SCIENCE NEWS

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AWARD OF THE NOBEL PRIZE IN PHYSICS

THE Nobel prize in physics for 1938 has been awarded to Professor Enrico Fermi, of the University of Rome. Born on September 29, 1901, Professor Fermi has won fame in both experimental and theoretical fields of research. He was the first man to predict and determine experimentally that the bombardment of elements by neutrons would cause transmutation of the elements. Working at Rome, Professor Fermi was able, within six months after the discovery of artificial radioactivity by the Curie-Joliots, to study the bombardment of over 60 elements with neutrons. Out of this number he found more than 40 to exhibit radioactivity.

Professor Fermi was also the first to show that the capture of neutrons could be facilitated by water and by making them travel at low speeds. These "slow" neutrons are now a valuable research tool in the field of nuclear physics. In theoretical physics he is best known for his development of the so-called Fermi-Dirac statistics, a mathematical method of dealing with the problems encountered in predicting atomic structure and behavior. In mathematical physics, he developed a hypothesis known as the Fermi theory of beta-ray decay which attempted to fit the atomic particle, the neutrino, into the still baffling problem of the liberation of the beta rays (electrons) from radioactive materials. While this theory is far from correct it is still the only one, of the many suggested, which appears to have a semblance of plausibility.

During his intensive research on the bombardment of many elements with neutrons Professor Fermi used uranium as a target. He was able to make the neutrons stick in the nuclei of the uranium atoms and create superheavy elements. At first the scientific world was amazed and skeptical that Professor Fermi had been able to create an element, No. 93, heavier than the heaviest of all known elements, uranium, No. 92. However, the discovery was amply confirmed and it has since been found that science can create artificially elements still heavier, Nos. 94 and 95.

Through his atomic experiments Professor Fermi was able to show that the ability of the nuclei of atoms to capture neutrons was far larger than had been supposed. There appear to be conditions of resonance in the nucleus which aid in this unsuspected capture.

Coworkers with Professor Fermi at Rome have been a group of scientific men whose names should not be forgotten. They are Drs. E. Amaldi, F. Rassetti, E. Segré and B. Pontecorvo.

AUTOMATIC POSITION FINDER FOR AIRPLANES

AN experimental model of a position finder which automatically tells an airplane pilot where he is at a given moment, with only a small error, has been successfully demonstrated at Hamble, England.

The device, still very much in the process of development, consists of a pair of automatic direction finders, each tuned to a different radio station. Each is linked to a needle swinging on a point representing the station to which it is tuned; hence each needle points toward the plane. The point where the needles cross is the point where the plane is located. The two needles are, of course, located on a map of the region over which the plane is traveling.

Successful development of this device will mark another of the major safety advances in aviation that seem promised by instruments demonstrated within the last few weeks. Not only would it be another insurance against being lost, but it would be useful in medium-sized transport and military planes which can not carry a separate navigator and whose pilots already have more than enough to do. Collaborating in the development are O. G. E. Roberts, of the Straight Corporation, and J. A. McGillivray, chief wireless instructor of Air Service Training.

An automatic direction finder, which in itself is a guarantee of not getting lost, has been independently developed and demonstrated in the United States by the Sperry Gyroscope Company and the Radio Corporation of America, both of New York.

This new scheme merely takes two automatic direction finders and operates on the well-known principle that the lines from the plane to the stations must intersect at the plane. By superimposing the lines on a map, in the form of needles that respond continuously to changes in the plane's position, the pilot can be kept informed of where he is.

Refinements in construction of the direction finders and in other parts of the equipment may mean some day that much of the laborious work of calculating one's position will be made unnecessary. It should also make ground speed determination, still one of the not-so-easy-to-figure aeronautical facts, easier to determine.

The present equipment is still subject to certain errors, one of which probably can be eliminated, and the other of which is not a large error. The possibility of linking the device with the automatic pilot is also foreseen. Reports emphasize, however, that this model is only an experimental one and that conclusions as to its performance in production models, which are still a long way off, can not yet be drawn. Its weight, now 100 pounds, can probably be reduced to 60 pounds.

USE OF THE CYCLOTRON IN THE TREATMENT OF HUMAN CANCER

HUMAN cancer sufferers are now being treated for the first time with neutron rays from the 85-ton cyclotron of the University of California.

Announcement of this use of the cyclotron, which it is hoped will greatly advance the war against cancer, was made by Dr. Ludvig Hektoen, executive director of the National Advisory Cancer Council, adjunct of the U. S. Public Health Service, which has been in the forefront in supplying funds and technical assistance for this newest assault on cancer.

Cancer sufferers throughout the nation are warned not to start for California in the hope of getting treated by the cyclotron. The treatments are purely experimental and no successful outcome can be promised. Only a small group of patients from the teaching hospital in San Francisco of the University of California are being treated. The cyclotron's neutron rays have been so effective in treating cancerous growths on small animals that scientists believed this treatment was worth at least a trial on human cancerous growths.

"The success of the neutron ray in animal experimentation does not justify any conclusion that it will be necessarily more successful in treating human beings than x-rays," said Dr. John Lawrence, who, with Dr. Robert S. Stone, chief roentgenologist in the hospital in San Francisco, is directing the experiments. "It may be months or even years before any results are known and, until then, we can offer no additional hope to cancer sufferers."

Dr. Lawrence is the brother of Dr. E. O. Lawrence, the physicist who developed the cyclotron and the neutron ray used with cancer patients. The neutron rays are created by bombarding a target of a light metal, notably beryllium, with very energetic deuterons, which are the nuclei or ions of heavy hydrogen.

The rays produced by this method were found to have a sharply different effect on biological tissue cells than the x-ray, and it was this difference which led to the present clinical investigations.

UNRECOGNIZED HORMONE OF THE PITUITARY GLAND

AN unrecognized hormone, called "the specific metabolic principle" and produced by the middle part of the pituitary gland, has been chemically dissected from the tiny "master gland" by a group of investigators at McGill University, headed by Professor J. B. Collip. Associated with Professor Collip were Drs. D. K. O'Donovan, E. F. Denstedt, A. H. Neufeld and L. W. Billingsley.

The new hormone speeds up the rate at which the body converts food, fuel or energy. This vital process is known as metabolism. Professor Collip and his associates found that it stimulates metabolism quite independently of the thyroid gland. It does not work by first stimulating the thyroid, as does another pituitary hormone called the thyrotropic hormone. Doses of the hormone injected into rats, rabbit and guinea-pigs from which the thyroid glands had been removed increased the metabolic rate markedly within four hours.

The new hormone has other striking effects. It neutralizes to some extent the effect of insulin, diabetes remedy. Insulin ordinarily lowers the amount of sugar in the blood, but when the new hormone is given, the usual dose of insulin has a diminished effect on the blood sugar. Large doses of insulin, however, are not neutralized.

The hormone also exercises some control over the adrenal glands, judging from its effect when given with adrenalin, one product of these glands. The effect of adrenalin on blood pressure is not affected by the new hormone, but the effect on blood sugar is. The amount of sugar in the blood goes up, instead of down, when adrenalin is given.

Professor Collip described the hormone at the Third International Goiter Conference recently held in Washington, D. C.

THE AMERICAN PATENT SYSTEM

To destroy the basic concepts of the American patent system would be to destroy the pattern of present-day industry and bring a return to secrecy of invention, Dr. Frank B. Jewett, vice-president of the American Telephone and Telegraph Company, stated in an address given at the Philadelphia meeting of the American Institute of Chemical Engineers.

Citing the protection afforded by the patent system as the backbone of industrial progress, which has made possible the enormous growth of the last century in America, Dr. Jewett urged that efforts to attack the patent system should be limited to the prevention of long-drawn-out lawsuits and toward expediting the handling of unavoidable litigation. Efforts to change the patent law of America so as to alter its basic concept of a long term monopoly as the reward for disclosing the nature of the invention were termed "eye wash" by Dr. Jewett.

Of the charge that industry deliberately suppresses socially valuable patents, he said:

"That the number of unused patents is large goes without saying. That any considerable number of them are of much, if any, value, I doubt, and that any really valuable ones are 'suppressed' I just simply do not believe. The explanation is that any one possessed of a valuable patent has every reason to exploit it before its life blood runs out and dare not delay the exploitation for fear his competitor will get a better patent. I have no doubt that there are now, as there always have been, valuable patents which are not in use because the art to which they apply is not yet far enough advanced to permit. This is not suppression—all the will in the world could not force use under the conditions."

THE RESEARCH FUNDS OF THE GOVERNMENT

RESEARCH for the American farmer and engineering research, mainly for national defense, absorb over $43,000,000, or 75 per cent., of all the $57,700,000 research expenditures of the Federal Government, according to an analysis, made after a study of the Federal budget for the fiscal year 1938, by Dr. Lyman J. Briggs, director of the National Bureau of Standards in Washington. Dr. Briggs's report was made to a forum at Detroit on "Invention and the Engineers' Relation to It," sponsored by the American Engineering Council.

The distribution of research funds, exclusive of statistical agencies and those engaged in social sciences is approximately as follows:

Engineering research, mainly national defense	36%	$21,000,000
Surveys and mapping	16%	9,400,000
Physical sciences	4%	2,200,000
Natural sciences, mainly agricultural research	39%	22,400,000
Public health	5%	2,700,000

The Federal Government, Dr. Briggs explained, thus confines its research activities almost exclusively to subjects having an immediate practical interest. It has not undertaken long-range research, except in the field of agriculture. Basic research in this country has in the main been carried out by our colleges and universities. In so far as these institutions have been supported by state funds, the various states have borne the responsibility of providing for basic research, upon which new industries are built.

"New industries, which create additional employment, grow out of discoveries made in the laboratory. The radio industry is a striking example. To provide more employment we need new facts, new discoveries, upon which new industries may be based—industries that will supply things that people will want in addition to what they already have, not industries which merely compete with those already in operation.

"Discoveries of this kind are not made overnight, but they will continue to be made, as they have been made in the past, if facilities and support are provided for basic research. A steady flow of new discoveries would stabilize economic conditions. Coordinated basic research, directed along lines that may lead to new industries, should be supported by the Federal Government as long-time insurance against unemployment and economic stagnation."

ITEMS

A RING of charged atomic fragments surrounding the earth 20,000 miles above its surface during a period of high sun-spot activity was reported in a lecture at the California Institute of Technology by Professor Robert A. Millikan. Detected through measurements of cosmic rays, this ring has been built up gradually since 1932, when sun-spot activity was low, until it is now at a maximum. Sudden changes in this ring of charged particles also takes place when the sun is having a particularly violent eruption. The effect of solar activity is to cut down the magnetic field surrounding the earth and thereby to permit more cosmic rays to reach us than before. The intensity of cosmic rays thus becomes a way of measuring the magnetism of the earth, especially that part of the magnetism which is due to currents outside of the earth itself.

THE 125th anniversary of the Nikitsky Botanical Gardens in the Crimea was observed by the establishment of five new gardens, supplied with plants from the parent institution. During the past decade over 1,000 new species and varieties of plants have been tested in the gardens, and 233 new kinds were introduced into general cultivation in the USSR as a result of these tests, states *Tass*.

COLD climate is good for growing corn, declares Professor Karl W. Woodward, of the University of New Hampshire. He points proudly to the fact that the average per-acre yield in his state, 44 bushels, tops even that of Iowa, 38 bushels, and is more than double that of two typical states in the South, Louisiana and Arkansas, whose average per-acre corn yields are 18 and 19 bushels, respectively.

METHYL bromide has been successfully used to kill insects feeding inside of apples, in experiments reported to the journal, *Scientific Agriculture*, by W. R. Phillips, H. A. U. Munro and C. E. Allen, of the Canadian Department of Agriculture. The substance, while deadly to insects, leaves so little residue in the flesh of the apple that it is harmless so far as human consumption is concerned. Some of the apples were damaged by the fumigation, but it was found that this damage could be eliminated by picking the apples at the proper state of maturity and storing them at a temperature between 32 and 39 degrees Fahrenheit.

SUBMERGED canyons are not all beneath the sea. There is one, of quite respectable dimensions, drowned under the waters of the northern end of Lake Michigan, states Dr. George M. Stanley, of the University of Michigan, in the current issue of the *Journal of Geology*. Cut steeply into the more gradually sloping lake bottom, the valley winds like the channel of a river, and was without doubt formed by the action of a stream before or during the glacial age. The bottom of the channel varies from 150 feet to as much as 300 feet below the present lake level. It continues on into Lake Huron, and just beyond Mackinac Island it widens out into the deep basin of what was the ancestor of Lake Huron in the days before the Ice Age.

NEW light on the American Indians' family tree is being gained by scientific investigation of an unknown prehistoric race that once inhabited the Aleutian Islands that swing out from Alaska toward Siberia. At the Smithsonian Institution Dr. Aleš Hrdlička is studying a large collection of skulls and bones of these people, some partly mummified, which he found during expeditions to the Aleutian Islands. The new-found race is believed to be ancestral to some of the Indian tribes that occupied the Pacific coast, including California, when white men came to America. The pre-Aleuts, as these long-lost ancestors are descriptively termed, lived about 2,000 years ago. They were descended apparently from earlier immigrants who had come over from Asia to Alaska, and they were followed in turn by the Aleuts. Dr. Hrdlička's exploration in the Far North have demonstrated that Alaska was a racial cats-cradle with five or six different Eskimo, Aleut and Indian peoples crossing and re-crossing one another's path. All of them contributed in some way to the blood of the tribes that peopled North and South America.

MORE and more the railroads of America are making use of "velvet track," declared H. C. Drake, of the Sperry Products, Inc., Brooklyn, N. Y. Flash welding of railroad rails into long continuous stretches of rail make this achievement possible. In this welding method the two ends of ordinary track lengths are placed next to each other and a heavy electric current preheats them. Then they are moved in and out of contact, a few times, as extremely hot arcs of electricity flash between them. Finally the two ends are squeezed together with a pressure of 10,000 pounds to the square inch to complete the weld. "Velvet" riding smoothness, without the familiar clicking of the wheels on rail junctions, is the result.