HEW may establish, repeal, or modify tolerances when it is felt that such action is required in the public interest.

The judicial review provisions, Mr. Hitchner believes, removes the "power of life and death over the development of new products by one government agency."

Many Supporting Witnesses

Other witnesses whose testimony was similar to that of Mr. Hitchner included Willard M. Fifield, University of Florida Agricultural Experiment Station. Dr. Fifield stated that his view was supported by 30 to 40 groups representing all phases of Florida's agricultural interests.

George C. Decker, Illinois Agricultural Experiment Station, and H. H. Schwardt, Cornell University Agricultural Experiment Station, also voiced similar sentiments. State and federal records reflect that very few deaths from pesticides have resulted, and these have been due to carelessness of the applicator in handling, Dr. Decker said.

Samuel Fraser, International Apple Association, while supporting the objectives of the bill, raised some questions. He said that the Food and Drug Administration should not be a combined fact-finding agency, promulgator of regulations, and source of information to the prosecutor. He advocated placing the fact-finding and determination of tolerances with the U. S. Public Health Service and the administration of the law with the Food and Drug Administration. He also voiced objections to the lack of definitions of such terms as "insects, rodents, fungi, weeds, and viruses" and pointed out the need for standard methods of analysis of residues.

Opposition to Certain Provisions

Judge Harold M. Stephens, U. S. Circuit Court of Appeals, and Judge James J. Morris, U. S. District Court, both of the District of Columbia, testified in opposition to the legal appeal provisions of the law. In nonlegal terms, they said, the *de novo* (new trial) procedure called for in the proposed law would in effect give the courts administrative and regulation-making responsibility which should be vested in the legislative and executive branches.

Legal appeals are possible under existing law. However, if Congress desires to include some additional legal appeal, they suggested that the *de novo* requirement be eliminated from the bill and that legal appeals not be limited to courts of the District of Columbia. Instead, they believe a petitioner should be allowed to seek court action in the district in which he resides or has his business.

Spokesmen for the Food and Drug Administration, Charles W. Crawford, Commissioner, and William W. Goodrich, legal counsel, voiced objections to

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Effects of Radiation on Biological Systems of Increasing Interest

Radiations may act on living cells both directly and through the action of radiolytic products

IOWA CITY.—A desire to know more about the action of radiation on living cells brought together more than 300 chemists, physicists, biologists, and medical scientists at the first annual meeting of the Radiation Research Society here June 22 to 24.

The society is a new one and was organized to foster a closer relationship among the rather heterogeneous group of scientists working in this field.

An ionizing radiation may kill microorganisms by two different methods. It may directly damage some vital component of the cell or it may bring about the formation of toxic substances by decomposing water. In the latter case the toxic substances diffuse and kill the cell.

The fact that radiation can act in these two ways was the basis for an explanation of how temperature affects irradiation of yeast cells.

Thomas H. Wood, Institute of Radiobiology and Biophysics, University of Chicago, studied suspensions of *Saccharomyces cerevisiae* irradiated at temperatures between −30° to 40° C. He found that the radiosensitivity above the freezing point and in supercooled liquids cold as −10° C. was practically independent of the temperature. From −30° to −10° C. there was also little temperature effect, but in this case the radiosensitivity was only about half that found in the liquid suspensions. In frozen suspension between −10° and −0.5° C. (the freezing point of the suspension) the radiosensitivity increased with the temperature.

Dr. Wood was of the opinion that when liquid suspensions are irradiated both types of inactivation occur. In frozen suspensions, however, there is little or no diffusion, so only direct action comes into play. Between −10° and −0.5° C. the quantity of free water varies with the temperature, thereby allowing diffusion to take place accordingly.

Temperature Influence. It is generally thought that bacterial inactivation with x-rays is independent of temperature. Evidence to the contrary was introduced by G. E. Stapleton, Biology Division, Oak Ridge National Laboratory. He described experiments in which he exposed buffered suspensions of *Escherichia coli* to x-ray irradiation at various temperatures from 78° to 313° K. From these data he was able to plot a family of exponential survival curves. The slopes of these curves decreased with decreasing temperatures. Below 240° K. there was no change in slope; between 240° to 313° K., however, there was an eight to tenfold difference.

The change in slope of the survival curves of oxygen saturated suspensions was discontinuous at the freezing point. This effect was not observed in oxygen free suspensions. Dr. Stapleton said that his experiments indicated the importance of diffusion in x-ray inactivation of bacteria.

Radiolysis of Water. The changes which take place when aqueous solutions are irradiated are but little understood. It is known that hydrogen atoms, molecular hydrogen, free hydroxyl radicals, and hydrogen peroxide are formed. The diffusion of these and possible other entities may have a profound effect on biological systems. J. L. Magee, University of Notre Dame, said that there is much disagreement among investigators in this field.

He called for the establishment of a standard experiment in which all conditions could be carefully controlled. Once established, such an experiment would enable workers in different laboratories to compare their work on the same basis, he said.

Seeds X-Rayed. In exposing dormant barley seeds to x-rays and thermal neutron radiation, R. S. Caldecott, Brookhaven National Laboratory, found that in both cases frequency of interchange and mutation was directly proportional to dosage.

X-radiation was applied in dosages varying from 5000 to 25,000 R. Thermal neutron radiation was varied between 2.3×10^{12} and 30.1×10^{12} per square centimeter. Frequencies of interchanges and mutations were about 1.5 to 2 times as great in the case of the highest thermal neutron dosages as with the highest x-ray exposures.

The water content of barley seeds affects their susceptibility to x-ray damage. C. F. Konzak, also of Brookhaven National Laboratory, exposed both wet and dry barley seeds to x-radiation up to a level of 1000 R. The reduction in growth of the exposed seedlings was used as a measure of the radiation effect. Similar experiments with thermal neutrons showed no difference between wet and dry seeds.