

PHYSIOLOGY

Scientists Demonstrate How Radiation Kills

ONE WAY in which radiation kills has been demonstrated by two New York University scientists.

Such an understanding of the manner in which radiation kills suggests that means may be found to increase or decrease the lethality of the rays and perhaps of undoing the damage they inflict. This knowledge could then lead to future defenses against radiation in fallout or atomic bombing.

Dr. Evelyn Slobodian, Martin Fleisher and Dr. Sidney Rubinfeld, of the department of radiology at the University's Bellevue Medical Center, have demonstrated that radiation knocks a hydrogen atom off a water molecule and that the remaining hydroxyl radical then reacts with a key enzyme to make it inactive and functionally useless.

The enzyme which proved vulnerable to the rays is ribonuclease, or RNase. This enzyme acts on what are believed to be the cell's protein-producing factories—giant molecules called ribonucleic acids. When RNase ceases to function, these molecules can no longer be broken down, and the delicate balance between thousands of reactions which comprise life chemistry may be altered.

This discovery might also explain a major mystery of life, the problem of mutation or gene changes and the role played by radiation in the cause and treatment of cancer. The team's work was reported by the American Cancer Society.

Science News Letter, December 12, 1959

MEDICINE

Anxieties May Cause Pregnant Women Upsets

THE UPS and downs experienced by the expectant woman may be due to numerous tension-building anxieties.

Symptoms that disturb such women include "morning sickness," headache, insomnia, tension, and backache. A group of New Jersey physicians suggests that many of these are due to or compounded by anxiety. One way of overcoming the symptoms is through the use of tranquilizers, they advised colleagues attending the clinical meeting of the American Medical Association in Dallas, Texas.

In addition, the physician can do much to ease the pregnant woman's anxiety by encouraging her to discuss all aspects of her pregnancy, emotional as well as physical, and by helping her to live with those fears that cannot be dispelled.

The physicians, Drs. Henry A. Belafsky, Samuel Breslow, Jack E. Sangold and Leonard M. Hirsch of Perth Amboy General Hospital, Perth Amboy, N. J., explained further that:

Excessive anxiety in the pregnant woman stems from two major sources, fear and guilt. She fears having an abnormal baby, loss of attractiveness or a career, or that she will have the baby enroute to the

hospital, or the difficulties and pain of delivery and even death.

Guilt feelings may stem from an inability to "take it," or live up to what is considered "correct" behavior. The woman may even feel a lack of maternal instinct or a rejection of breast feeding.

Depending upon the physical and emotional make-up of the individual woman, such feelings may lead to excessive anxiety which in turn may produce many of the physical disturbances associated with pregnancy. In severe cases, anxiety may interfere with the normal birth process or lead to mental illness.

The doctors then reported a study of 800 pregnant women who received meprobamate (Miltown). In 388 cases of morning sickness, 364 were completely relieved. Of 184 women with insomnia, 177 were able to sleep normally after taking the drug. Among 157 women with headaches, 134 obtained relief.

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MEDICINE

Tetanus Should Be Used In Polio Shots

POLIO VACCINE should contain tetanus toxoid to control lockjaw, the horrible disease that each year kills almost twice as many children and adults as polio.

In 1958 there were 255 deaths from polio while there were between 400 and 500 deaths due to lockjaw. Yet, only one out of four persons is protected from this acutely infectious disease.

In an editorial in the *New Physician* (Dec.), journal of the Student American Medical Association, Dr. Edward R. Pinckney, editor, makes a two-point plea to the medical profession and the pharmaceutical to wipe out lockjaw.

Doctors should make it as much a habit to ask about tetanus immunizations as they do about polio shots, he said. The drug companies should combine tetanus toxoid with polio vaccine so one series of inoculations will protect against both dangers.

Currently there is one quadruple vaccine administered to infants. It includes whooping cough, diphtheria, polio and tetanus toxoids. Also, virtually any child who receives whooping cough and diphtheria shots also gets tetanus shots at the same time. However, adults do not usually receive these shots periodically.

"Of equal importance, doctors must make patients aware of the fact that they, or their children, have been immunized, in order to inform any doctor in the future who may have to treat a subsequent injury," Dr. Pinckney warns colleagues.

With 75% of those who have "tetanus-prone" wounds needing antitoxin, which can be as dangerous as the disease itself because of possible allergic reactions, there can be no doubt that prevention is almost mandatory. That the vaccine works has been proved during World War II when there was only one case of lockjaw in more than 160,000 battle injuries. Inoculation against tetanus was mandatory for service men.

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IN SCIENCE

ASTRONOMY

Fusion Explosion Seen Cause of Supernovas

FUSION explosions, such as man has made on earth, but on a scale many millions of times larger, are responsible for the stars known as supernovas, which suddenly blaze to brilliances hundreds of thousands times their normal brightness.

This theory on fusion chain reactions to account for supernovas was reported to the American Institute of Physics by Dr. Michal Gryzinski of the Institute of Nuclear Research, Polish Academy of Science, Warsaw. He suggests that the conditions suitable to a strong concentration of helium three, the fusion material, exist only for a relatively small number of stars.

The helium three is formed when protons react in the hydrogen-burning cycle by which stars are stoked. If the star's temperature does not exceed about five million degrees absolute, then a sufficient amount of helium could be produced in about five billion years to give the critical density at which the fusion chain reaction developed.

The nuclear energy released in the outburst is much greater than the star's potential energy, so it is completely destroyed, Dr. Gryzinski reports in the *Physical Review* (Sept. 1).

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TECHNOLOGY

Britain Plans TV Round-the-World

A PLAN to link the whole of the British Commonwealth by undersea cables which will carry "piped" television as well as telephone calls has been revealed.

First link is a Britain-to-Canada cable, ready by 1961. And all the main parts of the Commonwealth will be joined in ten years. The second link is to be Canada to Australia, with target date of 1964.

England's new Postmaster-General, Reginald Bevins, said: "After that we will work on the links from Australia connecting Malaya, India, Pakistan and Ceylon, and from those countries by way of Kenya to South Africa (which, at the present time, has no TV and its Government has just refused to permit its introduction) and then back to Britain, so that the whole world will be encircled."

The television pictures carried in the cables will not be live but "delayed" TV. This is relayed immediately after the event and takes about two hours in transmission. It was this system which relayed to Britain pictures of the Queen during her Canadian tour. Cost of the global link is estimated at between \$200,000,000 and \$230,000,000.

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E FIELDS

MEDICINE

Radioisotope Used in Diagnosing Bone Disease

DISEASES of the bone may be diagnosed through a procedure which features the use of strontium-85, a safe relative of hazardous strontium-90, the fallout product.

The procedure, developed by Dr. Norman S. MacDonald of the University of California Medical School, Los Angeles, is described in a special report published by the University.

The technique, known as an osteogram, employs tracer amounts of strontium-85, which is rapidly absorbed by bone when it is injected into the body.

By placing special radioactivity detecting scintillation counters over the bone area, the rate of absorption or deposition of the strontium can be measured.

In preliminary studies of patients with various bone diseases it has been demonstrated that the rates of absorption differ in diseased bone areas from those of normal bone.

Furthermore, there seem to be differences in these rates in various types of bone diseases. Thus the osteogram patterns might be useful in determining that bone disease was present and in telling what the nature of the disease is.

Bone diseases studied with the new technique to date include osteoporosis, a disease characterized by spongy fragile bone; Paget's disease, a skeletal disorder; and various types of bone cancer.

Dr. MacDonald said the osteogram is useful in following progress of repair of bone fractures and treatment of bone disease as well as in obtaining additional basic knowledge about bone chemistry.

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PUBLIC SAFETY

Oceanic Atomic Waste Disposal Declared Safe

AMERICAN and Russian scientists have made contradictory statements about the length of time which is required for water particles to rise from the depths of the ocean to the surface.

Although the American scientists have conducted experiments which determine this time span as 400 to 600 years for the Atlantic and to 1500 to 2300 years for the Pacific, Soviet scientists insist that the total displacement of surface water by deep water takes only 40 to 60 years.

American scientists have based their calculations upon measurements of the rate of disintegration of radioactive carbon 14 and radium. The Russians arrived at their figure by measuring the biochemical consumption of oxygen. Both sides agreed at a conference in Monaco that further re-

search into the subject by direct observation of currents at great ocean depths with perfected apparatus is necessary.

The argument arose during a discussion on the safety of dumping and releasing radioactive wastes into the oceans. Concerning present releases of liquid radioactive waste from the British atomic site Sellafield, it was mentioned that the total amount of radioactivity going into the sea water is 10,000 curies per month. Most of this radioactive material, however, is short-lived and will thus not contribute to permanent contamination of the oceans.

Dr. E. Glueckhauf of the Atomic Energy Research Establishment, Harwell, England, mentioned that at Windscale Works in Sellafield only 1,000 curies of strontium-90, one of the radioactive wastes most dangerous to man and his environment, is being released to the sea annually as compared to 200,000 curies of strontium-90 which enter the oceans as fallout of atomic bomb tests of the past. Even when Britain has its nuclear power program fully realized, no more than 1,000 curies of strontium-90 will be released into the sea per year because of improved methods in chemical processing of radioactive waste products.

Dr. Glueckhauf also mentioned that natural radioactive potassium-40, diluted in the oceans since ancient times, contributes 100,000,000 curies of radioactivity to the Atlantic.

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PSYCHOLOGY

People Under Stress Do What They Learned First

UNDER STRESS, we may revert to earlier learned ways of doing things, momentarily forgetting some of our most recent lessons.

This is the implication of research by psychologists Dr. Richard Barthol of the University of California, Los Angeles, and Miss Nani D. Ku of Pennsylvania State University.

Two groups of college students were taught to tie a bowline knot by two different methods. Method A involves a simple straightforward way made easier by a story accompanying the instruction; method B is finer and faster but harder to learn.

Group I learned method A first and Group II method B. Stress was applied in the following manner. Group I was asked to take an intelligence test at one o'clock Sunday morning following a Saturday night dance. Group II was asked to do the same following a weekly 9:00 p.m. final examination. The tests were quite long and more difficult than the students had expected. Subjects were not allowed to smoke, talk, or leave the room.

Following the intelligence tests, which observations indicated were quite stressful, subjects were suddenly required to tie a bowline. All members of Group I tied the bowline by method A, which they learned first. Group II members, with two exceptions, tied by their first learned B method.

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BIOLOGY

Cosmic Rays Fail to Cause Mutations in Flies

HIGH-FLYING fruit flies, sent nearly 15 miles above the earth in a high altitude balloon, have survived without any apparent genetic damage.

However, this still does not prove that cosmic rays at these altitudes are harmless to humans or any other living organisms, Dr. William N. Sullivan Jr., U. S. Department of Agriculture scientist, warned. More tests are needed to determine their exact effects.

The fruit flies, *Drosophila melanogaster*, along with houseflies and fleas, remained at altitudes of 78,000 to 82,000 feet for 16 hours under a cosmic ray attack 60 times more intense than what the insects would receive at sea level. The impact on living tissue amounted to as much as 10,000 roentgens for less than a millionth of a second.

The 10,761 early-stage fruit fly larvae sent up—more than has ever been sent aloft before, Dr. Sullivan believes—actually represent only 0.6 cubic centimeter of tissue. The radiation frequency encountered may have been too low to strike such a small target, he said. A larger target, either more flies or a larger animal, man for example, might show damage.

There was no sign of X-chromosome breakage, nor was there any increase in gross abnormalities compared with flies that remained on the ground, Dr. Sarah B. Pipkin of Howard University reported.

Neither the houseflies (*Musca domestica*) nor the oriental rat fleas (*Xenopsylla cheopis*) showed signs of genetic effects. Reproduction was normal and no physical abnormalities were found by Dr. Sullivan or Carroll N. Smith, also with the USDA's Agricultural Research Service.

Right now, Dr. Sullivan said, the scientists are trying to get space on the next recoverable satellite to be sent up. In these experiments the insects would be subjected to very greatly increased radiations.

Science News Letter, December 12, 1959

PSYCHOLOGY

Patients' Dreams Foresee Illnesses and Operations

THE PSYCHOANALYST in his practice has found confirmation of the belief that sometimes dreams can accurately foretell events which are to occur in the future.

Dr. R. K. Greenbank of the Temple University School of Medicine in Philadelphia reported to the American Psychoanalytic Association meeting in New York evidence of cases in which patients foresaw illnesses and operations which made serious changes in the individual's life. The patient had no conscious knowledge of these conditions before the dream.

"An adequate explanation is available for such events," Dr. Greenbank told his colleagues, "in that it is felt that the deeper portions of the human mind are aware of things about to happen which the conscious mind may not be aware of."

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