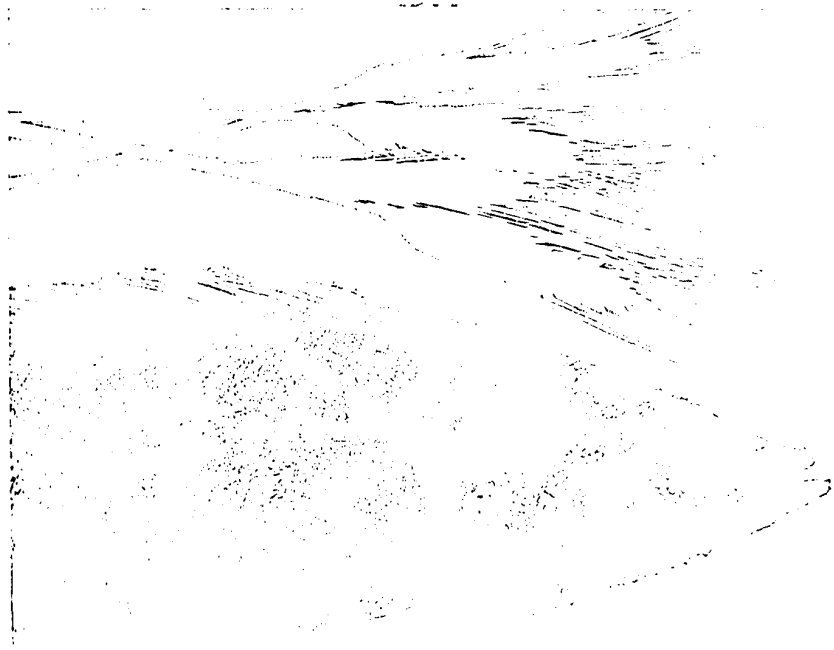
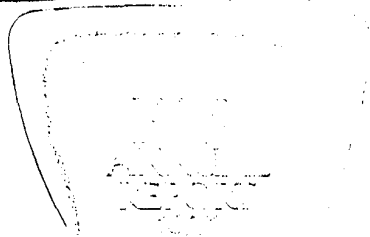


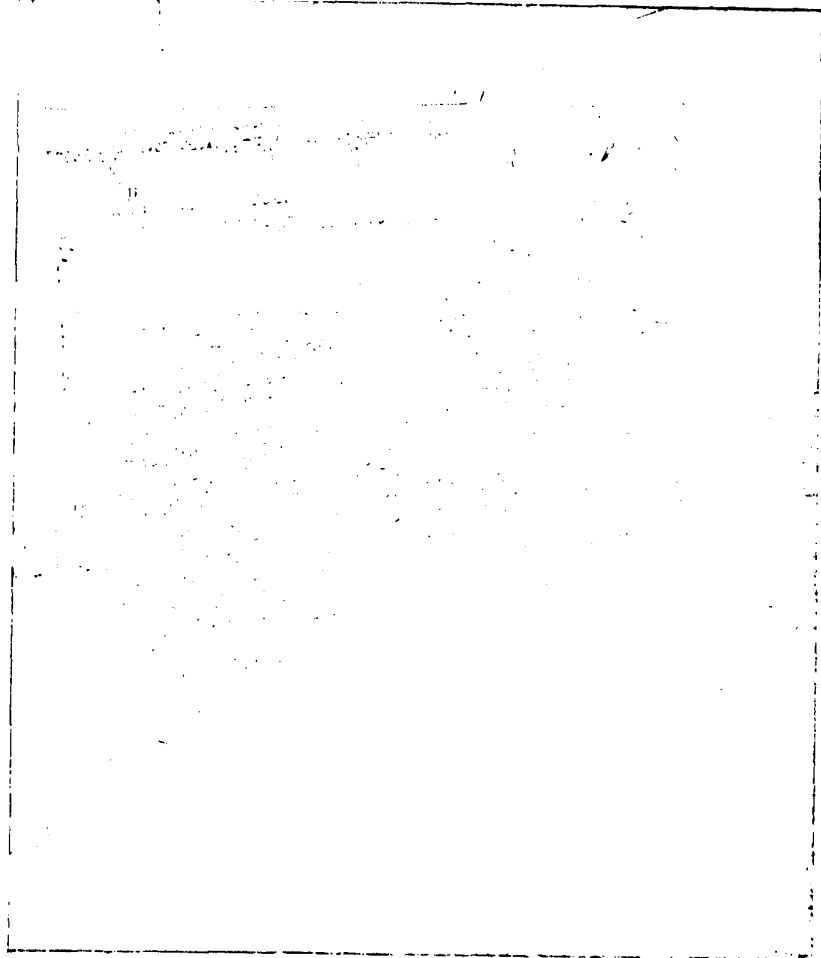
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FDA PAPERS



Protecting the Healthfulness and Safety of Food



French fries for freezing are sampled by an FDA inspector for testing in the District laboratory.

Using an atomic absorption spectrophotometer, FDA Chemist Benjamin Krinitz is determining the quantity of lead which could be extracted by acid foods from earthenware mugs. Materials which contact foods are subject to regulation as food additives if they are absorbed.

Mercury in tuna and swordfish required a massive sampling and testing program. With full industry cooperation, over 12 million cans of tuna—between 3 and 4 percent of the country's domestic and imported supply—were removed from the market after tests showing mercury in excess of 0.5 parts per million. In February 1971, FDA announced that this program was completed and that the tuna remaining on the market was within the established limit. The final statistics showed the problem of mercury in tuna to be much less serious than was feared initially. An industry-FDA monitoring program has been set up to prevent recurrence of the problem.

While testing tuna, studies of mercury content were begun on 19 other species of fish. In May 1971, a three-month survey of swordfish was completed, showing only 42 of 853 samples below the FDA's 0.5 ppm guideline. The data were reviewed by an ad hoc committee of scientific and medical experts from the United States and Canada. Extensive recalls were undertaken by the leading food chains. FDA seizures totaled 832,000 pounds. Swordfish brokers cooperated by withholding up to four million pounds from the market. However, swordfish continued to be available to the public at or over the guideline, and on May 6, 1971, FDA issued a notice recommending that the public not eat swordfish.

PCB's (polychlorinated biphenyls) are a family of chemicals widely used for at least 40 years. While there is no imminent threat to the safety of the food supply from PCB's, the FDA conducted research aimed at assessing the scope and significance of long-term, low-level human exposure. Seizures involving

PCB's in fiscal 1971 included such commodities as shell eggs, catfish food, fishmeal, and trout chow.

Dioxins (chlorodibenzo-p-dioxins), highly toxic to man and animals, have been detected in a number of samples of foods and food materials. A method was developed to help determine the presence of these compounds. Further studies are in progress. Emphasis is being placed on chlorophenols as a potential source of chlorodioxin impurities which may indirectly contaminate food. Four methods of analysis for chlorodioxins in commercial chlorophenols are currently under study by 12 laboratories.

Pesticide tolerances. Lower tolerances for residues of DDT and its metabolites in many raw agricultural food commodities were published in the *Federal Register* in December 1970. DDT residues in the soil, air, and water will gradually diminish in the environment with increasing restriction against its use. The proposed tolerances were set high enough to avoid jeopardizing current crops containing unavoidable residues, and low enough to prevent direct use of the pesticides on prohibited crops. This was the last pesticide tolerance-setting by FDA, this function having been transferred to the Environmental Protection Agency by a Presidential order effective December 2, 1970. Enforcement of pesticide tolerances continued as an FDA function.

In addition to the previously mentioned problem of lead and cadmium contamination in table pottery, FDA found these heavy metals in imported enamelware. Five major voluntary recalls of enamelware contaminated with cadmium occurred, including enamelware from Hong Kong, and fondue pots from Switzerland.

FDA analysis of a nationally marketed brand of im-

tested, 13 (11 of them from poultry feed) were found to contain toxic fungi. The mycotoxin sterigmatocystin can now be identified in grain by its tendency to fluoresce. Studies are also being conducted to determine the toxicity to poultry of patulin, another member of this toxic group of compounds.

Adulteration Problems

Work was carried out to establish the normal composition of foods and to detect adulteration of various foods with cheaper substitutes. A method which will detect as little as 10 percent skim milk powder in fresh fluid milk was modified for regulatory use, and a procedure was developed to detect the presence of added foreign fats in vegetable oils such as peanut oil. A number of infant foods were tested for their content of trace elements essential to human health; some were found to be deficient in copper, others in zinc, and most of them were deficient in iron.

Certain compounds, such as ethylenediamine-tetraacetic acid (EDTA), which is approved for many foods uses, have the ability to tie up metals so that they cannot be utilized by the body. A number of such compounds were tested in chicks. Of the 10 compounds tested, none affected the chick's utilization of calcium but they did affect utilization of iron and manganese. The effects depended on the form and amount of the compound present.

Nitrosamines, some of which have shown to be carcinogenic to test animals, have been identified at very low levels in samples of smoked fish treated with nitrite-nitrate as a preservative to prevent botulism. Nitrosamines have also been detected in samples of untreated fish. Since some meat products are also processed with nitrite-nitrate, a number of processed meats were examined for the presence of nitrosamine by the method previously developed at FDA. None of the samples contained as much as 10 parts per billion, the limit of detection for the method, although a single sample of ham appeared to contain traces of nitrosamines.

Monosodium glutamate (MSG), widely used as a seasoner or flavor enhancer, has been reported to cause adverse effects. In studies with rats, MSG was not found to impair brain development nor affect reproductive function. The chief effects noted were hyperirritability in weanling rats, and a rough, shaggy-hair coat which persisted for about three-four weeks.

Cadmium, which is naturally present in food, water, and air, can produce cardiovascular and respiratory diseases if exposure to it is excessive. Studies with Japanese quail as a test animal showed that iron, vitamin C, and to a lesser extent, copper and the amino acid L-cysteine help protect against the toxic effects of cadmium.

Cyclamates are no longer permitted in foods, but interest continues in their effects. When rats were fed diets containing low levels of cyclamate, fat metabolism was found to be affected, and metabolism of glucose increased. Bladder lesions were observed in rats fed

The "woman's viewpoint" is becoming well represented among FDA inspectors. Over 30 are now employed. Women laboratory and medical scientists—chemists, bacteriologists, physicians, pharmacists—number around 250.

cyclamate for long periods of time, and several rats developed bladder tumors. Another study showed that seven of 11 rats converted cyclamate to one of its metabolites, cyclohexylamine, which has been found to cause chromosome aberrations in laboratory animals. When cyclohexylamine was given to rats at high dose levels, sperm cells were affected.

PCB's. In recent years FDA has found that certain industrial chemicals present health problems similar to those caused by pesticides.

Methods have now been developed to distinguish PCB's from pesticides and from the dioxins. The dioxins were the toxic materials chiefly responsible for the chick edema disease which decimated poultry flocks over 10 years ago. Members of this class of chemicals differ in their toxicities. A study was made of the manner in which the various dioxins were distributed through the tissues of test chickens fed a fatty material containing dioxins. It was found that the more chlorine the particular dioxin contained, the less likely it was to be absorbed by the tissues; 92 percent of these negatively chlorinated compounds were excreted. The lower chlorinated compounds were found in the bones, hearts, intestines, kidneys, livers, and skin of the test chicks but not in the adrenals, testes, or brains.

A method was developed for detecting the presence of the dioxins in chlorophenols, and a number of commercial samples were examined and found to contain small quantities of dioxins. It has also been learned that the toxicity of the herbicide 2, 4, 5-T is due chiefly to its contamination during manufacture by one of the dioxins. A method has now been developed to separate the dioxin from the herbicide for identification. Commercial samples of 2, 4, 5-T when given to hamsters caused abnormal fetuses and other reproductive damage, whereas 2, 4-D (structurally similar) did not have any significant effects on reproduction, confirming the conclusion that the toxic effect was due to the contamination of 2, 4, 5-T with dioxins rather than to the herbicide itself.

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