

the radioactivity associated with one gram of radium.) When not in use, the package of radiating tubes is carefully lowered 25 feet under water which acts as a barrier to the rays. When it is ready to be used, the source is hoisted by remote control into position in a specially protected room, and the food in containers is carried on a mechanical conveyor belt under and over the cobalt.

The other source of radiation used by scientists is a stream of electrons generated by a linear accelerator and aimed directly at the food. This electron stream can be turned on and off, much like a light switch.

Detailed studies are underway to determine the wholesomeness, nutritional value, taste, appearance and safety of these irradiated foods. Such items as bacon, potatoes, and grains for flour have been cleared by the Food and Drug Administration, and petitions for oranges and fish such as had-

dock, halibut, flounder, sole and cod are being submitted.

Researchers point out that it may yet be several years before these and other irradiated foods are available on the market. Possibly if industry would get started in the process, research would move faster. But the present limitations of high research costs and relative undependability of results with high-quality flavor, color, and texture have kept the business world undecided. The present state of radiation technology is so new, industrialists believe, that the public is not yet ready to accept the product. Researchers point out that it took 15 years before frozen foods became firmly established in the market.

The eventual cost of radiated foods to the shopper will not be significantly higher than that of ordinary food, but the quality will be greatly enhanced.

• Science News Letter, 89:42 January 15, 1966

CHEMISTRY

Harm in Irradiated Sugar?

► WHEN EXPOSED to sufficient radiation, sugar breaks down and can transmit the lethal effects of radiation to living plant cells and possibly other forms of life.

This was found by Cornell University scientists who analyzed irradiated solutions in which plant cells were grown. They found that cane sugar, and not the rest of the solution, was broken down into irradiated chemical substances. Plant cells growing in this material were affected almost as if irradiated directly.

The laboratory for cell physiology, growth and development, headed by Prof. Frederick C. Steward at the N.Y. State College of Agriculture, Cornell University, achieved the scientific find. The researchers, Drs. Richard D. Holsten, Michiyasu Sugii and Prof. Steward reported that although the work primarily involved plants, the evidence has obvious bearing on other living things.

Harmful effects of radiation usually are ascribed to direct radiation in which vital parts of the cells are hit, principally the cell nucleus where hereditary information is carried. But the new work shows that these effects on cells may be produced by stable chemical substances derived from sugar, and they may act long after the direct exposure to radiation has ceased.

Not only do the findings add to an understanding of cell growth and the biological affects of radiation, but they have possible implications for the food industry. If radiation effects can be transmitted by stable chemical products from irradiated sugar, the biological consequences should be known before there is widespread use of radiation sterilized foods, especially those rich in sugar, according to the researchers.

In their experiments, carrot cells were grown in a solution containing coconut milk, a growth stimulant in which Prof. Steward has been able to grow whole carrot plants from free cells. Cell growth was virtually stopped when this solution was sufficiently irradiated. The scientists said, however, that at low dosages of radiation cell growth was stimulated instead of being stopped.

Sugar was found to be the only part of the nutrient solution that could indirectly transmit the radiation effects.

The researchers then irradiated substantial quantities of sugar, and by testing at each step of the way for effects on the growth of carrot tissue and cells, they obtained the harmful product in crude form. While general characteristics of the product have been determined, work is now under way to find its full nature.

To add weight to their findings, the scientists experimented on other plants. They even tried an experiment with fruit flies, and found some ill effects.

Prof. Steward and Dr. Holsten suggested that chromosomal abnormalities found in barley and other plants grown on irradiated media could be attributed to changes in sugar normally present.

The scientists also report that cane sugar is not the only sugar to absorb radiation and transmit its lethal effects, and they indicated it may be general among sugars.

They made it clear that while their work primarily concerned higher plants, there is reason to suspect that similar results might occur in experiments with other living things, including animal and human cells.

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Do You Know?

About 56 registered English language newspapers were published in India in 1964.

Scientists working with laboratory mice have found that leukemia viruses may be transmitted from mother to infant through the mother's milk and transmission may also be possible through the placenta before birth.

Reduced water velocities result in reduced growth of steelhead trout and coho salmon embryos.

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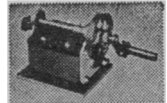
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