BIOCHEMISTRY

Study Radiation Immunity

Laboratory experiments with mice indicate that an individual's sensitivity to radiations can be made greater or less. This may be significant in cancer treatment.

➤ IT MAY be possible in the future to make a person more resistant to radiations such as X-rays or even the potent radiations of an atomic bomb blast.

Scientific research holding out the possibility of some day giving humans at least some degree of immunity to radiations has been reported to the National Academy of Sciences in Washington.

The new findings, so far limited to experiments with laboratory mice, may also lead to more effective treatment of cancer. The study was made by a husband-wife team of scientists, Dr. John B. and Ruth M. Graham, formerly of the Vincent Memorial Laboratory at the Vincent Memorial Hospital in Boston and now at the University of Oregon Medical School, Portland.

Scientists have generally assumed that a person's response to radiations was unchanging and could not be altered.

"We believe this assumption is erroneous," declare Dr. and Mrs. Graham.

To test their theory, they injected Swiss mice with certain chemical compounds and then exposed them to radiation. Some groups of treated mice showed markedly higher casualties than the controls which had not had any of the compounds. Other groups which had been given different chemicals had more survivors than the controls.

In a preliminary report of their work, the scientists conclude that an individual's sensitivity to radiation can be made greater or less. Either greater or lesser sensitivity to radiations would be useful and perhaps life-saving.

Some immunity might help protect atomic age workers who may be exposed to radiations in industry and scientific laboratories, and even, perhaps, some persons at a distance from the center of an atomic bomb blast.

Greater sensitivity to radiation might prove useful in cancer treatment with radiation.

A theory on the varying effectiveness of radiation treatments on different cancer victims led the Grahams to their present research. They believe that in radiation treatment of cancer the reaction of normal tissue to the treatment "is at least as important" as the sensitivity of the tumor.

They found radiation reaction in both normal and malignant cells of many patients who improved under treatment. The normal cells showed no response to the radiation in many of the patients who did not improve. Thus, they suggest, tests on normal cells, rather than tumors, may tell the physician most reliably whether his patient is likely to improve.

Laboratory mice were given various substances, some 10 days before radiation and others immediately after radiation. Results in terms of mouse mortality varied not only between the substances and the time when given but also by the sex of the mice.

Horse serum administered 10 days before the radiation treatment cut mortality in 40 days to zero, compared with 21% and 28% losses among male and female controls which were exposed to the same amount of radiation. But when the serum was given immediately after radiation, deaths more than doubled in comparison with the controls.

Other substances given the mice which produced varying differences from controls in the radiation experiments were male and female hormones and adrenal gland cortical hormone.

From their experiments, Dr. and Mrs. Graham said, "We conclude that an individual's sensitivity to ionizing radiation may be either enhanced or diminished by the administration of certain steroids or foreign protein before or after radiation.

"It is possible that this observation may have some bearing on survival from total body radiation and on the effectiveness of radiation treatment of cancer."

If other scientists confirm the Grahams' findings, a new approach to radiation problems may be opened for the much-heralded atomic age.

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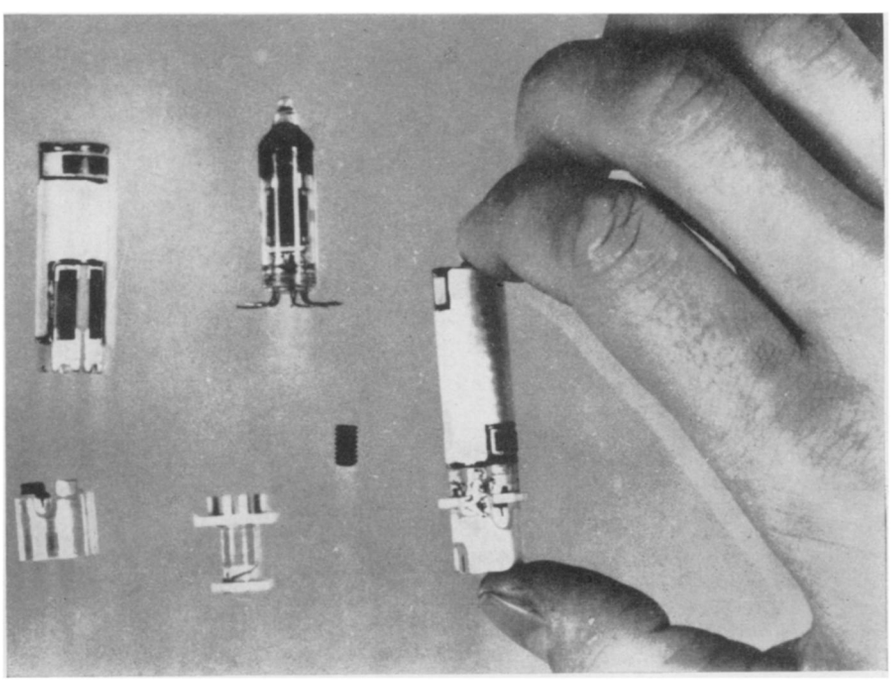
ELECTRONICS

Tiny Electronic Assembly

➤ PLUG-IN units containing the entire assembly used with delicate tiny electronic devices, such as broad-band, high-gain, intermediate-frequency amplifiers for aircraft and missiles, have been developed by the National Bureau of Standards. The objective is to obtain the smallest possible volume for the equipment, and a unit easily handled.

Such electronic assemblies are known as subminiature electronic devices when their volume is compacted to a dimensional



SUBMINIATURE ELECTRONIC TUBES—These will be used for plug-in units with other tiny electronic devices in aircraft. The objective for the packaging is to obtain the smallest possible volume for the equipment and a unit easily handled.

limit imposed by the smallest available electron tube. In making a single package to include the tube and other components, the shape as well as the size of the plug-in unit is a consideration.

The extreme compactness brings about higher internal temperatures than are usually encountered in conventional assemblies. Because of this, insulating materials commonly used are not satisfactory. Ceramics, vitreous enamels, and silicone-bonded bodies are used in the subminiature unit.

Low-dielectric-constant (low-K) ceramics, such as steatite, are used in preference to organic insulating material. The high-K titanate ceramics can serve not only as satisfactory printed-circuit base materials but also as miniature capacitor dielectrics. Fashioning the high-K ceramics bodies into cylinders makes them stronger than they would be in flat shape. These ceramic cylinders are made to play a multiple role as capacitors, tube shields, stand-off insulators, and base material for printed wiring.

The intermediate-frequency amplifier chosen by the Bureau for miniaturization embodies a type of critical circuit layout which represents the most typical problems. Two methods of fabrication were employed in their construction. One assembly was designed so that it could be readily manufactured by techniques similar to those now employed in the electronic industry. The other, a printed circuit assembly, was made to the same general specifications as the first which uses standard miniature components.

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GEOGRAPHY

Denmark Wanted in Pact

➤ TWO important reasons why Denmark is wanted in the group signing the North Atlantic Defense Pact are based on the nation's geographical position:

1. Denmark can control ship passage from the Baltic Sea to the Atlantic Ocean.
2. Denmark owns strategically located Greenland.

It is not the mainland Denmark on the Jutland peninsula that is the principal block in the water route from the Baltic to the ocean. It is the many islands between the peninsula and the southwest coast of Sweden, of which Sjalland is the largest and most important. It is on this island that Copenhagen, the Danish capital, is located. The north coast of the island is on the Kattegat, which separates the Jutland peninsula from Sweden and is the connecting waters between the Baltic and the Skagerrak and the North Sea.

Two passageways are available for ocean vessels and submarines, one to the east of Sjalland which, in its narrowest place, is only about a dozen miles wide, and the other to the west through what is known as Store Belt in whose waters are many small islands.

One important reason behind the construction of the Kiel canal across the German part of the Jutland peninsula was to give the German nation a way out of the Baltic without passage through Danish waters. Denmark's strategic position in controlling the entrance to the Baltic was one of Hitler's principal reasons for taking early possession of Danish territory.

Greenland's strategic value is its location in the North Atlantic close to the Great Circle air and ocean surface routes from America to Europe. Along with Iceland, a probable signer of the North Atlantic Pact, it is a stepping stone on the route from Labrador to the Scandinavian peninsula. Its southern shore area is suitable for emergency landing fields which could easily become refueling stations for giant bombers traveling either eastward or westward.

Greenland is the largest island in the world if Australia is rated as a continent. While much of it is ice-bound, its southern shores are temperate enough to support its present population of approximately 20,000—stockmen, fishermen and miners. Weather stations on the island are of great value to air and surface ships passing to the south. Radar stations on the island could locate approaching planes, and loran stations would help navigators.

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ARCHAEOLOGY

Stone-Age Game Animals Shown on Engraved Pebble

See Front Cover

➤ ANIMALS that cave-men hunted in the later Old Stone Age, some 20,000 to 25,000 years ago, are shown in a mass of finely engraved lines on a large rounded pebble, the size and shape of a big potato, found at the La Colombiere rock shelter in eastern France and now at the Peabody Museum of Harvard University. The find was announced by Dr. Hallam L. Movius, Jr., curator of palaeolithic archaeology.

Similar engraved pebbles have been found in the past, but this is regarded as one of the finest specimens of its kind ever discovered. The drawings, which show such animals as horse, ibex, rhinoceros and bison, are carved one over the other, so that it is somewhat difficult to make out what some of the animals are. One stocky horse figure, however, stands out with particular clearness, as shown on this week's cover of the SCIENCE NEWS LETTER. It has been gone over in ink to make it stand out from the other animals on the face of the stone. The head of an ibex and reindeer can be seen directly in front of the horse's nostrils when the picture is turned upside-down. The ibex is outlined below.

Nobody knows what purpose, if any, these portable art objects served, Dr. Movius states. It is conjectured that they may have had religious or magical significance.

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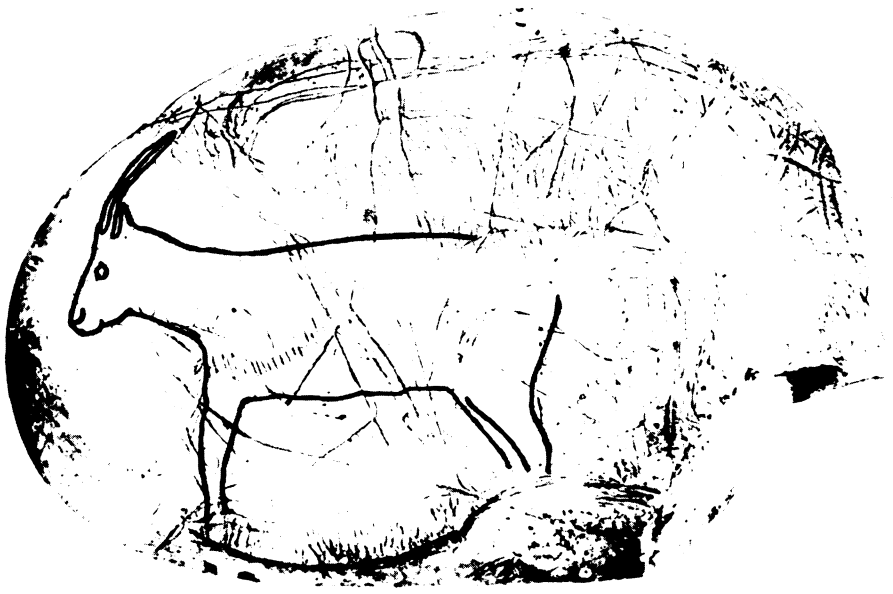

ANCIENT GAME—The picture of an ibex, gone over with ink to make it stand out, is one of several animals engraved on the La Colombiere pebble. A horse can be seen directly beneath the legs of the ibex when the picture is turned upside down, as shown on the cover.