# SCIENCE NEWS

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## THE CYCLOTRON OF THE CARNEGIE INSTITUTION

SCIENCE has a new tool with which to probe the mysteries of the atom. It is the new giant cyclotron, or atom-smasher, just put into operation at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. The new cyclotron, one of the two largest in operation in the world, the other being at Berkeley, Calif., generates atom-smashing projectiles of 15,000,000 electron volts energy, permitting the most precise measurements ever made of the forces released by atomic disintegration.

The cyclotron itself weighs more than 225 tons, has an overall height of 12 feet, is 30 feet long and 20 feet wide. It took four years to build, at a total cost of $500,000 for the cyclotron, its appurtenances, and the special three-story building housing the equipment and instrument shop.

The magnet is made up of four iron castings, the largest weighing more than 50 tons. Surrounded by this heavy magnet is the accelerating chamber, about 60 inches in diameter, in which atomic particles are produced. In this accelerating chamber, the atomic particles receive successive "kicks" which cause them to whirl around in continually widening circles at tremendous speeds, until finally they reach a window on the side of the chamber, where scientists place any element they wish to bombard. Here the element receives the full force of the atom-smashing beam of atomic particles.

The Carnegie cyclotron is housed ten feet beneath the earth's surface, to prevent the radiation from reaching people outside. Mice, exposed to cyclotron radiations, of much less intensity than those created by the new atom-smasher, died in a few hours.

The new cyclotron, patterned along the same lines as 20 other similar instruments in the United States, is operated by Dean B. Cowie, physicist in charge. He sits at the control board, a huge organ-like console, many yards away from the cyclotron itself, and protected from its radiations by specially constructed insulating walls. Before him are seven main switches, over 100 smaller switches, and a maze of dials and meters. Only by pressing the right switches, in the right order, can he make the cyclotron operate. This interlocking system of controlled operation protects the equipment from accidentally being damaged by mistakes in operation, or by failure of any component of the cyclotron. Because of the dangerous radiations, and the high-voltage equipment in the cyclotron laboratory, no one ever sees the cyclotron in operation. To prevent accidents, should anyone be in the laboratory while the power is on, master switches on doors leading to the powerful high-voltage parts of the laboratory automatically cut off all power when these doors are opened.

The Carnegie cyclotron, with its 100 kilowatt radio frequency supply, operates at a frequency of 10 megacycles which changes the polarity of the electrodes 10 million times a second.

The cyclotron was the invention of Professor E. O. Lawrence, of the University of California, who received the Nobel Prize for its development. At the present time he is working on the most powerful cyclotron in the world, more than three times greater than the present 60-inch instrument. Dr. M. A. Tuve, Dr. L. R. Hafstad, Dr. R. B. Roberts, Dr. G. K. Green and Dr. P. A. Abelson, of the Department of Terrestrial Magnetism, integrated past experiences at other laboratories in this country, with improvements. With the beginning of the war, all these men were assigned to other, more immediately urgent war developments and since then Mr. Cowie has carried the responsibility of completion of the cyclotron.

## ITEMS

INCREASED use of mineral oil may have serious nutritional consequences. Non-rationed mineral oil robs the body of at least two of the fat-soluble vitamins, and of calcium and phosphorus, according to the U. S. Department of Agriculture. Mineral oil, which has been plentiful and relatively cheap as well as not becoming rancid, has been used in increasing amounts in salad dressings and in such foods as salted nuts, potato chips and doughnuts. Its prolonged use, however, may lead to deficiency ills because it prevents the body from making full use of some of the most important essentials in food. Recent studies at the Arizona Station showed that mineral oil not only cheated the user of vitamin A, but also of vitamin D, the "sunshine vitamin," and calcium and phosphorus. Rats taking mineral oil needed three times as much cod liver oil to supply vitamin D as those not given the oil. Puppies fed mineral oil could not use the calcium and phosphorus in their food to build normal bones.

SULFADIAZINE given prophylactically to members of the armed forces to protect them from meningitis in case of a threatened epidemic will not affect their ability to pilot an airplane, drive a jeep or perform other tasks requiring hand-eye coordination and swift reaction, it appears from studies reported in the *Journal* of the American Medical Association. The studies were made by Dr. Alison H. Price, of Jefferson Medical College and Hospital, Philadelphia, and John C. Pedulla, safety examiner for the Pennsylvania State Police. Sulfadiazine in amounts usually considered adequate for treatment or prevention of certain infections was given to ninety healthy young men medical students. Eye-hand coordination and reaction time before and after the sulfadiazine were tested on apparatus used to determine the fitness of automobile drivers. The same tests were given to forty-four students who did not receive any sulfadiazine and who served as controls. No significant difference was found between the controls and the men taking sulfadiazine. What effects there might have been if the men had been suffering from an infection in addition to receiving the drug was, however, not learned from the tests.