

NUCLEAR PHYSICS-MEDICINE

Neutron Beam Injurious

Five radiation martyrs are going blind with cataract of the eye as a result of their work with the neutron beams of atom-smashing cyclotrons.

► THE HISTORY of scientific martyrdom is repeating itself. Five physicists are going blind because they looked unguardedly at the powerful neutron radiation from their atom smashers.

A half century ago when X-rays were new, other young and eager scientists also took chances with this novel radiation. Perhaps a half a hundred of them (a meticulous count 12 years ago listed 27 by name) suffered the serious and horribly painful X-ray burns which developed into cancer. First a finger was lost, then hands and arms and finally life.

Happily, those wounded by neutrons are not martyrs in the strict sense of the term which implies sacrifices of life as well as health for a cause. And medical science can restore eyesight to them through operation for cataract and proper eyeglasses, though it could not restore lost fingers and hands to the earlier radiation martyrs.

The physicists sacrificed their eyesight in pioneer work on the cyclotrons. They were fired by the same zeal to speed the benefits of their powerful new tool as led men and women of an earlier generation of Americans to sacrifice health and life in perfecting X-ray equipment and technique for diagnosing and treating human ills.

Like the X-ray martyrs, the physicists took a calculated risk with neutrons. As early as

1935, the neutron beam from a cyclotron was known to be more dangerous than an X-ray beam. It has been known since the early days of the Manhattan District work on the atomic bomb that neutrons are four to 10 times as dangerous as the same amount of X-rays. Yet the cyclotron pioneers used to watch for the violet-blue fluorescent beam of neutrons appearing. They deliberately looked into the beam either from necessity while making repairs to the machine or out of curiosity over this new and powerful tool.

Neutrons, the sub-atomic particles that cause the eye damage, are the triggers of the atomic bomb, operating the chain reaction. Because they are electrically neutral they are very penetrating. With protons, neutrons make up the hearts of all atoms. The lens of the eye is one of four tissues most sensitive to ionizing radiation, whether in the form of neutrons, X-rays or gamma rays from radium.

The other three are: 1. the white blood cells in the veins and arteries and bone marrow; 2. the male reproductive cells; 3. the cells lining the intestinal tract.

Even though the neutrons that caused cataracts in the lenses of the physicists' eyes must have hit other parts of their heads, the brain and other parts of the eye are very resistant to radiation so the men are not expected to suffer further damage.

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exploited by converting the coal to coke.

An entirely different process is also under study. In this the coal is dissolved before being treated with hydrogen. Research is now directed at determining the best solvent, and also at discovering suitable catalysts to speed the hydrogenation action under these conditions. This process is carried out at relatively low temperatures and pressures.

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CHEMISTRY

New Repellent Protects Crops from Wild Animals

► HERE'S how to protect your bean crop from wild rabbits next spring, or from deer if you are in a deer country. Spray the foliage with a new chemical mixture which acts as a repellent to grazing animals after they chew a few leaves. Certain types of insects also are discouraged by the action of the chemical.

The new material is a development of the B. F. Goodrich Chemical Company of Cleveland, and was thoroughly tested by the Maine Fish and Game Department during the past year. Taste, not odor, is the big factor. It is not poisonous, but wild animals do not like its taste.

The compound is a vinyl resin. One application is sufficient until new leaf growth occurs. It can be used to protect other plants besides beans, and repels other animals besides rabbits and deer.

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ZOOLOGY

Mice Found Unadventurous —Unless Grub Supply Fails

► MICE are conservative home-bodies. As long as they have an assured food supply they will stick close by it, never venturing more than 30 or 40 feet away in any direction. Rats are pretty much the same, except that they will travel as much as 100 feet from their base of supplies.

These are among the facts of rodent life which scientists at the University of Wisconsin have been discovering, in an intensive research program headed up by Prof. John T. Emlen. With him are working four graduate students: Harold Young, Robert Strecker, James Beer and Fred Greeley. They keep track of the movements of rats and mice by trapping them, marking them and turning them loose again.

Among the practical aspects of their research is the discovery that the ordinary snap trap is a more efficient means for controlling mouse populations than any poison now known. One sure way to send mice and rats scurrying in search of new feeding grounds is to put a really good hunting cat to work on the premises.

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ENGINEERING

Cheaper Fuels from Coal

► CHEAPER gasoline and fuel oil from coal is promised by improved processes under development at the U. S. Bureau of Mines experimental and research laboratories in Bruceton, near Pittsburgh.

In these laboratories, a basically new approach to the problem of synthetic liquid fuel production by direct hydrogenation of coal is under investigation, the American Chemical Society was told by Dr. Henry H. Storch, chief of research at the institution. The method, he said, is a departure from the conventional Bergius process used by the Germans.

In this German process, coal dust is mixed with oil to form a paste. This is then treated with hot hydrogen under a pressure of more than 2,000 pounds per square inch. In the new process, Bureau chemists are trying to achieve better results by using moderate pressures and relatively high temperatures. Under these conditions

considerable coal is turned to coke, but the coke can be recovered and used to furnish heat for the process.

In the new developments, relatively inexpensive water gas may replace the expensive hydrogen. The cost of compressed hydrogen constitutes about 50% of the total cost of liquid fuels prepared by hydrogenation of coal, he stated. Water gas, made by passing steam over white-hot coke, is the common manufactured gas used in many cities where natural gas is not available.

Laboratory experiments have disclosed that under appropriate operating conditions it is possible to replace pure hydrogen with the water gas, which is itself a mixture of hydrogen and carbon monoxide. Similarly, it is also possible to substitute for pure hydrogen the light, gaseous by-products of the hydrogenation process. Coal itself contains some available hydrogen which can be ex-