

PHYSICS-BIOLOGY

Neutrons, Tool of Physics, Deadly Biological Menace

Warning That New Potential Danger to Experimenters Exists in Rays Ten Times More Potent Than X-Rays

DEADLY danger for young research workers in physics lies in wait in their own laboratories, if they work with powerful new atom-smashing machines using streams or rays of neutrons.

Neutrons are the uncharged particles of matter which can be knocked out of the cores of atoms. They are widely used as atomic "bullets" to pierce the inner nuclei of other atoms and are capable of effecting transmutation of the elements and synthetic radioactivity.

Warning of the potential danger in using such neutron rays is drawn from the results of two investigations on their biological effects, which have just been published (*Proc. Nat. Acad. Sci.*, February). The neutron rays appear, in summary, to be ten times more potent than X-rays in what they can do to the body.

In the first research carrying its warning to scientists neutron rays were used on white rats. It was presented by two brothers, Dr. John H. Lawrence of Yale University School of Medicine, and Prof. Ernest O. Lawrence of the University of California, who built the large cyclotron apparatus with which the neutron rays can be produced. The second, in which neutrons were shot at just-sprouting grains of wheat, was the work of Dr. Raymond E. Zirkle of the University of Pennsylvania and Dr. Paul C. Aegersold of the University of California Medical School.

Exposure to neutron rays was deadly to white rats. They grew sick, miserable-looking, humped-up, and died. The rays were apparently bad for them "all over," but as a quantitative measure of their effect, the decrease in the number of the necessary white blood corpuscles in their blood was counted. It was found that destruction of white blood cells was as great from a given dose of neutron rays as it was from a ten times more intense dose of X-rays, heretofore counted among the really dangerous scientific tools. The effects of neutron rays on growing plant tissue were found by Drs. Zirkle and Aegersold to follow about the same ratio: neutron rays are ten times as dangerous as X-rays.

Commenting on their results, the Doctors Lawrence stated:

"This should constitute a warning inasmuch as many laboratories will soon be using neutron generators of such power that individuals in the vicinity of the apparatus will be exposed to many times the allowable dosage in the course of a few minutes unless adequate protective screening is provided." They set the "allowable dosage" at just one-tenth the intensity of X-ray exposure that workers can stand without permanent damage to their health.

If the present warning is heeded by the enthusiastic scientists in the universities now setting up apparatus for producing neutrons, the world may be spared the tragedies that followed the discovery of X-rays in the late 1890s,

and of radium early in the present century.

Not knowing the deadliness of the then new rays to living cells, many of the early workers were severely burned, and even maimed for life, through reckless exposure. Even yet, there are veteran X-ray technicians in scientific laboratories and medical clinics whose hands are seriously damaged—unwitting victims of the two-edged tool they used in their younger days.

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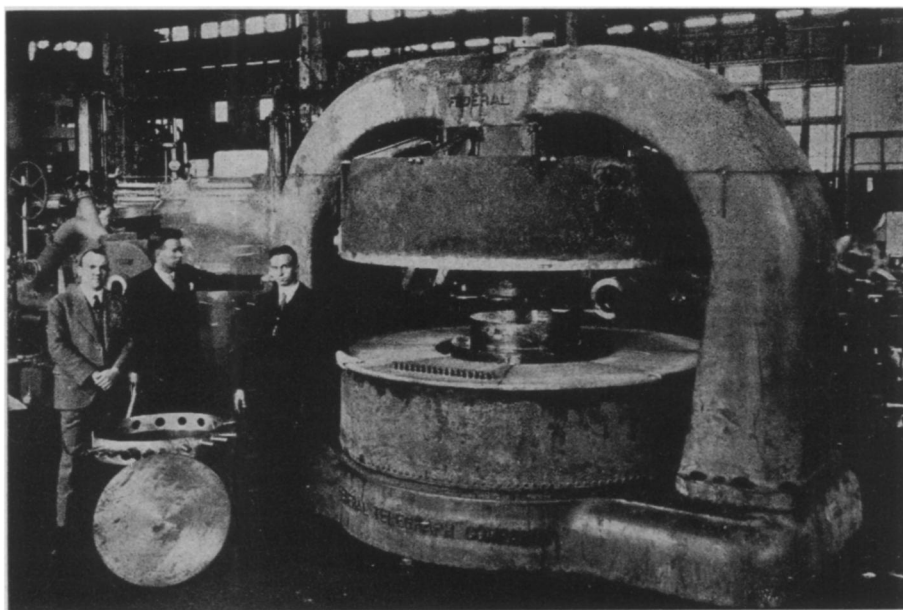
PUBLIC HEALTH

Respirators Cannot Take Place of Dust Control

THE RECENT furor concerning alleged deaths from silicosis at Gauley Bridge, West Virginia, has increased the demand for a better dust respirator which workmen may use when exposed to the dangerous quartz and silica dust.

Says Dr. Philip Drinker of Harvard University, who is the inventor of the artificial "lung" known as the Drinker respirator:

"Some firms, driven panicky by the present silicosis-dust racket, have even gone so far as to stock up with 'ap-



DANGER TO SCIENTISTS

The giant 85-ton cyclotron atom smashing apparatus of Prof. E. O. Lawrence at the University of California, Berkeley, Calif. Across its 45-inch diameter pole pieces scientists create magnetic fields tens of thousands of times as powerful as those of the earth, for use in experiments with neutrons and problems of transmutation of the elements and artificial radioactivity. The men, left to right are: C. U. Foulds, Prof. E. O. Lawrence and Dr. M. S. Livingston. The piercing radiation from this apparatus and other similar ones now under construction throughout the nation is exceedingly dangerous to unprotected scientists near it. Mounds of earth and tanks of water are two protective methods suggested to shield workers from the menace of such potent rays.