

GENETICS

X-Rays Can Harm Genes

If too large a dose of X-rays during routine treatment of a patient reach the reproductive glands, his remote descendants may be born defective.

► YOU DO NOT have to wait for an atom-bomb to receive a dose of rays that will cause your remote descendants to be crippled or otherwise defective. It can happen to you in the course of X-ray treatments for certain kinds of cancer, or even in a routine X-ray examination of your abdomen, if enough of the rays reach your reproductive glands.

This warning was given by Prof. H. J. Muller of the University of Indiana, in a lecture before the University of Chicago chapter of the Society of Sigma Xi in Chicago. Prof. Muller received the 1946 award of the Nobel Prize in medicine and physiology for demonstrating the possibility of producing hereditary bodily changes through the use of X-rays.

X-rays and other penetrating radiations used in clinics and laboratories can do the same kind of things to descendants of human beings that they do to the offspring of fruitflies, because the cell mechanisms that determine hereditary characters are essentially similar in them, and in all other higher organisms.

Most mutations are harmful, whether they occur spontaneously or through impact of X-rays or other disturbing influences, Prof. Muller pointed out. In perhaps a majority of cases they are of the type known as lethal, and simply prevent the affected individual from coming into existence at all. But if birth does take place, the unfortunate "mutant" is apt to be deformed, or blind, or abnormal in some other way.

These misfortunes of X-rayed fathers (and mothers) are more likely to be visited on descendants in third and fourth and subsequent generations than on their immediate offspring, Prof. Muller pointed out. Their coming to light depends on the meeting in reproduction of two deficient genes, for if one normal gene is present it will possess the controlling influence, and the deficient gene will simply be carried forward into another generation, to lie in wait for its "opposite number."

X-rays and other rays produce hereditary changes in two ways, Prof. Muller told his audience. The first is the result of an impact on a single gene, changing it from normal to deficient. The second method of change is more easily demonstrated, for it consists in the breaking apart of a whole chromosome by a ray. The broken ends tend to re-unite, but if the patch takes place in the wrong way results in succeeding generations are apt to be unfortunate.

However, X-ray doses are capable of

harming the individual who receives them, even if the usual warning signs such as reddened skin and loss of hair are absent, Prof. Muller warned in conclusion. Recent statistical studies, he declared, have demonstrated that the life-span of persons given courses of X-ray treatments is significantly lowered. For this reason, he suggested strongly the use of alternative treatments, where such exist.

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MEDICINE

Vitamin Lack May Be Cause Of Heart Troubles, Cancer

► LACK of some still undiscovered vitamin or other chemical may be the cause of artery hardening, high blood pressure, heart disease and cancer. This possibility was suggested by Dr. Tinsley R. Harrison of Southwestern Medical College, Dallas, at the meeting of the Association of Life Insurance Medical Directors of America in New York.

In the world search for not only longer but more useful and vigorous life, great

strides have been made in conquering two degenerative diseases, diabetes and pernicious anemia, Dr. Harrison pointed out.

Each of these diseases is due to lack of a chemical needed by the body, insulin in the case of diabetes and a substance in liver in the case of pernicious anemia. Other degenerative diseases might, he suggested, also be due to "deficiencies of substances or processes as yet unknown."

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ELECTRONICS

Electronic Pencil Enables Composers To Hear Score

► COMPOSERS may now play the music they have written on a simple electrical machine by writing out the score with an electronic pencil.

The new composer's music box was described in Cleveland to the Acoustical Society of America by Prof. Robert B. Watson of the University of Texas physics department and defense research laboratory.

"Some composers are able to hear the music mentally at the time of composition," Prof. Watson explained, "but others desire to hear certain musical passages while composing. A composer may now use a compact electro-acoustic device to produce various tones with comparative ease and little distraction from writing his musical score."

The music box is operated similarly to writing with paper and pencil. The tone is started by placing the electronic pencil on



COMPOSER'S MUSIC BOX—Musical scores can now be written with an electronic pencil which permits the composer to hear his music while he is composing it. Pitch and volume are varied by moving the pencil.

the plate of the instrument and stopped by lifting it.

Pitch is increased by moving the pencil upward. Loudness is increased by movement to the right. Tonal qualities of the

sound can be obtained by varying the circuits in the machine. Skill of the player enters in variations of timing, pitch and volume.

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MEDICINE

Polio in Drinking Water

► THE GERMS, or viruses, of infantile paralysis and several other diseases can get into drinking water through back-siphonage in the plumbing system. Once in the water, they can survive for from one to seven days even when the water is chlorinated to the extent most city drinking water is.

Experiments showing this are reported by Dr. Joseph Zichis of the Markham Laboratories in Chicago and Dr. E. A. Piszczek of Cook County Health Department in the journal, *SCIENCE* (Nov. 5). This seems to add evidence to the suspicions of many scientists that one way

infantile paralysis spreads is through contaminated drinking water.

The viruses of St. Louis encephalitis, of western equine encephalitis (so-called horse sleeping sickness) and of lymphocytic choriomeningitis were the ones tested besides the infantile paralysis virus.

Infantile paralysis, St. Louis and Japanese B encephalitis and infectious hepatitis (jaundice) viruses all can produce the diseases when given by mouth, and the infantile paralysis virus is known to leave the body through the intestinal wastes.

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ENGINEERING

Full Use of Highways

► THE PUBLIC is not getting the full use of the highways to which it is entitled, the American Petroleum Institute was told in Chicago by John S. Worley of the University of Michigan. Public interest must come first in the study of any highway problems which may arise.

We are faced with a number of these problems, he said, among them taxation, trade barriers, an adequate highway plant, uniform traffic code, safety, a fuller use of our highway plant, and long-range highway planning. Taxation he characterized as probably our most confusing activity, administered with the least intelligence of all our highway transport activities.

Fuller use of the highways and streets, in which more than \$33,000,000,000 has been invested, includes their use to full capacity. The capacity of a highway is found in the elements of space for and strength for carrying the loads.

The reasonable capacity of a modern rural road, in terms of passenger cars, is about 450 cars per lane per hour when the average speed is 42 miles an hour. Trucks and trailers reduce this amount. Congestion begins where the number of cars increase or the average speed is less. But few rural roads are used to the saturation point.

In urban areas, it is the street intersections rather than lack of lane space which governs the number of vehicles moving along a street. A great deal of the congestion we think we encounter in cities is psychological. If measured in time lost, it would be found to be only a few minutes per 24 hours.

Heavier loads would make possible fewer trucks on the highway, as well as a lower

charge for service, all of which is in the public interest, he declared. Legal loads permitted in adjoining states upon the same road built under Federal specifications show how the public does not get the full use of its highways. On U. S. Highway 23, as an example, the allowable gross load in Michigan is 120,000 pounds; in Ohio, 77,500 pounds; and in Kentucky, only 50,000 pounds.

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ARCHAEOLOGY

Prehistoric Eskimo Houses Had Beams of Whale Ribs

► PREHISTORIC Eskimo houses in which the long ribs and jawbones of whales served for timbers were excavated on the coast of Frobisher Bay in Baffin Island during the past summer by Dr. Henry B. Collins, Jr., Smithsonian Institution archaeologist. They were built on the same general plan as the "dugouts" used as dwellings by both Indians and early white settlers in the West, except that in the latter wooden poles supported the roof over the pit that constituted the main part of the house.

Most of the weapon points, tools and household utensils found in the ancient village belonged to the very old but still undated Eskimo type known as the Thule culture. They were made of stone, ivory, bone and antlers. Such artifacts have been found over a wide stretch of territory, from Greenland to Alaska. It is believed that the Thule culture started in Alaska and spread eastward.

Along with these Thule artifacts, which

are large and rough, were many small, very delicately carved implements of the type known as the Dorset culture. Users of these were an earlier people, who also apparently spread eastward from Alaska.

Although it is usually supposed that the Thule culture dates from about 800 years ago, the only definite date that can be assigned in connection with the village which Dr. Collins excavated is one earlier than the end of the sixteenth century, when the English explorer Frobisher penetrated into the waters north of Canada seeking the fabled Northwest Passage. The Eskimos whom he met were already using iron tools—and no trace of iron was found in the ancient village on the shore of the bay that bears his name.

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BIOCHEMISTRY

Broken-Down Cells Can Still Synthesize Protein

► A NEW WAY of studying protein synthesis and new information about this all-important tissue-forming mechanism have been reported at the University of California.

Living cells apparently do not have to be intact in order for protein synthesis to be carried on, a team of researchers headed by Dr. David M. Greenberg report.

The scientists broke down the walls of living liver cells, and placed the nuclear material in a nutrient solution. Then they added radioactive glycine, labeled with radioactive carbon 14, which permits the carbon atom to be traced through any chemical reaction.

Radiocarbon atoms showed up in the protein material, indicating apparent incorporation of the glycine into protein. It was also found that a considerable portion of the glycine had been transformed into another kind of amino acid, serine.

Dr. Greenberg said there was evidence that protein synthesis and the transformation of one amino acid into another is accomplished by enzymes, chemical agents which catalyze biochemical reactions. He added that there appears to be a special enzyme for protein synthesis, and another one for transforming one amino acid into another.

The scientists expressed hope that further studies along this line may make it possible to isolate these enzymes. Dr. Greenberg said that while protein synthesis in the laboratory is a long way off, the new information will be of help.

Protein synthesis was observed earlier in the Berkeley laboratories, using radioactive sulfur and radioactive glycine with intact cells in the form of liver slices. However, the new technique expands the scope of experiments that can be performed.

Dr. Greenberg's associates in the research were Drs. Theodore Winnick, Felix Friedberg, and Martin P. Schulman, of the department of biochemistry.

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