

prospector was sent, and he brought his wife with him. There turned out to be no diamonds after all, but before the Zulu couple could get a boat back home the man fell sick and died.

The woman, not caring to go back to her people a widow, remained in the North and married an Eskimo. Kuploo, now about 16 years old, is their child.

Like a good many boys of his age, he is rather bashful and didn't want to have his picture taken, so Père Arthème Dutilly, Canadian missionary-scientist, asked him to hold up a bird he had just shot for his collection. It didn't occur to Kuploo until the operation was all over that he would also be included in the picture.

Science News Letter, September 11, 1937

PHYSICS

Giant New Atom-Smasher Uses 2,700,000 Volt Potential

Apparatus Enclosed in High-Pressure Tank To Cut Down Sparking and Corona Discharges

THE HIGHEST steady operating potential ever used in atom bombardment research is attained in the new 2,700,000 volt electrostatic generator with which physicists at the University of Wisconsin are now exploring the nuclei of atoms.

Sealed in a giant steel tank under a pressure which can be as high as 100 pounds to the square inch, the Wisconsin apparatus has already made possible the discovery of powerful gamma radiation, excelling in piercing power the rays from radium, which is liberated when fluorine is bombarded in the apparatus. The medical implications of this discovery, in the treatment of cancer and other malignant diseases, are yet undeveloped but offer a promising field of research.

Drs. Raymond G. Herb, D. W. Kerst and D. B. Parkinson are the scientists who have fashioned, and now operate, the new tool of atomic research which operates steadily at 2,500,000 volts. The experimenters are assisted, in the theoretical implications of their discoveries, by the well-known mathematical physicist Dr. Gregory Breit, also of the University of Wisconsin.

The virtue of the Wisconsin apparatus, Dr. Breit told Science Service, is that it gives a high, steady and controllable voltage with which particle "bullets," like protons, can be driven at atoms under investigation.

The device, of the electrostatic type, differs from the famous cyclotron apparatus used at the University of California in about the same way that a rifle differs from a shotgun. The cyclotron can apply equal or greater energies to its particles but may not supply them

in a steady stream with every particle in the stream having the same energy. Like a shotgun, a cyclotron can be said to spray bullets of different energies at the target.

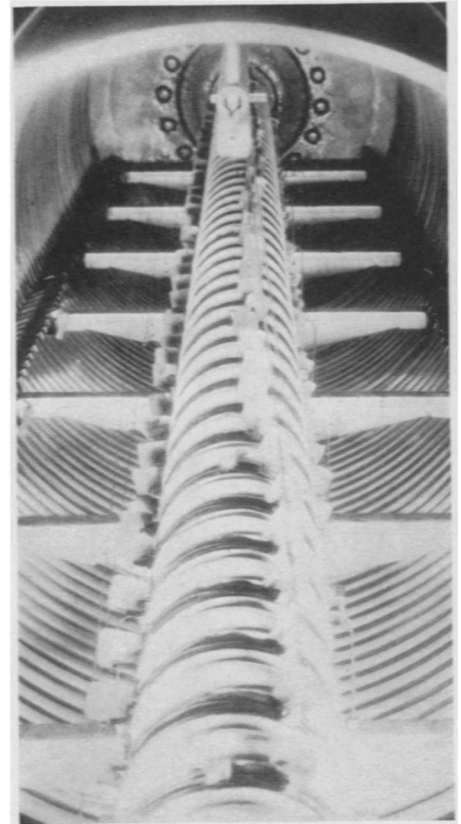
Moreover, as now used, electrostatic generators have methods of determining the energies of their particles by external means, without actually going into the bombarding particle beam (as the cyclotron investigators must do) to measure the energies of the particles.

In contrast to cyclotrons, the Wisconsin apparatus, to keep the analogy, would be a rifle which shoots its bullets with known and readily controllable energy. For many vital experiments in atomic physics, it is most important that the energy of all the particles be quite the same and their energy accurately known.

Typical of an experiment where such knowledge is vital, is that of measuring the binding force in the nuclei of hydrogen atoms. The fundamental results of this new, powerful force of nature and knowledge of the laws by which it acts, were first secured at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington with the electrostatic atom-smasher of Drs. Tuve and Hafsted and their colleagues.

Already work at Wisconsin, not yet officially reported, indicates that the basic curves obtained in this earlier work will be substantiated with great accuracy, and extended into the new ranges of energy which the Wisconsin device can attain.

The function of the steel pressure tank, enclosing the Wisconsin apparatus, is to reduce markedly the corona discharge and electrical spark-over at



ATOMIC RIFLE-RANGE

Down this long porcelain tube speed the atomic "bullets," in the University of Wisconsin's new atom-smashing machine.

the very high electrical potentials employed. While it might seem that this is a new idea—from the number of similar devices now being built elsewhere—it is not.

The idea of a pressure tank was in nearly all the investigators' minds as the way to accomplish the best operating conditions. The apparent delay arose from the need for much experimental spade work in learning how to construct and operate satisfactorily the electrostatic type of generator.

This knowledge has now been achieved, so that besides the Wisconsin device, operating at pressures of 100 pounds to the square inch, there is now building the Westinghouse apparatus which will have pressures of 120 pounds to the square inch. And in Washington a tank with 50 pounds to the square inch pressure is under construction which will house a new generator.

Also, Dr. Robert Van de Graaff of the Massachusetts Institute of Technology, who was the first of the modern scientists to apply to the problems of atomic bombardment the electrostatic methods

of the last century, has now dismantled his huge generator and taken it to Cambridge where it will be housed in a pressure tank. The giant airship hangar at Round Hill, Mass., formerly used, will be abandoned for its research purposes. Dr. Van de Graaff's pioneer giant instrument has served valuably in helping to show needed changes in construction methods and operating techniques which can only be learned after equipment has been built.

Dr. Herb, at Wisconsin, has announced that a very small amount of carbon tetrachloride—familiar as a cleaning fluid—has aided in improving the operating characteristics of his apparatus. It has been suggested that the vapor will break up in the presence of ionization in the tank and that the chlorine part serves to turn swift-flying electrons in the apparatus into slow-moving, larger ions. Thus the rapidity of spark-over is diminished and better operation secured.

Science News Letter, September 11, 1937

MYCOLOGY

Mushrooms Grown in Air-Conditioned Houses

MUSHROOMS grown in air-conditioned houses are the newest offering for gourmets' tables. Near West Chester, Pa., thirty growing houses have been fitted with apparatus to control the temperature and humidity and by that means to increase the mushroom yield from two crops to three. Previously the houses were shut down during the summer months because hot weather produced inferior mushrooms.

Control of temperature and humidity marks another chapter in the art of mushroom growing, one of the world's most specialized crafts. Parisian mushroom growers long ago found a partial solution to the problems of variable temperature and humidity by placing their growing beds in galleries and cellars from 60 to 160 feet below the surface of the ground.

Credit for the suggestion to apply air-conditioning to mushroom-growing goes to William E. Chambers, vice-president of the Grocery Products Manufacturing Corporation.

Science News Letter, September 11, 1937

England became a tea drinking country because of its Oriental trade and tea plantations, whereas Holland and France took to coffee because of their coffee plantations in the Indies.

CHEMISTRY

Milk: Its Whence and Whither Discussed at Chemists' Meeting

Chemistry of Other Foods and Their Health Importance Are Increasing Concern of Members of Profession

CHEMISTS are looking into cows, nowadays. Pioneer research that may open the road to learning how milk is made was reported before the annual meeting of the American Chemical Society in Rochester, N. Y., by Drs. Ross A. Gortner and Stanley M. Jackson of the University of Minnesota.

Great changes in the relative amounts of different proteins were found in the mammary glands of heifers, "fresh" cows, and "dry" cows, they declared.

In what was described as the first real attack on the problem of how milk is secreted, they reported that albumins—proteins such as the white of egg which are soluble in water and which are coagulated by heat as in boiling an egg—decreased very sharply when the glands became active. Similarly globulins, another type of protein, increase in amount.

"Just what the changes mean, insofar as the synthesis of proteins in milk are concerned, still remain to be worked out, but this study does show that when the gland becomes active there are major changes in the physical state of the proteins making up the glandular tissue," they concluded.

Making Smaller Curds

By adding enzymatic extract of hog's pancreas, cow's milk curds can be made small enough closely to approximate the curds in human milk, Dr. Victor Conquest and his colleagues of Armour and Company reported. In the past, cow's milk that was to be fed to babies had to be diluted with water and lactose in order to make the digestion of its relatively large curds easy for an infant's stomach.

"The method of preparing this product is identical with the pasteurizing processes except that a slight incubation period for the milk after it has been mixed with a small amount of dried enzymatic extract of the hog pancreas has proven to be successful," Dr. Conquest explained.

Nutritive qualities of the milk are

not affected by the treatment, which is easily carried out on a large scale, it was indicated. "The purpose of our investigation has been to reproduce such a milk in a manner that will not take away any of the valuable constituents of normal cow's milk, the method of which will be fast and the resulting product such that it will produce a flaky curd in the stomach and which will give a curd tension reading low enough to be classified as a soft curd milk."

Pint a Day Sufficient

To get an adequate amount of calcium for bone building, children need only a pint of milk a day, not a quart as has been sometimes claimed. This is the verdict of a study of five University of Illinois scientists, presented in a report to the chemists. More milk would be needed by a child who has been underfed or improperly fed, however, they emphasized, in order to make up for past deficiency.

The verdict, Miss Julia Outhouse, one of the five scientists, explained, is based on how much calcium a child can absorb in order to build its bones and its teeth. Other food requirements which a larger milk supply would fill can be obtained from other than milk sources.

Results of the Illinois experiments are said to be the nearest approach to determining scientifically how much milk children should have. Associated with Miss Outhouse in the study were Gladys M. Kinsman, Millicent L. Hathaway, and Janice M. Smith of the University's Department of Home Economics, and H. H. Mitchell, chief in animal nutrition.

Only one-fifth of the calcium in milk solids can be used by growing children who were well nourished with respect to all other known food requirements.

Five little girls, ranging between three and a half and five years of age, were used in the experiment. The average daily calcium requirement was found to be seven milligrams per kilogram of