

## SCIENCE NEWS

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## MATTER IN THE CORES OF ATOMS

PROFESSOR NIELS BOHR, of the University of Copenhagen, at a lecture given at the University College, London, stated that the nuclei or cores of atoms are composed of such dense matter that if the human fist were packed as tightly with matter it would weigh a million times a million tons. It is this close packing of the hearts of atoms which is proving puzzling to investigators, according to Professor Bohr, for the structure and behavior of atom nuclei are governed by laws quite different from those already known for atoms, as a whole, or for familiar matter that can be seen or handled.

A possible explanation for the mysterious explosions of atoms which have been observed in studies of cosmic rays might be found, he suggested, by the impact of particles having energy of perhaps 1,000 million volts. This is a hundredfold multiplication over the mere 10,000,000 volt energy particles available in laboratories. When the particle "bullets" can be produced having the much higher energy, atomic explosions may also be produced in the laboratory. That 1,000 million volt energy particles may be produced is not beyond distant hope, he said.

The nucleus, Professor Bohr suggested, may be likened to a group of billiard balls lying on a circular table with low cushions. If some external ball is shot into the group there starts a series of mutual collisions which may cause the capture of the impinging ball. Such a capture explains the creation of the super heavy element No. 93 by the Italian physicist, Dr. Enrico Fermi.

Another possibility, Professor Bohr pointed out, is that if the balls keep colliding there is a possibility that one of them will collect enough energy to jump the barrier and go off the table. This situation could be likened to the experiments on artificial radioactivity performed first by the latest Nobel prize-winners, Irene Curie Joliot and her husband, M. Joliot.

## MAXIMUM AGE OF THE UNIVERSE

THE universe is not so old after all! Flatly contradicting Sir James Jeans's figures of ten million times a million years for the age of the universe, Dr. Bart J. Bok, of the Harvard College Observatory, has found that number approximately five hundred times too high.

Twenty billion years is the upper limit of the age of the universe, as viewed by Dr. Bok. Jeans's long time scale does not fit with the evidence of star clusters, with the known facts of the rotation of the Milky Way system or with the existing theories of the creation of the spiral nebulae. Nor does it explain the existence in the same star cluster of "young" red giant stars and of "old" dwarf stars.

"The giants with their tremendous energy output can hardly have existed for much longer than ten billion years, unless we wish to make the as yet unfounded hypothesis that the energy radiated away is being replenished in some unknown fashion from surrounding space," Dr. Bok said. "We found it unlikely," he concluded,

"that the observed clusters have existed for more than twenty billion years as groups of stars. Lemaitre's theory of the expanding universe indicates that a catastrophe took place a few billion years ago, and it is tempting to place the origins of the stars and stellar systems at the epoch of this catastrophe."

Hundreds of star clusters, including the well-known Pleiades, Hyades and Taurus, would now be on the verge of disintegrating all at once, torn apart by the gravitating forces of the Milky Way, if they had been in existence as long as Jeans believes, according to Dr. Bok.

"In the course of their development these clusters must have wandered through widely different parts of our galaxy, but in spite of this, under Jeans's long time scale we should find them ready to disintegrate, cosmically speaking, simultaneously," he said. "In other words if we were to take our observations at a future epoch removed from the present by only half a per cent. of the total supposed age of our galaxy, no sign of them would be left."

"It seems absurd to assume that several hundred clusters, all of which had presumably considerable mass and density at the time of their birth, would be observed simultaneously on the verge of disintegration in a galaxy for which the conditions that determine the rate of disintegration will be apt to vary from point to point."

## LIGHT IN THE NIGHT SKY

THE hiker caught out after dark on a moonless night may feel very thankful for that faint illumination which he calls starlight. But he is wrong in thinking that it all comes from the stars. Only about one fifth of it is of stellar origin. Most of it is produced by particles of electricity, hurled from the sun at enormous speeds, and "striking sparks" as they collide with the molecules of the upper atmosphere.

Professor Georges Déjardin, of the University of Lyons, describes the experiments which have led to the acceptance of this theory in the current issue of the *Reviews of Modern Physics*, published in New York by the American Institute of Physics.

One may wonder how the sun can be responsible for this light when it, itself, is on the other side of the earth. The answer to this is that the electrons are bent around by the earth's magnetic field so that almost as many fall on the far side, where it is night, as fall on the near side. Displays of "Northern Lights" are quite similar to the light of the night sky when examined with the spectrograph, and have, in large measure, the same explanation. The night sky is brighter at times of the year when the northern lights are also most in evidence, according to Professor Déjardin. Some nocturnal light, while also coming from the sun, reaches the earth by another route. Just as sunlight is reflected from the moon this glow is reflected to us from small pieces of matter which fly about in empty space.

The hypothesis that most of the night light is produced in the earth's atmosphere is verified by the fact

that it is stronger near the horizon than directly overhead. When we look straight up, we look through less atmosphere and therefore see less of the light.

Examination of the night sky with a spectrograph shows very nearly what one would expect from collisions of electrons from the molecules of our atmosphere. The photographic plates show abundant evidence of oxygen and nitrogen. These spectra did hold some surprises for physicists, however. The usual oxygen spectrum shows some gaps in its systematic scheme of lines. These gaps have been given the name of "forbidden lines." But in the night sky spectrum these forbidden lines are conspicuously present. After this discovery it was found possible to produce in the laboratory oxygen spectra in which these lines also appear. Most of the light from the nitrogen in the air also comes from a rather rare form of the gas called "active nitrogen." This form of nitrogen has also been produced in the laboratory and appears only when the gas is in a very rarefied state.

Other substances whose spectra can be detected in the night sky include water vapor and argon. The extreme reaches of the upper atmosphere have long been supposed to consist of the very light gases, hydrogen and helium. But the nocturnal spectrograms indicate that oxygen and nitrogen extend as far as the confines of the atmosphere.

#### INCREASE IN CASES OF MENINGITIS

AN increase in cases of meningitis, with no signs of any let-up, is worrying health officers all over the country. Health authorities do not like to hazard any predictions, but they believe cases of the disease will continue to increase.

The increase seems to have started just a year ago. Reports from state health officers to the U. S. Public Health Service show that the number of cases in the country last year were more than double the number for the preceding year. Reports for the current year indicate that there are now double the number there were last year.

Latest figures available are for the week ending February 8. There were 152 cases during that week, as compared with 101 cases in the corresponding week last year. The cumulative figures are even more impressive. For the first six weeks of 1935 there were 539 cases, and for the first six weeks of 1936 there have been 998 cases. The total number of cases in 1935 was 5,583. The total in 1934 was only 2,295. At the same rate, there will be over 10,000 cases during the current year.

The meningitis now so prevalent in the country is caused by a "germ" called the meningococcus. There is a serum for use in treating the disease which is fairly successful. Preventing the disease, however, seems to depend on isolating the patients and on avoiding crowded living conditions, especially crowded sleeping quarters.

The disease starts very suddenly with a severe chill, headache, fever, explosive vomiting and finally stiffening of the neck. A physician should be called at once and his advice acted on immediately.

Most people, fortunately, are not susceptible to the disease, but an unfortunate feature is the fact that these insusceptible persons can carry the germs without know-

ing it, and it is in this way, chiefly, that the disease spreads.

Control of meningitis, Dr. Adolph Weinzirl, of the Baltimore City Health Department, says, is probably a matter of remedying economic conditions responsible for large numbers of persons living and sleeping under very overcrowded conditions.

No one knows why the disease has increased so markedly in the last year. The factor of crowding was undoubtedly responsible for outbreaks in transient bureau dormitories and camps. It is possible that the disease was spread by healthy carriers from such dormitories to the general population.

#### PROGRESS IN THE STUDY OF THE COMMON COLD

THE road now seems cleared for the conquest of the common cold, influenza, pneumonia and other diseases of the nose, throat and breathing organs. The achievements of medical science which have cleared such a "possible" road were related by Dr. A. Raymond Dochez, professor of medicine in the Columbia University School of Medicine, at the alumni day celebration.

The common cold and influenza occupy "the key positions in the whole pattern" of infection of the breathing tract, Dr. Dochez has concluded as a result of studies by himself and other medical men. These two diseases are caused by agents known as filterable viruses.

"Each of the agents produces its own characteristic disease, but each carries an added menace in that it promotes infection with those dangerous bacteria that are responsible for the great amount of injury and death that attend severe respiratory disease," Dr. Dochez said. If an effective means of vaccinating against these two diseases could be developed, it would mean not only control of the colds and influenza, but also a possible lessening in the amount of all serious bacterial infections of the breathing organs.

Asserting that the goal of his studies on respiratory disease and a possible road to it have become clear, Dr. Dochez described the following achievements which helped to clear the way:

1. Studies showing that the common cold is caused by a filterable virus.
2. Growth in the test-tube of large amounts of the cold virus, which has been kept alive outside the animal body for 20 months.
3. Growth of the virus of influenza in the test-tube.
4. Transfer of the influenza virus from man to the ferret and from the ferret to the white mouse.
5. Discovery that the influenza virus from different parts of the world and at different periods of time is very similar in its activity.

#### ITEMS

A TINY wanderer of the sky, which might be considered either a comet or a minor planet, has been resighted by telescopes. It is the Delporte object first seen in 1932. It has the distinction of making the second closest approach to the earth of any such comet or planet. Its

magnitude is 13, the Harvard College Observatory reports, which means that it is possible to see it only with large telescopes. It is located somewhat west of the constellation of Leo. The Delporte object is also known by the name of Amor and its number among the minor planets is 1221.

SHOWER baths required before swimmers are allowed to enter pools are not enough to prevent the spread of the streptococcus infections of nose and throat, W. B. Ardrey, of the Michigan State College, reported to the Society of Bacteriologists, Pathologists and Allied Workers at a recent meeting in Detroit. Bathers are instructed to take their usual baths before entering the pools and then to stay at the shallow end of the pool and wade around. Few or no streptococci were found in the water until the bathers were told to swim and take exercises which placed their mouths and noses under water. Bacterial counts then made of the swimming pool water showed large increases in streptococci. This was explained on the basis that some water enters the nose and mouth and is immediately blown out again.

MANY cases of septic sore throat are directly attributable to drinking raw milk from infected cows, C. S. Bryan, of the Michigan State College, told the members of the Society of Bacteriologists, Pathologists and Allied Workers of Michigan, Indiana and Ohio. Investigation shows that as high as four fifths of herds tested which supplied one large city with milk were infected. In some herds only one cow had streptococci mastitis, but as high as 26 per cent. were involved. These infected cattle constitute a grave menace to public health because of the contagiousness of the infection. From the standpoint of the farmer they are also of little value, for such infected cattle produce 22 per cent. less milk and their butter fat production is reduced 24 per cent.

A PROTEIN substance found in milk and called lactalbumin helps in the prevention of rickets, Dr. James A. Tobey, director of the health service of the Borden Company, reported at a Farm and Home Week meeting held at Cornell University. The lactalbumin apparently does not have any rickets-preventing effect by itself, but when vitamin D is added to milk by irradiation with ultra-

violet light, the dispersed lactalbumin increases the effectiveness of the vitamin's rickets-preventing power. The discovery of the rôle of lactalbumin in augmenting the rickets-preventing potency of vitamin D in irradiated milk was made by Dr. George C. Supplee at the Borden research laboratories at Bainbridge, N. Y.

THE United States has more birth control clinics in proportion to its population than any other country, Dr. Eric M. Matsner, medical director of the American Birth Control League, has found in the course of a survey he has just completed. There are more than 225 such clinics under medical direction in the United States, an increase of 80 since last November. Birth control clinics are not only more numerous but more effective in this country. "Theoretically, Great Britain, the Scandinavian countries and the Soviet Union are in advance of America, since they regard birth control as a public-health measure," he stated. "Practically, they are not in advance, since the methods available to birth-control clinics there do not surpass and seldom equal in effectiveness those used in American clinics. In Russia the materials are of definitely inferior quality. However, the Soviet Commissariat of Health is seeking to improve birth control methods in order to decrease the number of abortions performed there."

PINE trees in the southern states produced in 1935 the most tremendous seed crop in years. Every five or ten years they bear a big crop of seed, but the past season's yield is huge even for a "big seed year." All four of the principal pine species—long-leaf, short-leaf, slash and loblolly—were thick with cones, and the winged seeds carpeted the ground. Forest interests took utmost advantage of the unusual harvest. CCC men gathered seed by the carload, for use in tree nurseries, without visibly diminishing the supplies left on the ground. Foresters, both federal and state, as well as progressive-minded lumber companies, urged timberland owners to refrain from their usual practise of burning off the forest undergrowth and grass, and to exert every effort to keep accidental fires out of the woods. If the forest lands of the South can be kept fire-free for the next few years, it is said that it will be worth hundreds of millions of dollars in timberland eventually restored to normal productivity.

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