justified, or was taken out of context. Some officials believe that Goddard mentioned the health effects in order to stress the seriousness of the situation and the need for better data on feeding studies.

"In discussions we have had with FDA," Colonel Irvin C. Plough of the Army Surgeon General's office said, "the FDA officials have not seemed to have any real qualms about the safety of irradiated food. They would simply like to see it spelled out better."

The ham decision has had a severe impact on the entire food irradiation operation in both the AEC and the Army. The Army had planned to submit petitions for pork, chicken, beef, and shrimp, but now must wait until wholesomeness and safety protocols have been established for ham. IRRADCO has postponed construction of its meat irradiation plant, which had been contingent on FDA approval of the ham petition. IRRADCO had contracted with both the AEC and the Army, and was to have been the first mass producer of irradiated foods.

The AEC has recently added data to a petition for irradiated fish fillets, since some of the initial data were based on Army feeding studies which had been questioned by FDA. The AEC is also working to irradiate papayas and mangoes in Hawaii. Indications are that irradiation destroys seed weevils on the mango and would make that fruit eligible for export to the mainland. At present, because of the weevils, there is a quarantine on Hawaiian mangoes.

Almost all of the AEC's food irradiation research, development, and testing is contracted out to universities, industrial firms, or nonprofit foundations. But most of the Army's work on food irradiation is done at its Natick laboratories. There are two large radiation sources used—a 24-Mev, 18-kilowatt electron linear accelerator and a 1,250,000-curie cobalt-60 isotope source. Recently researchers at Natick labs have begun to irradiate foods at low temperatures, eliminating the off-taste that is sometimes associated with irradiated food.

The process—for either isotopic radiation or electron radiation—is not very complicated. The food is first heated to 150 degrees ("blanched" is the term used); blanching does not cook the food but only stops enzymatic activity. According to Ari Brynjolfsson, a nuclear physicist at Natick, this does not measurably change the nutritional value. Then the food is cooled to a low temperature, and this, Brynjolfsson said, protects the vitamins from destruction and retains the taste of the food. Then the food is exposed to radiation; various doses produce various effects. The highest-level radiation used kills spore-forming bacteria, other bacteria such as salmonella, and trichina, all of which are prevalent in meats. Without radiation, Brynjolfsson said, foods must be heated and cooked for such long periods, to rid them of these organisms, that some 20 percent of the nutritional value is usually lost. Radiation at low temperatures kills the harmful organisms without loss of the food's nutritional value, he said.

Several other countries are doing work with irradiated foods; Canada has approved potatoes and onions, and about five other countries have approved potatoes. The Soviet Union has reportedly approved several irradiated fruits and vegetables and is continuing research on radiating meats (beef, pork, chicken, and rabbit).

Proponents of irradiated food point to its advantages: long shelf life, high nutritional qualities, and freedom from disease-generating organisms. Josephson said that foods exposed to radiation would have advantages for underdeveloped nations, where, in some places, over 50 percent of the food produced spoils before it ever gets to the consumer. The amount of radioactivity in the food is negligible, he says; a steady diet of irradiated food would actually expose a person to less radiation than he is exposed to in walking down the street and breathing the air.

But FDA officials seem to feel that the Army and the AEC have not made sufficient effort to demonstrate that these foods are safe. In view of its wariness about food additives, FDA is particularly cautious about possible harmful effects of radiation. It is FDA's contention that each irradiated food must be shown to be safe, and that feeding studies must be conducted for each food for which regulations are sought. It may turn out to be quite a while before 4-year-old irradiated chicken will be gracing the American dinner table.—ANDREW JAMISON

Smithsonian: Art of Organic Forms

Until 31 July, the Smithsonian's Museum of Natural History is exhibiting a noteworthy collection of paintings which is, in part, predicated on the idea that a way to encourage public understanding of science is to emphasize its beauty. Philip C. Ritterbush, the originator of the exhibit, also hopes that it will enhance the aesthetic appreciation of science for those interested in the subject. The exhibit focuses primarily on 75 paintings and drawings which have been influenced by microscopic organic forms.

Ritterbush, the director of the Smithsonian's Office of Academic Programs, has written a book, *The Art of Organic Forms,* to complement his exhibit of the same name. The book is dedicated to G. Evelyn Hutchinson, Yale professor of Zoology, who has argued that the public should be more aware of the beauty of the items displayed in natural history museums.

The selection of relevant paintings borrowed from many collections in the United States was made by Ritterbush's assistant, Diana Hamilton, a recent graduate in biology from Bryn Mawr College. Ritterbush is also thinking of organizing an exhibit of paintings by scientists sometime in the future.

The paintings, which include the work of Paul Klee, Matta, and Leon Kelly, among others, have been well mounted by Lucius E. Lomax. In line with the Smithsonian's new philosophy of having its exhibits appeal to all the visitor's senses, an attractive 25-minute recording, including music by Erik Satie, is played in the darkened exhibit hall. Although Washington *Post* critic Wolf Von Eckardt condemned the playing of the recording ("I say it's Muzak and to hell with it"), he was generous in his other comments—"the sheer enjoyment and fascination of a remarkable and thought-provoking exhibit that does the good old Smithsonian proud." There is a possibility that some of the paintings in the exhibit will be displayed at the AAAS 1968 annual meeting in Dallas.—B.N.