SCIENCE NEWS

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THE NAME OF THE KERST X-RAY MACHINE

THE name of the latest machine for producing powerful radiation, the device that promises to rival the famous cyclotron in atom-smashing, is under discussion.

Announced as the "rheotron," it is also being called the "betatron." Built by the General Electric Company, the invention of Dr. Donald W. Kerst, of the University of Illinois, "betatron" is now in the lead as it is the pick of Dr. Kerst. The 20,000,000-volt doughnut-shaped electron whirling x-ray machine has been removed to the University of Illinois while the General Electric Company constructs a 100,000,000-volt machine of the same kind.

The name rheotron derives from the Greek word rheo which means to flow. And the machine does cause electrons to flow. But the cyclotron, invented by Professor E. O. Lawrence, of California, also causes protons and other heavy atomic particles to flow, so that the name rheotron could appropriately apply to both. So could the name cyclotron, since each machine causes flow in circles.

The distinguishing feature of the new machine is that it whirls electrons, the lightest constituents of the atom, while the cyclotron whirls the heavy parts. This distinction is emphasized in the name betatron, because "beta rays" was the name given to the electron rays of radium. In the same way the name "alphatron" might be given to the cyclotron because "alpha rays" was the name given to the heavy particle radiation from radium. However, these rays consist only of alpha particles which are the kernels of helium atoms, whereas the cyclotron will whirl any heavy particle that has a positive charge.

Radium also gives off gamma rays which are similar to x-rays but more penetrating or "harder" than are produced by the usual x-ray machine. Cosmic rays produce gamma rays that are harder than any that have yet been produced artificially.

The 20,000,000 volts of the betatron, more than twice the voltage of any previous electron accelerator, imparts to its electrons a higher speed than any ever before obtained artificially. When these electrons strike a target, they produce x-rays more penetrating than those of radium.

FIBER, DRUG AND OTHER PLANT PRODUCTS GROWN IN THE UNITED STATES

MANILA is cut off temporarily, but the United States is still able to get at least a certain amount of Manila hemp for necessary naval cordage. Thanks to botanical research conducted in the U. S. Department of Agriculture in peace years, wartime supplies of a number of formerly imported plant products are getting on a basis of home, or at least Hemisphere, production, according to Dr. E. C. Auchter, chief of the Bureau of Plant Industry, in his annual report to the Secretary of Agriculture.

The abaca plant, from which Manila hemp is made, has been brought into fairly large-scale production in Central America, and a great increase in acreage is expected for the current year. Other problems in plant production which were at least partly solved by research conducted before the outbreak of war include:

Development of cotton varieties with extra-long staple, formerly imported from Egypt, now grown in our own Southwest. These cottons are valuable in making fabrics for parachutes and other aviation uses.

Fiber flax, at one time almost out of cultivation in the United States, now staging a comeback, thanks to improvements, especially in the direction of disease resistance.

Introduction of drug plants. Normally unprofitable because of competition of low-cost hand labor abroad, these now command high enough prices to repay cultivation under American conditions. It is estimated that the addition of a mere 3,500 acres in assorted drug plants will take care of our ordinary needs.

New soil-building plants, notably grasses and legumes, to recondition exhausted soils and check the progress of erosion.

Cultivation of rubber in the American tropics has been much talked of, but it must be recognized that this program is a long-time one, and that benefits will accrue in the post-war period rather than during the immediate emergency. However, the department obtained about ten million choice rubber seeds out of the Orient just in the nick of time, and these are now coming along in nurseries in suitable spots in Central and South America.

PLANTING SUGAR BEETS

LESS of the heavy "stoop" labor which has always been held against the beet sugar industry, and more sugar production for a country and a world at war, are promised by a curious turn of invention which will be widely used throughout the immense sugar-growing area of the western United States in 1942.

Incidentally the industry has profited from a hard lesson which it learned in 1915–18, when every pound of beet seed came from abroad. Huge seed plantations are maintained, and every pound planted in the United States is now raised here at home.

The beet seed ordinarily grows from two to four germs, in a single woolly outside covering. Until a year or so ago, it was necessary to plant these hulls whole. This meant that the young beets came up two to four in a clump, and in a virtually solid row like young lettuce. Since the optimum space between beets is about a foot, this in turn meant that thousands of people, mostly Mexicans, had to crawl along the rows and, by hand, separate the clumps and pull out the surplus beets.

Roy Bainer, a research associate of the U. S. Agricultural Experiment Station at Davis, Calif., and his associates there worked out a process to "crack" the woolly hulls and thus release the single seed-units for planting singly. The process consists essentially of pass-

ing the seeds between a disk and a moving belt. It required delicate adjustment to "crack" the hulls without damaging the seed-units. But it has been done.

The result is that farmers can now plant beet seeds singly, with the aid of new planting machinery which is also being developed, and though they can not quite plant them just where they want them, they can plant them far enough apart so that men with long-handled hoes can now pass rapidly along the rows and deftly clip the unwanted beets out of the soil. A man can now thus thin beets up to an acre a day.

There will be thousands of pounds of "singled seed" planted next spring. Demonstrations were conducted all over the beet country this year under the auspices of the beet-sugar companies.

GUAYULE RUBBER

GUAYULE rubber's relatively high resin content, hitherto a handicap in the use of this native American plant resource, figures as a possible actual benefit if the proposed large-scale production of synthetic rubber is carried through.

Tire-making and other rubber-processing machinery is set for handling natural Hevea rubber, which normally has a resin content of about five per cent. Synthetic rubber contains no resins at all, and if it is to be processed by the same machines, resins must be artificially added—a somewhat expensive process. On the other hand, raw guayule rubber has a resin content ranging from 15 per cent. to 18 per cent., which must be reduced to the five per cent. of Hevea rubber before processing—again at some expense. However, if the low-resin synthetic rubber is blended with the high-resin guayule product in the right proportions, the blend becomes the equivalent of natural rubber from the East Indies without additional expense.

Since neither synthetic nor guayule rubber is now being produced in even a small fraction of the national needs, the proposal to establish huge synthetic plants and the bills now before Congress for setting up a 45,000 acreage in guayule, sponsored respectively by Senator Downey and Representative Anderson (both of California), become in a sense mutually complementary. This is true even in the matter of timing, for it is expected that it will take about two years to get the synthetic plants into production—and it takes two years to bring a crop of guayule to harvest.

Other proposed sources for home-grown American rubber offers less promise than guayule. There is rubber in various species of milkweed, spurges and goldenrods publicized by the late Thomas Edison, but the content is low and there are difficulties in extraction, usually involving the development of special machinery.

Much has been said lately about a Russian dandelion called kok-sagyz, but preliminary investigations by the U. S. Department of Agriculture have not yielded any encouragement. Kok-sagyz plants yield only about one per cent. or two per cent. of rubber, as compared with the 15 per cent. to 20 per cent. possible from guayule. It is estimated that something over 45 million acres of kok-sagyz would be necessary to supply the normal American demand. The Soviets are believed to be concentrating on kok-sagyz only because experimental plantings have shown that while guayule plants will grow in Russia's semi-arid regions they will not develop high rubber content because of different climatic conditions.

Kok-sagyz, incidentally, is a true dandelion, belonging to the same genus as our common yellow-flowered pest. Its botanical name is *Taraxacum kok-sagyz;* the technical name of the common dandelion is *T. officinale.*—FRANK THONE.

GERMANY'S WAR MATERIALS

A REPORT made public by the Department of the Interior summarizes Germany's war materials acquired during the past eight years through purchase, aggression and internal effort. According to this report, prepared by Charles Will Wright, foreign minerals specialist of the Bureau of Mines, "in the case of aluminum and magnesium, the metals so essential to the manufacture of airplanes and incendiary bombs, Germany was out-producing the United States, Great Britain and Canada up to 1941. By the end of 1941, it was expected that the combined aluminum output of the three allied countries would pull ahead of the German-dominated nations, and that the Allies' 1941 figures would be nearly doubled by the end of 1942. In the case of magnesium, it is believed that American and British output is now equal to German production, while American output alone by 1943 will be more than four times Germany's expanded 1941 production."

Mr. Wright states, however, that mineral production for non-defense purposes in the United States still goes on, even since December 7, and that "Just when the United States and Great Britain will be able to exceed the German production of these war machines (tanks, submarines and munitions) depends largely on their ability to increase and maintain mineral production and the extent to which civilian consumption is curtailed to permit more rapid advances in the manufacture of required war materials."

It is reported that Germany lacks "copper, tin, tungsten, nickel and petroleum, but that there is no immediate prospect of a collapse of the military machine because of shortages of any of these materials."

According to Mr. Wright, German possession of the Near Eastern oil fields would assure ample petroleum oil for all essential needs if transport and reconstruction problems were solved.

PITCH THE BEST INCENDIARY EXTINGUISHER

HARD coal-tar pitch, granulated or flaked, will extinguish a magnesium incendiary bomb by forming an air-tight blanket which quickly smothers the flame.

According to Dr. R. R. Sayres, director of the U. S. Bureau of Mines, the pitch is the best known extinguisher—better than sand or water or even prepared compounds such as carbon tetrachloride, carbon dioxide and foam.

The pitch, sometimes called "fuel-pitch," will soften

at about 300 degrees Fahrenheit. It is suggested that 25- or 50-pound lots be stored in boxes or bags with long-handled shovels kept near-by.

Directions given by the Bureau of Mines follow:

A slightly different procedure is followed in extinguishing incendiary bombs falling on wood surfaces and those falling on concrete or metal, according to the Bureau of Mines. In either case, it is necessary to wait about a minute for the thermit to burn itself out before trying to extinguish the bomb.

In dealing with a bomb on concrete or metal, use a shovel or scoop to spread—not throw—a layer of pitch over it. If a short flame persists, apply another layer of pitch and allow it to cool ten minutes before removing it from the house or office in a bucket or metal container. Although the bomb may continue to smoke for a few minutes, it will not burn again because the pitch encircles it in an airtight blanket, shutting off its necessary oxygen supply.

To extinguish a bomb on a wood floor such as an attic, cover the bomb with a layer of pitch to stop the heat and glare. Then spread a layer of pitch on the floor near-by, rolling the bomb with a long-handled shovel or hoe on to this layer and covering the entire mass with more pitch. This is necessary because the burning bomb can get air through the pores and cracks of the wooden floor. Fires already started in wood or other near-by combustible material by the bomb may be put out with water or prepared chemicals, taking care not to direct such a stream on the bomb itself. A bomb rolled in pitch this way is completely extinguished and does not have to be removed from the building immediately. After the pitch has cooled sufficiently to handle, it can be removed simply by rolling it up like a carpet.

Because some incendiary bombs contain mild explosive charges which hurl small fragments, the bureau recommends that protective clothing and goggles be worn and that long-handled implements be used in dealing with a magnesium bomb. One of the best protective measures for a householder is to remove all paper boxes and inflammable material from the attic and cover the floor with sand, or sheet metal.

SNOW-WHITE MOUNTAIN GOATS

FOR the first time in the history of modern game management, wild mountain goats have been successfully trapped, transported and transplanted. To the state of Montana goes the honor for capturing ten of the snow-white crag climbers on the Lewis and Clark Forest and subsequently transporting them several hundred miles to the Crazy Mountains north of Livingston, Mont., before liberating them.

Native mountain goats are true dwellers of the high country, spending a large portion of their lives high above timber line. Claimed by many to be the most agile of beasts, the mountain goat is capable of unbelievable endurance at an amazing clip across the jagged, rocky slopes. Its small, sharp and slightly curved horns are as black as its pelt is white. For centuries the mountain goat has been without peer as a game animal, its rocky fortress sufficing as protection against the most accurate of modern armament.

Within the last few decades it has become increasingly necessary to offer mountain goats sanctuary from a fast multiplying army of hunters. In many places they have become extinct. It was to such a place that the Montana Fish and Game Department transported the undomesticated nannies and billies, the largest of which weighed 142 pounds.

It is anticipated that the present nucleus may some day furnish a population of sufficient size to permit hunting. If, however, the small herd merely perpetuates itself without increasing its number, the game managers will consider the job well done. Though the trapping and transportation ran close to $35 per animal, the preservation of the species for future Americans to see in its native haunts is considered worth many times that price.

ITEMS

TYPHOID deaths reported in 1940 of 78 United States cities surveyed since 1910 was only 172, the lowest number on record, according to the *Journal* of the American Medical Association. This report is on the basis of the 1940 census and information from city health officers. The *Journal* states that the rate for all cities is now "just about one half of one point per hundred thousand of population." No typhoid outbreaks have been recorded.

SPECIAL foods for middle-aged and aged people may be the next step in nutrition, according to a food survey reported to the American Chemical Society by Dr. William A. Hamor, associate director of the Mellon Institute of Industrial Research, Pittsburgh. "New advances have been made in infant feeding and the nourishing of 20,000,000 school children. With less than 2,000,000 babies born a year, infant-food manufacturers are extending their markets with lines of products for older children. It has predicted that the next step may be foods especially for the middle-aged and aged."

SULFATHIAZOLE ointment cured impetigo in roughly a third of the twelve to sixteen days usually required under other means of treatment, in a series of 60 cases reported in the *Journal* of the American Medical Association. The cases are reported by Dr. L. H. Winer and Dr. E. A. Strakosch, of Minneapolis. They found the sulfathiazole ointment apparently safe and "more agreeable and cleaner" than ammoniated mercury ointment, cinnabar lotion, gentian violet or silver nitrate solution. None of these treatments has been found wholly satisfactory, hence Drs. Winer and Strakosch propose the use of sulfathiazole ointment in the treatment of impetigo.

"WU WU" is not always a youthful exclamation of breathless amazement. It has a more serious side, and as such is listed among several thousand terms in a new "Dictionary of Philosophy," edited by Dagobert D. Runes, published by the Philosophical Library. "Wu wu: To regard things as things, that is, to regard things with objectivity and no attachment or selfishness, on the one hand, and with the conviction that the self and the non-self form an organic unity on the other."