BIOCHEMISTRY-PHYSICS

Atomic Debris Is Deadly

Products of atomic bomb and pile are dangerous radioactive agents which can fatally bombard the bone marrow where blood is made.

➤ THE DEBRIS from atomic bombs contains the world's most dangerous radioactive agents which can fatally bombard the body's bone marrow where blood is made.

This was discovered in a University of California research that had as its object finding what biological action can be expected from the elements born of atomic fission and of the atomic piles. (*American Journal of Radiology,* Sept.).

The findings are significant primarily for two reasons: 1. They have helped make the nation's atomic production plants and experimental laboratories among the safest there are; 2. They elaborated the implications of the possible biological action of atomic explosions or use of by-products of the atomic piles as a sort of atomic poison gas in warfare.

In a comprehensive report issued under the sponsorship of the Atomic Energy Commission and with acknowledgment to the Manhattan Engineer District, Dr. Joseph G. Hamilton, University of California medical physicist, describes animal research which has been in progress in Berkeley since 1942 on the metabolism of the fission products and the trans-uranic elements.

In a description of the scope of the problem which confronted scientists when they undertook to develop an atomic energy industry, Dr. Hamilton made a comparison with radium. He pointed out that since radium was discovered 50 years ago, one kilogram, or a thousand curies in terms of its radioactivity measurement, has been isolated.

During these 50 years a large number of instances of radium poisoning have occurred, Dr. Hamilton pointed out.

He added that the fission products alone produced in the Hanford atomic piles are in the range of millions of curies, and that kilogram quantities of plutonium have been isolated by complicated chemical processes involving many workers.

Since the trans-uranic elements and the fission products, including nearly 200 isotopes of 34 elements extending from zinc to europium, are with one or two exceptions strange to the human body or undetectable if present, and consequently nothing was known about their biological effect in 1942, the magnitude of the problem was readily apparent.

Dr. Hamilton and his co-workers have studied the distribution, retention and excretion in the animal body of 20 of these radio-elements, and are continuing research on others.

Included are five elements which are synthetic products of the atomic ovens or of cyclotron bombardments, which are not found in nature. These are element 61, and the trans-uranic elements, plutonium, neptunium, americium and curium. So rare is curium in the world that its metabolism was studied with quantities too small to be visible to the naked eye; only in the last few weeks has a grain-sized quantity of this element been isolated in pure form in the Berkeley laboratories. (*See SNL,* Sept. 27).

The Berkeley scientists duplicated as nearly as possible the possible manner in which poisoning from the radio-elements might occur, through the mouth, nose and scratches or cuts in the skin.

Slices of bone or tissue were then placed on a photographic plate, the radiations from the deposited elements exposing the plate and giving a picture of the distribution of the materials.

Dr. Hamilton said the most significant finding was that many of the highly radioactive groups of elements studied are deposited in a thin layer of tissue, called the osteoid matrix, adjacent to the bone-marrow cavity.

The bone marrow manufactures red blood cells, and is extremely sensitive to radioactivity. Its bombardment by alpha particles emitted by some of the elements could interfere seriously with the multiplication of red blood cells and white corpuscles, the scientists found. Further, the body does not eliminate these elements readily, and they remain radioactive for a long time.

Plutonium, neptunium, americium, curium, and the naturally occurring element, thorium, are included in this group, as well as the fission products, yttrium, zirconium and cerium. Dr. Hamilton said it is probable that others

BODY PARTS LIBRARY—Disabled persons can now get the best artificial parts to fit their needs by visiting the Veterans Administration showroom or library in Washington. The exhibit includes many models of aids for the blind and deaf, artificial arms, legs, hands, eyes. The VA sells none of them, but explains the advantages of each manufacturer's model, making possible the best buy with the least amount of trouble.

would have a similar action in the bone, including the fission products, columbium, lanthanum, praseodymium, neodymium, element 61, samarium, europium; and the naturally occurring elements actinium and proactinium.

Some of the fission products are slightly less dangerous because they emit lighter beta particles, Dr. Hamilton said. But the actinide series, including plutonium, have the undesirable characteristics of radium in that they have both long half-lives and emit heavier alpha particles.

Dr. Hamilton said that radium is probably less dangerous for comparable amounts of radioactivity, than, for example, plutonium. The reason is that radium is distributed throughout the mineral structure of the skeleton, with the result that fewer alpha particles penetrate to the marrow.

The research was done in collaboration with Dr. Robert S. Stone, professor of radiology in the University of California Medical School, formerly head of the plutonium project health organization, by Dorothy Axelrod, Josephine Crowly, Dr. Harvey Fisher, Henry Lanz, Kenneth G. Scott, Dr. L. Van Middlesworth, Dr. D. H. Copp, Dr. I. L. Chaikoff, Dr. D. M. Greenberg, Dr. Roy Overstreet, Dr. Louis Jacobson, and Dr. Hamilton.

Science News Letter, October 11, 1947

ENGINEERING

300-Cycle Power for Lights

Would improve fluorescent lighting but must wait for development of frequency converters for homes and offices. Would increase efficiency.

➤ BETTER fluorescent lighting is obtained by the use of higher frequency currents, the Illuminating Engineering Society meeting in New Orleans was told by John H. Campbell of General Electric.

General application will await the development of frequency converters for homes and offices to change the present 60-cycle power into frequencies in the range of from 300 to 600 cycles. The converters will have to be efficient and low in initial cost if the advantages of the new system for operating fluorescent lamps are to be obtained.

The efficiency of light output can be increased about 25% by use of the higher frequency, he said, and the cost of the ballast reduced considerably. The so-called ballast is the choke coil used to control and stabilize the electric discharge in the tube of the fluorescent lamp. The decreased cost in the ballast is due to the fact that with the higher frequencies a ballast weighing only a few ounces can be used, compared with a ballast of several pounds used with the 60-cycle power.

Flashing Fluorescent Lamps

➤ FLASHING fluorescent lamps for street advertising were described at the same meeting by Fred J. Vorlander and Sigmund Stawicki of the Champion Lamp Works, Lynn, Mass. Scientists of this company are credited with developing the first commercially successful circuit for the so-called flashing hot-cathode fluorescent lamps. The cathodes are the electric terminals within the fluorescent tube between which the electrical energy passes to cause the light.

In the device described, the repeating flashes are due to a combination for continuously heating the cathodes with an instant start circuit. The instant start circuit, regularly interrupted mechanically or otherwise, provides sufficient current to start the lamps without aid of a starting switch. Cathode deterioration is minimized by the constant heating of the cathodes.

Science News Letter, October 11, 1947

ORNITHOLOGY

Test Spraying Shows DDT Harms Small Birds

➤ DDT is capable of great harm to small-bird life in young forest growth when sprayed to check insect pests, it appears from evidence presented before the meeting of the American Ornithological Union in Toronto by Chandler S. Robbins of the U. S. Fish and Wildlife Service.

An oil spray of DDT was applied at the rate of five pounds per acre to a 90-acre tract of five-year-old scrub and sapling growth at Beltsville, Md., just outside Washington, D. C. Afterwards, bird population studies were carried on in a 30-acre plot at the center of the sprayed area and in an unsprayed check area of the same size one-half mile away.

The five commonest bird species, making up more than three-quarters of the entire bird population, suffered an overall 65% loss in the sprayed area. Heaviest losses were to three species, Maryland yellow-throat, prairie warbler and mouse wren, which were cut down by 80% in the sprayed area. The towhee or ground robin suffered a 35% loss. Of the five most abundant species, only the yellow-breasted chat seemed unaffected.

Birds suffer DDT poisoning by eating poisoned insects, and especially by feeding them to their nestling young.

Science News Letter, October 11, 1947

SCIENCE NEWS LETTER

Vol. 52 OCTOBER 11, 1947 *No. 15*

The weekly summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., NOrth 2255. Edited by WATSON DAVIS.

Subscriptions—$5.00 a year; two years, $8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents.

Entered as second class matter at the post office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., PEnnsylvania 6-5566, and 360 N. Michigan Ave., Chicago, STate 4439.

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