SCIENCE NEWS

Science Service, Washington, D. C.

ATOMIC ENERGY

TEMPERATURES of forty million degrees Centigrade (about 70,000,000 degrees Fahrenheit) will be required before man can release the energy of the atom, a release that is continually occurring in the stars and keeping them going. So members of the World Power Conference meeting in Berlin were told by Sir Arthur Eddington, astronomer at the University of Cambridge.

Every star is a celestial furnace, declared Sir Arthur. It is fed by subatomic energy. He expressed the belief that the source of this energy is the continual building up of complex elements out of hydrogen, the simplest of the elements. According to his theory, there is a process going on deep within the stars by which the primitive electric charges are evolving into atoms. Another possibility for the source of stellar energy, he admitted, is the annihilation of the electrons and protons of which atoms are made. As one is negative electricity and the other positive, the union of an electron and a proton would eliminate each and result in a burst of light or other electromagnetic radiation.

An approach to the far distant time when the atomic energy can be released by man by the use of the forty million degree temperature has been made by Dr. Kapitza, of the Cavendish Laboratory at Cambridge. Sir Arthur told of his colleague's experiments with extremely intense, though momentary, magnetic fields, the highest corresponding to a million degrees of heat.

A possible way in which subatomic energy may be released without such high temperatures may be found in the process causing the penetrating radiation studied by Kohlhörster in Germany and Professor R. A. Millikan in America. According to Professor Millikan's views these rays are caused by the building up of atoms in interstellar space.

In any event, said Sir Arthur, the universe will eventually reach a state of stability, of "uniform changelessness."

GENERATORS OPERATING IN HYDROGEN

WHEN engineers have made the largest electric generators possible, they will be able to still further increase the capacities of the huge machines another 25 per cent. by running them in an atmosphere of hydrogen gas. The light, inflammable gas has already been used successfully with a small enclosed generator, M. A. Savage, of the General Electric Co., told the World Power Conference meeting in Berlin. Engineers have learned from its operation how to apply hydrogen to the largest units.

"These data indicate that large generators can be built with efficiencies at rated load six tenths of one per cent. higher when operating in hydrogen and that the active magnetic material can be reduced some 25 per cent. for the same kilowatt output. Expressing this in another way, machines of 25 per cent. greater output will ultimately be possible when the limit in capacity is reached in air-cooled generators. Hydrogen cooling is a perfectly practical thing and its adoption will mark the next big step in the increase in efficiency of these large units."

Although an increase in efficiency of only six tenths of one per cent. seems very insignificant, if applied to the world's largest generator it would mean an additional capacity of more than 1,200 horsepower. The capacity of this one unit exceeds 200,000 horsepower and operates at an efficiency of about 98.5 per cent.

Hydrogen is more desirable than air as an atmosphere for generators because it reduces one of the machine's greatest losses, that caused by wind resistance. Hydrogen has only one fourteenth the density of air. Just as it is easier for a cook to stir water than a thick cake batter, so the rotor of a generator turns more readily in hydrogen than in air.

Generators using hydrogen will be entirely enclosed and the gas will be under a pressure slightly higher than atmospheric. It will then slowly leak out around the rotating shaft and there will be no danger of an explosive mixture accumulating in the enclosure.

ELECTRICITY ON THE FARM

NOT content merely to substitute for mechanical power and man-power on the farm, electricity is finding new and exclusive ways in which it can bring to agriculture advantages of research corresponding to those enjoyed by industry.

Electric lubrication of the soil to make plowing easier, electric treatment of ensilage so that it will keep better, the heating of hotbed soil with electricity, and putting crops under electric discharges and under ultra-violet and white light to increase yield are subjects of recent research, C. A. Cameron Brown, of the British Institution of Electrical Engineers, has reported to the World Power Conference.

Similar research is being carried on in different countries and some workers report more success than others with the same project. The cheapness of electrical energy is apparently the greatest factor determining the success of the new methods.

Water already in the soil is the lubricant for plowing. It is drawn to the mould-board of the plow by making that the negative terminal of an electric circuit. The coulter, insulated from the framework, is the positive terminal. Field experiments show that the force required to pull the plow is reduced every time the current is turned on. Dr. B. A. Keen, of Rothamsted, England, says that the method has definitely passed the experimental stage and is awaiting commercial exploitation.

The ensilage treatment has reached its greatest development in Germany. Metal plates at the top and bottom of a silo are used for terminals and a current is passed through the feed which heats it and destroys organic life. Feed can be harvested in any weather

without being cured in the field, according to reports, and when given the electrical treatment will last longer and retain a much larger percentage of its original food value. Manure is replaced by electrical heating units in the hotbed application. Countries with abundant electricity from waterpower are said to have found this method successful.

Light has probably found its greatest use for increasing farm productivity in the poultry house. Making hens work overtime during the dark hours of late winter mornings and early evenings to even out the egg production curve has become common practice with many progressive poultrymen. The application of light and electrical discharge to plant production is in a more preliminary stage.

THE PITUITARY GLAND AND HARDENING OF ARTERIES

THE probable rôle played by the pituitary gland in the development of arteriosclerosis, more familiarly known as hardening of the arteries, was discussed by Dr. Robert C. Moehlig at the meeting in Detroit of the Association for the Study of Internal Secretions.

The effect of feeding animals on high fat diets, on normal diets with injections of the posterior lobe of the pituitary gland, and on high fat diets with the pituitary injections were reported. Control animals were fed on normal diets alone and compared with the other groups.

Four of the five animals fed on the high fat diet alone showed gross arteriosclerotic changes of the aorta, the main blood vessel from which the arteries of the body proceed. Those fed on the high fat diet plus the pituitary extract showed the most intense lesions of all. Eight of the ten animals showed marked arteriosclerotic changes and microscopic examinations disclosed changes of the type seen in human hardening of the arteries.

The injection of the pituitary extract alone, without any dietary influence, produced overdevelopment of the cortex of the adrenal glands. Dr. Moehlig called this an important link in the chain of arteriosclerosis.

At the same meeting, Dr. W. Raab, of Prague and Vienna, described experiments of his which showed the rôle played by the pituitary gland in regulation of the body's fat. Dr. Raab concluded that injection of pituitary extract favors the absorption of fat by the liver. Assuming that a certain amount of fat is normally destroyed in the liver, it is evident that if the pituitary is disturbed in its cooperative activity with the brain and nervous system, these fat amounts will not be destroyed. They will be stored in the tissues and consequently lead to obesity.

THE CAUSE OF EYESTRAIN

EYESTRAIN, so-called, is more apt to be the result of "nerves" than of any disease of the eyes, Dr. George S. Derby, of Boston, told members of the American Medical Association at their meeting recently. Dr. Derby described a number of cases he had seen in which the patient recovered from his eyestrain when his bodily condition was treated and when the psychologic cause of his eyestrain was explained and he was persuaded to use his eyes normally. Dr. Derby suggested that the term eyestrain should be banished from our vocabulary.

"If the general public could learn that eyes are seldom strained, this would be a much happier world to live in," he said. "The fact of the matter is that the eye is provided with a large factor of safety and that healthy eyes do not become diseased even by excessive use."

Most of these cases of ocular neurosis, as Dr. Derby called it, are found in sensitive nervous persons. Fear is the commonest factor in these cases. Some ocular pain or discomfort makes the patient afraid that he is injuring his eyes permanently, that he can not continue his occupation and perhaps will become dependent. Many of Dr. Derby's patients had given up their work and many pleasures, and were devoting themselves to resting their eyes as much as possible.

Dr. Derby asked ophthalmologists not to overlook the psychologic factor in causes of eyestrain, and to treat the mental condition of their patients as well as to correct their vision with eyeglasses.

THE BEAM MICROPHONE

AN artificial "whispering gallery" is one of the latest improvements in talking movies, for the device makes it possible to focus the microphone on the speakers and shut out extraneous sounds. Recording engineers of the RKO Productions at Hollywood have developed the device, which is called the "beam microphone," and have been using it in a new production "The Record Run," now nearing completion.

The device is really a searchlight turned backwards and using sound instead of light. A searchlight reflector has the shape known as a paraboloid. Light radiating from a point known as the focus is reflected in a parallel beam. The reflector also works backwards. If a parallel beam of light, as from a very distant object, falls squarely on the reflector, the light is concentrated at the focus. Searchlight mirrors have actually been used this way with sunlight to obtain high temperatures for experimental purposes. A reflecting telescope used by astronomers works the same way.

Waves of sound can also be concentrated by a parabolic reflector, and this is the principle of the beam microphone. A metal reflector about five feet in diameter is used, with the usual condenser microphone placed in the center at the focus. Around the outer edge is a cylinder of felt to shut out most of the sound that would come across the edge of the reflector.

In use, the beam microphone is mounted in trunnions on a stand similar to those used for the large lights for illuminating the studio. It can be aimed at the actors, whose voices are picked up and intensified, while other sounds, if not too loud, are largely eliminated.

Though the device has proved especially valuable for out-of-door recording, where it is not always easy to prevent other noises in the neighborhood, it is also being used to advantage within the soundproof studios. For

instance, the RKO studios are now producing some pictures in wide film as well as the normal 35 millimeter version. The wide-film cameras are much noisier than the ordinary ones, and more difficult to silence with a soundproof cover, or "blimp." The beam microphone aids in keeping their grinding from being recorded with the voices of the actors.

Famous whispering galleries in buildings throughout the world depend on a similar principle of sound concentration. Some architectural freak may produce a curved wall that focuses the sound from a distant point. Then a person may hear a whisper from a position hundreds of feet away, but can not hear ordinary conversation much closer.

In the Louvre, in Paris, there is a famous whispering gallery caused by two huge alabaster bowls at opposite ends of a long chamber. A person standing before one bowl can hear a whisper made by a person at the far side of the other one. The bowl acts as a reflector, sends the sound waves in a beam to the curved ceiling, whence they are reflected to the other bowl, which then, like the microphone reflector, focuses the sound so the second person can hear it.

ITEMS

DEFINITE steps have been taken for the establishment of a botanical experimental area on the slopes of the lofty extinct volcano Mauna Kea, where all the widely varied climatic conditions of Hawaii are available, with a view to establishing a world center for botanical research. Plants will include those from nearly every country bordering the Pacific area, including New Zealand, Fiji, New Hebrides, Samoa and the Solomon Islands.

AN out-of-door laboratory for the testing of high voltage transmission line equipment is to be erected at Pittsfield, Massachusetts, by the General Electric Company. When nature does not produce in it the kind of weather wanted for testing the apparatus, an artificial rain-maker will be brought into use. This new experimental room is to be entirely separate from the artificial lighting laboratory where flashes up to 5,000,000 volts have been created.

EXHIBITS showing how the Army, the Navy and the general public in the United States are kept in good health are to be sent to Germany at once for an exhibition on international hygiene. A bill appropriating money to prepare and transport the exhibits has just been passed by both houses of the Congress, and the Surgeons-General of the Army, Navy and Public Health Service will have the work done at once. The exhibition started at Dresden last month, but it continues in session until October.

HARVESTING timber while it is still young and healthy is a means advocated by Professor Ernest E. Hubert, of the University of Idaho, as a way to avoid the enormous losses caused by fungous and other diseases of trees. Damage from this source amounts yearly to six billion cubic feet of timber, valued at about $878,000,000. Forest trees, like human beings, are most liable to disease in middle life and at advanced ages, and if they are put to use before they develop the manifold ills that wood is heir to they will give the saplings growing about them a chance to reach merchantable size with sound heartwood.

A YOUNG male gorilla grows more slowly than a boy of the same age. So reports Dr. C. V. Noback, of the New York Entomological Society, who has made a detailed study of a youthful gorilla received in New York some time ago. The rate of growth during the first three years of life was measured in terms of adult weight. Possibly correlated with this slower growth is the fact that the bones and teeth of the gorilla mature more rapidly than those of a human child. The animal reported in Dr. Noback's study had its full set of milk teeth at approximately eighteen months, and began to acquire permanent teeth at two and one half years. The study will be reported in full in an early issue of the *American Journal of Physical Anthropology.*

A CENTURY after the falls and rapids of Niagara were first overcome for water transportation by a small canal, there is nearing completion on practically the same site a mammoth structure which will pass giant 600-foot lake grain vessels up and down the 326.5-foot difference in elevation between Lake Erie and Lake Ontario in a few hours' time. The lift of the Panama Canal is only 85 feet. The Welland Canal's 326.5-foot lift is possibly the greatest of major canals and is especially noteworthy because a sharp rise in elevation makes necessary its accomplishment in a very short distance. The total length of the canal is 25 miles. The present canal is the result of the fourth reconstruction and cost about $115,000,000. The first was completed in 1829 and had 40 wooden locks, 110 feet long, 22 feet wide and 8 feet deep. In the modern structure only seven locks raise vessels 46.5 feet at a time.

IF your parents lived a long time, you have a better chance of reaching a ripe old age than your fellow men, Dr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Co., reported at the meeting of the Eugenics Research Association. Heredity as well as environment affects the length of a man's life. The longevity records of over 70,000 white men were followed in Dr. Dublin's study from the date of their insurance at the beginning of the century to 1928. The men were divided into two groups: those whose parents died before 50 years and those whose parents were living after 50. There were fewer deaths in the second group than in the first. Members of the second group moreover could expect to live on the average two and a half years longer than members of the first group. These results were confirmed by studies made of records of 34 American and Canadian life insurance companies between the years 1869 and 1900.