



BUILDING THE BEVATRON—This progress picture of the giant atom smasher shows a technician at work on the aperture of the magnet, through which protons have now been hurled at five billion-electron-volt energies. At left is the crawl space, which gives experimenters access to the accelerating chamber without taking the whole magnet apart. Ports in the crawl space permit insertion of experimental equipment into the chamber. The photo was taken as the machine neared completion.

PHYSICS

Biggest Atom Smasher

See Front Cover

► THE BEVATRON is now hurling nuclear missiles at five billion electron volts. The world's most powerful atom smasher is at work after four years of construction.

"Man has entered into a new domain of fundamental nuclear research," official announcement of the University of California and the Atomic Energy Commission said.

"We do not know what we shall find," said Dr. E. O. Lawrence, Nobelist director of the Radiation Laboratory and inventor of the pioneer atom-smashing cyclotron. "Every time we have extended the energy range of nuclear research, we have increased our understanding of the fundamental nature of the nucleus."

Protons, hearts of hydrogen atoms and one of the building blocks of all matter, are the projectiles hurled. They are synthetic cosmic rays. Never before have such powerful radiations been man-made.

Runner-up among atom smashers is the Brookhaven National Laboratory's cosmotron at Upton, N. Y., which is operating close to its three billion-electron-volt limit. Brookhaven is to have a 25 billion-electron-volt accelerator, authorized by the AEC at

an estimated cost of \$20,000,000, but not yet building. (See SNL, Jan. 16, p. 39.)

The bevatron cost \$9,000,000. Particles travel 300,000 miles in being whirled up to peak energy. The giant instrument has the world's largest magnet, 135 feet in outside diameter, weighing 10,000 tons. It is designed for a top energy of 6.25 billion electron volts. Five billion were achieved March 12. The next few months will be devoted to a shake-down of the new giant, Dr. Edward Lofgren, in charge, announced.

The particles circle the accelerating chamber some 4,000,000 times in 1.85 seconds, during which the magnetic field prevents them from wandering off the precisely prescribed orbit.

When the protons enter the accelerating chamber, they have already been speeded up, first to 500,000 electron volts in a Cockroft-Walton generator, then to 10,000,000 electron volts in a linear accelerator. The magnetic field is then relatively weak, about 300 gauss. As the particles gain energy, the increasingly strong magnetic field forces them to remain in orbit. The protons receive an average of about 1,300 volts of energy on each trip around the chamber.

Science News Letter, March 27, 1954

DENTISTRY

Navy's Ultrasonic Tooth Drill Nears Final Stage

► THE NAVY'S ultrasonic tooth drill is a step closer to banishing the fear and pain of having cavities filled by a dentist.

Scientists at the Naval Medical Research Institute, Bethesda, Md., have developed a handpiece that can be used easily and comfortably by a dentist. Ultrasonic sound waves do the work of drilling through the tooth to clean the cavity.

The handpiece of present dental equipment is used to hold the drilling burr. The heat, noise, vibration and pressure of the burr have created not only pain for the patient but also a fear of dental work in many people.

By eliminating the objectionable features of drilling, the Navy's dental scientists hope to cut down the fear.

Development of the new drill, headed by Comdr. Arne Nielsen, is still in the experimental stages. The ultrasonic drill has been tested on extracted teeth, glass and other hard surfaces. It drills a clean hole.

No tests have yet been made on human patients. The drill was demonstrated at a Washington Dental Society clinic.

Science News Letter, March 27, 1954

HEMATOLOGY

Blood Cell Difference Gives New Cancer Attack

► DISCOVERY THAT the sick white blood cells in leukemia patients take up the chemical, cysteine, at a much faster rate than normal white blood cells was reported by the American Cancer Society. The discovery was made by Dr. Austin S. Weisberger of Western Reserve University, Cleveland.

Cysteine is an amino acid that helps build up protein. The leukemic white cells take up as much in 20 minutes as normal white cells in three days, Dr. Weisberger found through feeding radioactive cysteine to leukemic animals.

The cancer society interprets the finding as follows:

"The discovery has opened three possible avenues of treatment: 1. Poisonous compounds closely resembling cysteine (analogues) may be taken up by the cancer cells and kill them; 2. the cysteine can be impregnated with radioactive atoms which will destroy the leukemic cells, or 3. the cysteine may be destroyed by an enzyme.

"Because of the great danger that either the poisons or the radioactivity may damage enough normal cells to harm human patients, a great deal of preliminary animal research will have to be done before any of the compounds can be tested clinically. It may be years before the right radioactive substance, or a poison which will act exclusively on leukemic cells, can be devised. No human tests are being undertaken now."

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