SCIENCE NEWS

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THE BETATRON

THAT the new atom-smashing Betatron, the most powerful X-ray in the world, may become a first-rank medical weapon for destroying malignant growths within the body, was reported by Professor Donald W. Kerst, who developed the instrument at the University of Illinois, to the Radiological Society of North America meeting in Chicago.

Mankind's most dreaded disease enemy might be attacked by this new weapon in either of two ways: first, by use of its 20-million-volt X-rays, and, second, by using directly the electron beam which makes the X-rays.

The new machine is not yet ready for use in treating patients and no tests with it have as yet been made on living tissues. Dr. Kerst and his assistants, Philip Morrison and H. W. Koch, have, however, measured the penetration of the X-rays and electron beams through material equivalent in absorbing power to tissues. These tests show that, unlike the 400,000 volt X-ray machines now used to attack malignant growths, the rays from the Betatron would produce their maximum effect about one and a half inches below the surface of the body instead of at the surface. This means that the killing rays would have little effect on the skin and fat beneath it, but would deliver their full effect on growths within the body. Sending the electrons directly into the patient is the most promising way to use the Betatron treatment. At 20 million volts these electrons will penetrate as far as 10 centimeters (about four inches) and no farther. Thus there is no damage beyond the area of treatment.

The Betatron is a compact machine and relatively inexpensive for the voltage produced. It is about the size of an office desk, and has a control panel and condenser bank, each of about the same office desk size, and a motor generator. It is thus smaller than many X-ray machines of considerably less voltage now in use and requires about the same amount of power for operation.

NEW COLOR STANDARDS

FOLLOWING the Victory bicycle and the Victory typewriter, one of the newest subjects of standardization is color itself.

The new war standards to specify and describe color were explained to the press at a conference of the American Standards Association by Dr. Deane B. Judd, physicist of the National Bureau of Standards; Arthur C. Hardy, of the Massachusetts Institute of Technology, and Dr. Lloyd Jones, of the Eastman Kodak Company.

While research technicians have been measuring color by means of spectrophotometers for almost half a century, said Dr. Judd, there was no public agreement on how colors should be described. The shade known to colorimetrists as "9YR 7.2/4.5," for instance, might be called orange by the housewife, apricot by the dress manufacturer, yellow by the paint industry, and red by the druggist.

The new standards adopted in June include a system for designating 319 colors with consistent names, based on the Munsell Color Standard. According to this system, worked out by Dr. Judd and Kenneth L. Kelly at the National Bureau of Standards, "9YR 7.2/4.5" will henceforth be called "weak orange" for practical purposes, since it falls within that range. While theoretically the human eye can distinguish about ten million different colors, 319 names are ample for everyday purposes. But for specifying color, or when a more precise description is required, technicians will continue to use numbers.

This standardization of easily understood names such as reddish brown, olive brown, olive green, etc., was originally undertaken to meet the needs of drug chemists and pharmacists. But now that it has been adopted as a part of the American War Standards for color it will be a boon to practically all industrialists and merchants, including of course the ultimate consumer. Adopted by the Textile Color Card Association, the term "pinkish grey" will mean more to clothing buyers and wholesalers than "Algerian sand." However, consumers will doubtless continue to buy Algerian sands and Morocco scarlets, since the new specifications make it clear that they are not intended to replace names used in sales promotion.

The new standards coordinate these four principles of color specification and description: (1) The spectrophotometer shall be recognized as the basic instrument of color standardization. (2) Specifications shall be derived from the color system adopted in 1931 by the International Commission on Illumination. (3) For the popular identification of color, material standards shall be used according to the Munsell system. (4) A descriptive name, derived from the Munsell notation, is recommended wherever general comprehensibility is desired and precision is not important.

SULFA DRUG FILM FOR SURGICAL DRESSING ON BURNS

A NEW kind of surgical dressing for burns and wounds, expected to be of use to our armed forces, has been developed by Dr. Kenneth L. Pickrell, of the department of surgery of the Johns Hopkins University and Hospital.

It is a film which looks something like rough waxed paper but which carries a powerful wallop against germs in its 30 per cent. to 50 per cent. content of sulfadiazine. Dr. Pickrell reports in the *Bulletin* of the Johns Hopkins Hospital that these sulfa drug films have been used in more than 100 cases, about 50 of which were patients with burns. In 30 of the burned patients, bacteriological studies showed no evidence of infection. In the other cases bacteriological studies were not made, but no signs of infections were seen on inspection of the wounds and burned areas.

When used on burns, the burned surface and surrounding skin, should there be gross contamination, is first cleaned with a surgical detergent. The area is then

washed with salt solution, sulfadiazine or azochloramid solution and while the area is still wet the sulfa drug film is put on, over which a smooth, firm pressure dressing of gauze is applied. The sulfa film is left in place for three to five days, at the end of which time, in second degree burns, new skin will be forming. In third degree burns and in wounds or sores with discharge, the film may be renewed as desired. Since it is translucent, the surgeon can inspect the wound or burn without removing the film.

The sulfa film is made by preparing an emulsion of 3 per cent. sulfadiazine or 3 per cent. sulfanilamide, 2.5 per cent. methyl cellulose (this is one of the newer plastics materials), 3 per cent. triethanolamine and 0.5 per cent. sorbitol with 50 per cent. alcohol or acetone to make 100 cubic centimeters (about three ounces). This is sprayed on a smooth, horizontal glass surface with a pressure gun or paint spray apparatus and allowed to dry, after which it is removed in a single sheet.

The sheets can be made any size, but at the Johns Hopkins they are cut in three-inch widths and rolled just like any bandage. They keep well and can be sterilized by dry heat. They are light in weight and can be packed easily in sheets, tablets or rolls.

Physicians who have seen them on visits to the hospital have been interested and enthusiastic about them and several of the larger commercial houses are beginning to prepare them. The films were developed following Dr. Pickrell's discovery that a solution of sulfadiazine in triethanolamine was effective in treatment of burns, the successful use of this solution in combating sinus infection, complications of the common cold, irrigating infected wounds and sinuses, preparing the surgical site for operations around or in the eyes and various body openings, and for fighting infection in skin grafts. Certain disadvantages of this solution, such as slow drying time and the thinness and fragility of the film it formed, led to development of the stronger film with methyl cellulose.—JANE STAFFORD.

DECLINE IN NUMBERS OF CARS AND TRUCKS ON ROAD

GASOLINE rationing, tire shortage and wartime restrictions on travel in general have contributed to a very decided decline in road-borne traffic, according to John T. Lynch, highway engineer-economist of the Public Roads Administration, in a report to the Highway Research Board meeting in St. Louis. There has been a steady decline in number of vehicles of all classes, though the ratio of trucks to cars has risen. A higher percentage of trucks are running without loads, but trucks that do have loads are carrying bigger ones.

Mr. Lynch reported the results of a country-wide survey of country highway travel, in which more than 500,000 vehicles were counted and classified and more than 50,000 trucks were weighed at 486 stations.

Traffic declined steadily from February to August of this year, as compared with figures for the same months in 1941. The decline was checked in September. This was due in part, Mr. Lynch thinks, to the passing of the normal vacation season, which this year was a period of very light traffic because of the large number of persons who did not travel by automobile.

The increased proportion of trucks running light may be traced partly to the use of light trucks as substitutes for buses and personal cars in getting workmen to their jobs, partly to the fact that many of the trucks were engaged in carrying materials to cantonments, airfields and other places where they had no chance to pick up return loads. The cargoes of trucks that did have loads were so much greater than they had been in pre-war times that despite the decreased number of loads the number of ton-miles of load carried by truck, for the country as a whole, is almost as great as in 1940. In the Pacific Coast region, indeed, it is 22 per cent. greater.

THE NICKEL-LESS "NICKEL"

THE new nickel-less nickel now in circulation contains 56 per cent. copper, 35 per cent. silver and 9 per cent. manganese, concluding a year-old research project of the Treasury, according to Mrs. Nellie Taylor Ross, director of the United States Mint.

Over a year ago, when the shortage of nickel first became acute, stainless steel was suggested as a replacement for 75 per cent. copper and 25 per cent. nickel in the old five-cent piece. Then came Pearl Harbor, greatly reducing our imports of chrome for stainless steel.

"So we tried silver and copper next," said Mrs. Ross. The trouble was that when this alloy was tested on slot machines, it was flatly rejected by certain types of vending machines, widely used for cigarettes and candy. The silver and copper were such good conductors of electricity that the principle of electrical resistance invariably bounced the experimental coin right into the rejection slot.

This problem was finally solved by adding manganese, and then Congress passed a bill authorizing the new coin. Manganese, being a poor conductor of electricity, reduced the conductivity of the copper-and-silver alloy to the approximate level of the old copper-and-nickel coin. But too much manganese made it too brittle to be rolled into the flat metal strips from which the coins are stamped. After further experimentation, it was found that 9 per cent. was the minimum amount of manganese required to operate all vending machines.

A new problem immediately arose, but not a serious one, Treasury spokesmen say. The old nickels were "cold rolled," that is, the molten metal was poured into long, thin, rectangular molds to form ingots, which were allowed to cool and harden, then pressed into flat strips. However, manganese made the ingots so hard that new annealing furnaces had to be installed in order to heat the ingots several times during the rolling process. Ingots for the new "nickels" are not remelted, but they must be heated to 1,200 degrees Fahrenheit to facilitate rolling.

The new five-cent piece is bright and shiny, resembling a new dime or quarter more than the old nickel. However, it tarnishes more quickly and turn a strange yellowish-gray color. If you're wondering whether you have one in your pocket, look at the Monticello design on the back. The new issue has the mint mark directly over

the dome: "S" for San Francisco, "D" for Denver, or "P" for Philadelphia. This, by the way, is the first time the mark of the parent mint in Philadelphia has ever appeared on a coin. Adoption of the new coin is distinctly a war measure. The Act authorizing it expires on December 31, 1946, by which time it is hoped the war will be over.

THE PENNY

ANOTHER consumer commodity has become critically scarce, the penny. Yes, the humble bronze one-cent piece is a commodity like any other, manufactured to meet consumer demand. But the demand is growing faster than the supply, there are no reserve stocks, and no copper available to make new ones.

The Treasury is experimenting with substitute materials, the favored ones now being plastics or steel, coated with less than 1 per cent. of zinc to keep it from rusting. But steel, zinc and plastics are all scarce.

Meanwhile tons of critically vital copper lie hidden away in bureau drawers and baby's banks in millions of American homes. Last year four thousand tons of copper went into pennies. This is enough to meet the combined copper requirements of building 2 cruisers, 2 destroyers, 1245 Flying Fortresses, 120 field guns and 120 howitzers. If every American family could unearth just 40 pennies hidden away in banks and boxes, this would exactly equal last year's production, one and a half billion pennies, four thousand tons of copper.

"We must get those hidden pennies back into circulation," says Mrs. Nellie Tayloe Ross, director of the United States Mint. "If the people only realized the importance of this, I know that every penny bank in the country would immediately be converted into war stamps.

"For the past two years the Mint has been working 24 hours a day, including weekends," said Mrs. Ross, "to supply the coins which are essential to the economic life of the Nation. Last year's output of 1½ billion pennies was one tenth of the Mint's total penny production of the last 150 years."

And still the demand grows. War conditions have brought an unprecedented demand. Federal and State sales taxes consume pennies, so do rising prices. Many lunch counters now charge 6¢ for a cup of coffee or a piece of pie, many commodities are now priced at odd figures such as 32¢. Penny vending machines have increased. And of course the Nation's total volume of business has jumped tremendously.

Mrs. Ross, describing the Treasury's difficulties in finding a substitute material for the copper in pennies, concludes "Everything is scarce." The first suggestion was zinc, which was promptly put on the critical list. Plastics were investigated exhaustively, only to become too valuable for war needs. Steel, now being considered, is also scarce and the Treasury has not abandoned its earlier experiments with plastics.

There is no intention of producing half-cent pieces, as has often been suggested, Mrs. Ross said. This would only multiply the problem by two.

The only abundant supply of coins which the Treasury has in stock is the silver dollar. Does any one want to save silver dollars instead of pennies? While the new "nickel" is now composed of 35 per cent. silver, the Treasury could not use any appreciable amount of silver in pennies without making them worth more than five cents.

ITEMS

THAT water running off flight strips during heavy rainstorms constitutes one of the major engineering problems connected with emergency aids to aviation was reported by Carl F. Izzard, Public Roads Administration engineer, at the meeting of the Highway Research Board. A "rain-making" device has been built for the experimental study of this problem. It consists of a set of pipes with sprinkler nozzles, capable of delivering a synthetic rainstorm of any desired violence over a measured area, together with arrangements to catch and measure the water that runs off the surface. It has been used on both paved and turf-covered flight strips, and the data which have been accumulated are now being analyzed as rapidly as possible. Results will be published in the near future.

MANY factors influence plants in their use of elements taken from the soil to produce nutritional value, was pointed out by Dr. L. A. Maynard, of the U. S. Department of Agriculture, at the National Industrial Chemical Conference. With the same kind of soil nutrients available, but different rainfalls, two crops of bread wheat will have entirely different protein contents. The amount of ascorbic acid, one of the most important of vitamins, in tomatoes is powerfully influenced by the number of hours of sunlight per day received by the plants. Light intensity, as well as length of daylight period, affects the vitamin content of certain fruits and vegetables. Much research on this subject yet remains to be done. Consideration needs to be given to yields of nutrients as well as to tons or bushels per acre, to nutritional quality as well as to market quality.

THOSE who eat in restaurants, even the best of them, are being deprived of about three fourths of the vitamins they should be getting from vegetables. Actual figures on vitamin losses from restaurant-cooked vegetables was reported by Dr. Robert S. Harris, of Massachusetts Institute of Technology, to the American Dietetic Association. Dr. Harris advised restaurant eaters to eat early and concentrate on raw vegetables. In his study, Dr. Harris selected a restaurant using superior cooking and serving technics. In spite of this, the average loss of anti-scurvy vitamin C from vegetables during cooking was 45 per cent., and the loss of thiamin (vitamin B_1) averaged 35 per cent. The large loss was attributed both to the destruction by heat and to the fact that the cooking water in which the vitamins are soluble was discarded. During the time the vegetables were held on the steam table before serving there was a further vitamin loss of about 15 per cent. Only about a fourth of the original vitamin content of the vegetables actually reached the consumer. It is evident, Dr. Harris pointed out, that the customers who eat earlier and who eat more raw vegetables will be better fed.