PUBLIC HEALTH

Irradiation Controversial

➤ BEFORE IRRADIATED foods are proved safe for humans a great many more experiments will have to be done on animals, D. G. Lofroth, biologist at Stockholm University Sweden, said.

Potential plans for use of nuclear radiation for food preservation hit a snag in 1965 when Dr. Richard D. Holsten of Cornell University, Ithaca, N.Y., stated in his doctoral thesis that lethal effects of radiation on plants could have "obvious implications for the radiation sterilization of food." Publication of findings based in part on the thesis has inspired numerous comments both in popular and scientific journals.

Dr. Lofroth takes the side of Dr. Holsten against those who state that the difference between a plant cell system and an animal is so great that any agent that affects plants cannot operate similarly in animals.

Two possible ways to avoid the dilemma of a safety factor for irradiated food are proposed by Dr. Lofroth in Nature, 211:302, 1966.

1. The primary step could be taken with plant cells. After cell destruction has been shown in the controlled environment of the test tube, foods passing such tests could be tried on large numbers of animals for extended periods.

2. For animal tests, each food could be prepared exactly as it would be for human consumption. So far, not more than 1,000 animals have been investigated thoroughly after feeding with any single tested and cleared irradiated food.

Up to the present time, says Dr. Lofroth, there is no "evidence that any class of compounds which results in cytogenetic or cytotoxic changes (for example, mutation, cancer, chromosome aberrations) is only operative in one type of cell and not in another.

On the contrary, it has been suggested that plant cells should be used to test chemicals for cytotoxic and cytogenetic effects."

The thalidomide disaster might have been prevented, the Swedish biologist pointed out, "if an easily performed investigation of possible cytotoxic effects in plant cells had been made and if the validity of plant cells in such a test had been recognized."

Any compound causing damage to cell generation or to cells already in existence must be considered a "potential hazard to any living cell or cell system, including man," Dr. Lofroth concluded.

CHEMISTRY

Bacilli Readied for Heat Death by Active Enzyme

➤ RESEARCHERS at the Ontario Research Foundation have found a way of making microorganisms in food more sensitive to destruction by heat or radiation.

In the preservation of food, undesirable microorganisms are destroyed or their growth is inhibited. The vegetative form of these organisms is easily killed by heat or radiation, but some species form spores that can survive the most adverse environmental conditions.

One problem common to the food canning industry is the destruction of heat resistant spores, and long cooking, with detrimental effects on the flavor, is often needed. Although it is more economical, the cooking method has lost ground to freeze-preservation because of flavor degradation.

The scientists discovered that a bacterial proteolytic enzyme would cause a common food contaminant known as *Bacillus subtilis* to germinate almost immediately. The spores of other types of bacilli were also found to be stimulated into germination by the same enzyme.

The spores become more vulnerable to destruction once they have germinated.

The enzyme works by forcing germination before the spores have a chance to harm the food.

It is possible that some enzyme may be found that will promote germination of all the spore forms found in uncooked food.

If this happens, the treatment of foodstuffs with enzymes and their subsequent sterilization by moderate radiation would be quite feasible.

It is presumed that canned fruits and vegetables would then have the "garden freshness" presently available in the more expensive freeze-preservation packages. Similarly, in the case of prepared meats it may be possible to minimize the danger of botulinus poisoning.

The research organization has applied for a patent for this new technique of food preservation by canning.

Further research is required, however, to seek out a practical commercial process.

The economic significance of a successful commercial process is substantial, since canned foods of the freeze quality would tend to cost less, and could be stored for longer periods without the cost of refrigeration.

AGRICULTURE

Fruit Life Doubled

➤ THE STORAGE life of apples, avacadoes, bananas, tomatoes and other fruit may be more than doubled if they are kept in vacuum dryers and ventilated with air at less than atmospheric pressures.

At normal air pressure, bananas, for example, ripen within about 10 days, but they can be safely stored for about 18 days if they are flushed with air at one-half normal atmospheric pressure. If pressure is reduced to one-third, storage time can be extended to 45 days or more without any significant drying or loss of taste or appearance.

Experiments by Stanley P. Burg and Ellen A. Burg of the University of Miami School of Medicine indicate that the delay in the ripening process may be the result of the reduced amounts of oxygen available when air pressure is lowered. Fruit ripening in air at normal pressure was compared with some ripening in pure oxygen at about one-fourth normal, thus evaluating fruit exposed to approximately the same partial pressure of oxygen in gas mixtures with widely varying total pressures.

In six tests the fruit ripened more slowly at the lower pressure.

From these results the researchers concluded in Science, 153:314, 1966, that something other than reduced amounts of oxygen was causing the delay in ripening. The additional factor is probably the removal of ethylene, a fruit-ripening hormone naturally synthesized by the fruit. When air pressure is reduced, the hormone escapes more quickly and its concentration in the cells is reduced, thus slowing the whole ripening process.

Studies on the effect of ethylene showed that fruit vacuum-stored and ventilated at 250 mm-Hg will ripen in about 45 days unless ethylene is added, in which case the ripening process is speeded to about 16 days.