entered the United States from the Pacific Ocean about a hundred miles north of San Francisco, and swept east southeast, but instead of veering northeast after passing the Rocky Mountains, as is usual with such storms, it continued in a straight line and at 8 A. M. on April 4 it covered northern Mississippi. Still in the same path, it reached Florida on April 5. Up to this time it had been relatively mild, and had not done any damage, but when near Miami, it developed into the tornado which produced the destruction." That southern Florida is well off the usual track of tornadoes is indicated by the records for the last eight years, in which 752 occurred, of which only six were in Florida. Most of these were in the northern part of the state, and they resulted in the loss of only one life.

A RECENT count of hospital beds in the United States shows that the 7,370 hospitals have accommodations for 813,926 patients, according to a report by the American Medical Association. More than one third of the 3,068 counties in the United States have no hospitals for general service within their borders. A comparatively small percentage of practising doctors are affiliated with hospitals: in New York, 36 per cent., in Cleveland 29, and in Chicago and its suburbs 25. Many hospitals in this country use the services only of staff physicians, but the association reports that the present tendency in medicine is to urge hospitals to adopt a more open policy in permitting physicians who are not on the staffs to treat hospital patients.

JUST as cities have their hustling daytime populations and their night-life denizens made up of quite separate classes of people, so the little Saharas on American sand dunes have entirely different day and night populations of insects, Professor Royal N. Chapman, of the University of Minnesota, and some of his graduate students have discovered through a study of small dunes here in Minnesota. They found a night population consisting almost entirely of one species of beetle, which burrowed deeply into the ground at the first streaks of day, and remained there until dark came again. The daytime population was more varied. Both night and day groups were largely governed in their movements by temperature.