hard workers," says Clare Floyd, in charge of bee affairs for the Minnesota Department of Agriculture and himself a beekeeper. The late corn crop is the big problem (insect population does not build up enough to require insecticide treatment of earlier crops) and the canners are working on a plan to plant the late crop as far as possible from fruit trees and other crops favored by bees.

Bees have an elaborate nervous system built into antennae, mouth parts and other organs highly specialized for their aerial life and intricate labors. This makes them highly sensitive to the modern neural-acting insecticides. So many bees have died since widespread use of DDT began around 1940 that growers are now obliged to rent bees as pollinators. Such rental fees are a bigger source of income to beekeepers than honey, whose price has remained at an uninflated 11 cents per pound wholesale for more than a decade.

Carbaryl, produced by the Union Carbide Corp. and trade-named Sevin, is also used widely by small home owners as a component of yard sprays purchased over-the-counter. When DDT was outlawed because of its long-lasting residues in the tissues of most species, organophosphorus compounds, similar in biochemical action to the deadly nerve gas invented for military use (SN: 8/15, p. 137), were the first replacement. Occasionally lethal to humans because they are absorbed through skin and irreversibly paralyze a key enzyme of the nervous system, the organophosphates (Malathion and Parathion are examples) are being replaced voluntarily by users aware of their hazards. Carbamates (Sevin is the best known) are the replacement.

For bees, Sevin is more dangerous than the organophosphates it replaces. The latter break down rapidly; beekeepers cover up their hives to keep bees at home for three days. Sevin does not break down for two or three weeks.

The problem is not confined to Minnesota. Late-planting zones established in the state of Washington failed to save the bees there. In the Yakima Valley, where 80,000 acres of fruit trees grow near 40,000 acres of sweet corn, beekeepers count losses of more than $700,000 as a result of heavy use of carbaryl in recent years. Losses are also heavy in California and Arizona, where carbaryl is used against the pink cotton bollworm.

"We have great hopes of eventual solution by means of sterilization and biological control of harmful insects," says M. D. Levin, chief of the U.S. Department of Agriculture's apiculture research branch. "In the meantime we are trying to develop insecticide-resistant strains of bees and to provide insecticide-free bee sanctuaries." □

GENERIC EQUIVALENCY

Testing the me-too drugs

A fair portion of the drugs on any pharmacist's shelves are what the trade calls me-too products, agents which are claimed to be identical to some brand-name drug. Often these so-called generic equivalents are less expensive than their brand-name counterparts. Frequently they appear shortly after the original manufacturer's patent expires.

There is little doubt that me-too products are, in fact, chemically identical to the original drug they are trying to compete with in the marketplace. But whether me-too drugs are biologically equal to the brand-name original is another matter. Indeed, the question of generic equivalency has long been one of the most hotly contested issues plaguing the drug industry and the Food and Drug Administration (SN: 4/22/67, p. 381).

After years of debate, open admissions by FDA commissioners that generic equivalents may not be equivalent at all and excuses that the complexities of the situation make dealing with it virtually impossible, the FDA is quietly but surely taking steps to guarantee that claims of equivalency can be supported, at least for all new products.

According to FDA Commissioner Charles C. Edwards, the agency finds that "comparable bioavailability frequently does not exist for products that are otherwise, so far as currently available methods are concerned, identical." In other words, two like antibiotics may contain precisely equal amounts of active ingredient, but because of differences in manufacturing procedures in formulating a tablet the active antibiotic may be released faster and in greater quantity from one tablet than from another.

In a limited but first step in coping with the problem, the FDA has issued a policy, in the form of a directive from Dr. Henry Simmons, Director of the Bureau of Drugs, "to determine the comparative biological availability of these drugs."

At present, the regulation is only prospective, applying to products currently up for consideration but not retroactively to those already approved. The demand it makes of manufacturers is relatively simple.

The ideal way to determine that two like products are equal in therapeutic action would be to compare them in extensive, double-blind clinical studies. However, the cost, time and skilled manpower required for such investigations is prohibitive. So the FDA is asking for the next best thing—tests of bioavailability to show that the active ingredient in me-too products is as available, once inside the body, as the original brand-name drug.

According to Dr. J. Robert Weinrogh of FDA, this can be demonstrated effectively by one of two methods. The most satisfactory involves giving compounds to human volunteers and then measuring drug levels in blood. But this becomes difficult, if not impossible, with compounds administered in minute quantities. Technically it may not be feasible, for instance, to detect blood levels of drugs given in one milligram dosages. In that case, dissolution tests are considered indicative of bioavailability. Compounds are exposed to synthetic gastric or intestinal juices in the laboratory to determine the speed and thoroughness with which a tablet or capsule is dissolved and the active ingredient released.

The FDA's new requirements are clearly neither the perfect nor total solution to the problem of guaranteeing that two or more allegedly equal products are genuinely comparable. But agency officials feel that a limited step in the right direction is preferable to doing nothing at all. □

SCIENCE NEWSBRIEFS

Icebreaker not economical

The Humble Oil and Refining Co. has announced that it is suspending its icebreaking-tanker studies to explore other ways to transport crude oil from Alaska's North Slope to markets in the United States. Two voyages by the super-tanker Manhattan (SN: 4/25, p. 420) demonstrated the operational feasibility of transporting the oil by ship through the ice-clogged Northwest Passage, company spokesmen said. But the company has decided that use of pipelines now appears more promising economically. □

Accelerator site

The council of CERN, the European international physics laboratory, has approved a plan to build a proton accelerator of 300 billion electron-volts energy on a site across the road from its present laboratory in Geneva. The new plan (SN: 6/27, p. 615) replaces one under which the new accelerator would have been built on a different site and which foundered on disagreements over finances and site selection. □

Flight of Zond 8

The unmanned Soviet moonship Zond 8 splashed down in the Indian Ocean this week after a 500,000-mile flight around the moon. Launched Oct. 20, Zond 8 studied the lunar atmosphere and photographed the surface as it swung around the moon last Saturday, the Tass news agency said. □