SCIENCE NEWS

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ENERGY FROM SPLIT URANIUM ATOM

THE minute amount of energy released by the splitting of an atom of power-producing Uranium 235 was used in Boston on July 24 to turn on the new fifty kilowatt transmitter of Westinghouse radio station WBZ.

Uranium, a heavy brittle metal, exists like other elements in several forms, or "isotopes." The one of atomic weight 235 has recently been isolated in microscopic amounts. Studies made at several laboratories have led to the suggestion that if large quantities of U–235 could be secured, the world might have a practicable source of atomic power, which has long been sought.

The switchover from the present station in Millis to the new one at Hull, across the harbor from Boston, took place during a 30-minute broadcast over the NBC-Blue network, beginning at 8: 30 P.M., Eastern Standard Time. Apparatus for the atom-splitting experiment was at Hull, and was under the control of Dr. E. U. Condon, associate director of the Westinghouse research laboratories at East Pittsburgh, Pa.

The splitting of the atom was heard by the radio audience as a sharp click. After two preliminary splittings, to acquaint listeners with the sound, the third one operated relays to switch from Millis to Hull. Those listening to WBZ, it is stated, noticed a new surge of power, and many more people were brought within easy hearing distance.

Dr. Condon explained the operation of the atomic power device as follows: "Neutrons (neutral atomic particles) from a mixture of radium and beryllium will be slowed down in passing through a coating of paraffin and will then strike a small target of uranium. One atom in 140 of the uranium will be in the form known as U–235. About once in every 10 seconds a slow neutron will hit the nucleus, or heart, of a U–235 atom and shatter it into five parts—two new atoms of different elements and three neutrons. As these fragments fly apart with an energy of 200,000,000 electron-volts, they will ionize (electrify) the air in the apparatus and permit a small electric current to flow through a circuit. Following an amplification of about a million times, the current will be strong enough to trip a thyratron tube which in turn will operate a relay to switch on the new transmitter."

The increased strength of the new station does not come from increased power, for this is the same (50 kilowatts) as the old one. According to Vincent F. Callahan, general manager of WBZ, it is due to the directing antenna. This reflects waves that would otherwise be wasted over the Atlantic Ocean and sends them back to reenforce those supplying the densely populated area around Boston. It consists of two 500-foot towers, one of which is the director, and the other the reflector. Located on the salt marsh of Hingham Bay, it takes advantage of the ideal properties of salt water in carrying ground waves.

RADIO COMPASSES

Two crossed white lines on a map indicate to an airplane pilot his exact position, with a new invention which has just received U. S. Patent 2,209,191. The inventor is John B. Dearing, of Ben Avon, Pa.

Radio compasses previously used on airplanes and ships give in numbers the direction, or "bearing," of a selected transmitting station. Thus, the pilot can find the direction of two separate stations whose positions are known, mark these on a map as lines passing through the locations of the transmitters. The intersection of these lines is the position of the aircraft.

To do this automatically is the purpose of Mr. Dearing's invention, the patent rights of which have been assigned to the Radio Corporation of America. Two radio receivers tune in the two stations, on a loop antenna, which responds best when the station is in the plane of the loop. The antenna rotates, and as it does so the intensity of the signal varies in strength.

The receivers control two beams of cathode rays, in a vacuum tube, which fall on a screen similar to that used in television receivers. The beams oscillate back and forth, tracing out two lines on the screen, and the direction of the lines depends on the bearings of the stations. By a small magic lantern incorporated into the device, a map is projected from a film on the same screen. Thus, the pilot sees the map, with the two bright lines, superimposed. Their intersection shows his location, which changes as he flies along.

In order to keep the map and screen properly oriented, regardless of the direction of flight, the entire indicating mechanism is rotated under the control of a gyro compass on the ship. This keeps north, for example, at the top at all times.

SUMMER HIGH TEMPERATURE

THE sun's light and heat rays are not as concentrated in July as they were at the time of the summer solstice, June 21. It is quite all right to feel hot, nevertheless. This is the time of year when normal temperatures are highest, according to the weather men.

On June 21, the summer solstice, the sun was farthest north. Then, in countries on this side of the tropics, it was highest in the sky and its heat and light rays alike were falling on the ground most nearly vertically. Therefore, they were most concentrated. Their heating effect was greatest.

Yet the summer solstice was not the hottest time of year. Here's why! All day long, the rays beat on the earth, and it becomes hotter. All night long, if it is clear, the earth radiates this heat out again into space. In June, with long days and short nights, the amount of heat taken in during the long day was considerably more than that given off during the short night.

Even after the solstice this condition continued, despite the fact that the sun moved southward in the sky, and its rays, falling on the ground at a lower angle, were less concentrated. Thus the temperature of the earth continued to rise. Not until July or August is there a balance, with amount of heat radiated at night the same as

that received during the day. After that, the nocturnal radiation is greatest, and average temperatures begin to drop.

Local conditions, naturally, affect this. If there happens to be a series of hot days and cloudy nights, the heat becomes greater than ever, because clouds blanket the earth, and reduce the nightly cooling. Most to be desired are cloudy days and clear nights. The former reduce the heat received from the sun, while the latter permit the heat to escape as usual.

Edward H. Bowie, in charge of the U. S. Weather Bureau at San Francisco, has made a study of the delay in hottest weather in various parts of the country. This shows that in southern Arizona and New Mexico, highest normal daily temperatures come only ten days after the solstice. Around the coast of the Gulf of Mexico, the delay is 40 to 50 days. Along the North Atlantic Coast it is about 40 days, but about a hundred miles inland it is only 30 days. In the central states it is about 30 days.

Along the Pacific Coast, the delay is greatest, about a hundred days at San Francisco, but this lag drops very rapidly away from the ocean. At Sacramento, less than 100 miles inland, it is 37 days. Dr. Edgar W. Woolard, of the U. S. Weather Bureau, who has carefully studied these time lags, attributes the great delay to the prevailing westerly winds that blow in from the cool ocean surface. The proximity of water along the Gulf and North Atlantic coasts makes the delay greater than in the dry southwest. Dr. Woolard states, however, that not all the delays are fully explained.

It is on account of these facts that the summer solstice on June 21, when the sun is farthest north, is considered the beginning of summer rather than its middle. If temperatures depended solely upon the sun, it would be just as hot a month before the solstice as a month after it. In reality, the warmest weather arrives some time after the solstice, so the highest temperatures come approximately in the middle of the three months following the solstice.

THE ZINC PEROXIDE TREATMENT FOR CANCER

Success in treating ulcers or sores in 35 cancer patients whose condition was so bad they had been given up as hopeless is reported by Dr. Bromley S. Freeman, of the Tumor Clinic at the Veterans Administration Facility, Hines, Ill., in the current issue of the *Journal* of the American Medical Association. The treatment consisted in using zinc peroxide for dressings on the sores and as a mouth wash in some cases of lip and mouth cancers.

The ulcers or sores had followed x-ray or radium treatment for cancer, which in some cases had persisted. Persistence of the cancer after the radium or x-ray treatment was in some cases hidden by the infection in the ulcers. After the zinc peroxide treatment cleaned up the ulcers, it was possible to give more irradiation for the cancerous condition and in some of the cases reported the patients have advanced to the stage where plastic operations can be done to restore bone and other tissue destroyed by the first treatments.

The zinc peroxide treatments relieved pain to the extent that most of the patients could get along with only mild sedatives instead of the morphine or other narcotics they had previously required. The odor from these sores, so bad that patients in the next ward complained about it, grew definitely less, in all but one case, starting within twenty-four hours after the first application of the zinc peroxide.

"Freedom from embarrassment and the return to normal social contacts and interests together with newly acquired confidence and hope have been noted uniformly," Dr. Freeman states in his report of the patients' condition after the treatment. He is now using the zinc peroxide prophylactically to prevent or lessen the frequency or degree of bone destruction following x-ray or radium treatment of cancer of the mucous membrane. The treatment is for cancers, or sores following their irradiation treatment, occurring on the surface of the body. Among cases reported were those where the ulcers were on the jaw, throat or mouth.

Zinc peroxide is effective in the treatment apparently because when suspended in distilled water it sets free oxygen which destroys certain germs, among them the kinds Dr. Freeman found most frequently in the sores of the advanced cancer patients. He states that after disappointing results with other products, he is using only the special medicinal brand of zinc peroxide.

THE DIET OF GOLF PLAYERS

GOLFERS, especially poor players, who get tired and begin to pile up a high score between the ninth and fifteenth holes in a foursome or between the eleventh and the fifteenth in a twosome are advised to eat more fat foods for lunch and take some sugar or candy near the seventh or ninth hole. This advice comes from Dr. Paul Michael, of Oakland, Calif., in a report to the current *Journal* of the American Medical Association.

The idea comes from previous findings that marathon runners who are sustained by sugar come through a race with less fatigue. Comparatively few persons run in marathons or other races, but more than 2,000,000 golfers play on 3,000 courses in the United States, so Dr. Michael decided to investigate the possibilities of helping this large group of sportsmen and women through diet studies.

Blood tests showed that following usual luncheons and playing under ordinary conditions, the sugar in the golfers' blood dropped below normal between the ninth and fifteenth holes in a foursome and between the eleventh and fifteenth holes in a twosome. This corresponds to the periods when the golfers made the greatest number of poor shots, felt most tired and had the highest scores.

The poorer golfers had even less sugar in their blood in many cases "because of the fact that they expended more energy in playing the game and showed greater signs of exhaustion." Getting upset over their poor shots at this period made the condition worse. The more composed and accomplished players did not have as low a level of sugar in their blood.

When the golfers ate more fat foods for lunch and took candy or sugar at the seventh or ninth hole, they did not feel so tired or nervous and, on the whole, had better scores.

BONY GROWTHS ON THE JAW

DR. ALEŠ HRDLIČKA, of the Smithsonian Institution, has been making a study of about 5,000 lower jawbones of the collection at the institution of ancient and modern skulls, and finds bony outgrowths from the inner jaw surfaces fairly frequent, and widespread in both space and time. Some of these growths are tuberculate (''lumpy''), others are ridges. They are almost like bony tumors, except that the bone appears to be strong and perfectly healthy.

The first suggestion, that these growths represent an evolutionary ''throwback,'' is set aside because ancient human and pre-human skulls do not show them. They are not found on Neandertal jaws or on the jaws of fossil or existing great apes. They appear only on jawbones of modern man, and are slightly more frequent in men than women.

The most plausible explanation is that the growths are responses to muscular pull on the bones, due to chewing hard on tough, resistant foods. Especially significant is their relatively high frequency among the Eskimos. Also, they were more common on the jaws of early Norse settlers in Iceland and Greenland than they were in the Scandinavian homeland.

Asked about possibilities of results from the modern habit of gum-chewing, Dr. Hrdlička stated, ''That question may not be as frivolous as it sounds. True, gum isn't tough, and it requires very little exertion to chew it. But the advanced gum addict chews and chews and chews, hours on end sometimes, so that the sum total of exertion on the part of the jaw muscles may easily amount to as much as a smaller number of harder bites on a tougher substance.

ITEMS

MRS. AGNES CHASE, who was loaned to Venezuela by the Smithsonian Institution, has returned after spending two months in the field as guest of the government. The grass problem in Venezuela is very much like that of our own Plains region: to find suitable species, native or imported, that can be used to greatest advantage in redeveloping its drought-afflicted, windswept rangelands, so that they may again become able to support great herds of cattle and flocks of sheep and goats. Mrs. Chase recommends that a Venezuelan botanist be sent to the United States for advanced studies that will enable him to continue the work she initiated.

CAMELS that once roamed the dry grasslands that are now rock strata beneath the soil of South Dakota are represented in fossil collections sent back to the Field Museum of Natural History by an expedition under the leadership of Paul O. McGrew. The camels lived in America during Miocene time, about 18 million years ago. They later became extinct in North America, but unlike primitive horses they still have surviving relatives native in South America. Mr. McGrew's search for fossils has been conducted largely in the vicinity of Wounded Knee. The party has now moved on to northwestern Nebraska.

FURTHER details are awaited before the reports from Switzerland that Dr. Walter Minder, of the Radium Institute at Berne, Switzerland, has discovered the missing chemical element 85 can be accepted. Several times in the past decade similar announcements have been made, but further research failed to confirm them. In 1930 Dr. Fred Allison, at the Alabama Polytechnic Institute, announced that he had found evidence of both 85 and 87 in certain minerals by a method using magnetic and optical principles in combination. However, others found themselves unable to duplicate his results. In 1931 Dr. Jacob Papish, of Cornell University, also announced the discovery of 87, but by different methods. This, also, is still unaccepted by the scientific world in general. However, recent work at the University of California in bombarding elements with neutrons, it has been claimed, has created extremely minute amounts of 87. Dr. Minder, supposed discoverer of 85, is known for a paper he published in 1938 on theoretical aspects of the disintegration of radium and similar elements. In this he made a suggestion that under certain conditions, 85 and 87 might be formed. The paper does not, however, give any clue to the methods that he might have used to detect and isolate it.

How much variation there may be in the same species of deer is brought out strikingly in a new publication of the Smithsonian Institution, in which ten distinct subspecies of the white-tailed deer are described by Dr. Remington Kellogg, of the U. S. National Museum, and Major E. A. Goldman, of the U. S. Biological Survey. Although the white-tailed deer is commonly called the Virginia deer, it is found practically all over the United States and in Mexico and Canada as well. Some of its variations in size, color, antler form, etc., have become so well stabilized in isolated places like mountain areas and off-coast islands that they are recognizable as distinct subspecies.

A WORKING model of the new 200-inch telescope being erected by the California Institute of Technology on Mount Palomar, one tenth the size of the original, and built at a cost of $25,000, has been placed on display at the Golden Gate Exposition. The model, with its 20-inch mirror and all necessary auxiliary attachments, is a complete telescope, and has been used for more than a year in actual observations. The model is part of the exhibit of the Westinghouse Electric and Manufacturing Company, which built the mounting for the telescope itself. Weighing about a million pounds, it is now in place in southern California, but will not be used until the completion of the 17-foot concave mirror which will gather the rays of starlight.

DR. IAN MCTAGGART COWEN, of the Provincial Museum at Victoria, B. C., reports in the *Journal of Wildlife Management* that cancer is attacking the grouse in British Columbia. Specimens of grouse with some unknown but apparently malignant growth on their heads, threatening to make their eyes useless, were brought in by hunters. Microscopic examinations of tissue sections were made by Dr. G. A. McCurdy, pathologist of the Royal Jubilee Hospital. He diagnosed the growths as ''low grade papillary carcinomata.'' Dr. Cowan states that ''The presence of this disease in epidemic proportions in a localized area suggests that it is contagious. It seems probable that the causative organism is a filterable virus and that transmission is by biting flies.''