

agricultural sciences

ENTOMOLOGY

Superflies beat dichlorodiphenyltrichloroethane

Farmers and pest control researchers have been uncomfortably aware in recent years that insects tend to develop resistance to insecticides to which they have been exposed for some time. Now flies have been bred in the laboratory that are simply impervious to DDT. Furthermore, their breeder says such superflies will have developed naturally within five years, rendering DDT worthless.

Dr. Roger A. Hoopingarner of Michigan State University in East Lansing is studying the development of natural resistance and ways to combat resistant pests. He has bred houseflies that can stand wetting down with pure DDT. Various mechanisms for such resistance have been suggested, among them detoxification of the poison by alteration of its molecular structure. Dr. Hoopingarner says some flies' resistance may be due to nerve sheaths that are relatively impervious to the poison. All defenses observed so far, he says, originate in a single chromosome. To get around the defenses, insecticide makers could perhaps develop one that attacked vital functions under the control of genes contained in some other chromosome.

Dr. Hoopingarner says existing insecticides will be obsolete within 10 years; most are obsolete now, he adds.

PESTICIDES

Charcoal diet for cattle

Scientists at Michigan State University have tested a livestock diet additive—activated charcoal—that promises to reduce substantially the level of insecticide contamination of meat and dairy products.

Robert M. Cook reports that his group fed Jersey heifers, sheep and goats with feed contaminated with dieldrin. They were then fed with a ration containing the charcoal. It was found that pesticide residues in the meat and milk of the animals were reduced 11 times faster than in animals receiving no charcoal.

Even when the charcoal was fed a week after contamination, Cook reports, elimination of residues occurred at twice the normal rate. He adds that the charcoal appears to have a beneficial side effect, stimulating the animals' appetites so they gain weight faster.

ENTOMOLOGY

Screwworm fly upsurge

Screwworms, the first pest to be eliminated on a large scale by the use of the sterile male technique, have shown an alarming increase, according to U.S. and Mexican officials. Many areas formerly cleared of the pests have been reinfested, the officials report.

The screwworm fly lays its eggs in open wounds on cattle. The maggots live on the flesh of their host, causing damage and death, and economic losses of many millions of dollars. Control has been achieved by releasing vast numbers of sterilized males; since the females mate only once, the sterilized males displace fertile wild males, causing a drop in overall breeding success.

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In the Mexican border states of Tamaulipas, Nueva Leon, Coahuila and Chihuahua there were 1,773 cases of screwworm attack reported in September, compared with 540 in the same month last year. In Sonora 784 cases were reported this September, against 86 last year. The flies also are reported on the increase in the United States, with 1,558 cases reported from Texas alone. The upswing has occurred in the last few months.

Mexican ranchers have been requested not to brand, castrate or otherwise treat cattle so they are left with wounds that might attract flies. More than 348 million sterile males have been air-dropped in the area.

EXPERIMENTAL ANIMALS

Meadow vole used in hay research

A colony of meadow voles, *Microtus pennsylvanicus*, is being developed at the U.S. Department of Agriculture's Beltsville, Md., research station for use in the study of forage plants.

The animals, slightly larger than mice, offer several advantages. The first is that they have a greatly enlarged caecum, or blind intestine, that constitutes almost a fifth of the vole's digestive tract. It is the caecum that enables horses and certain other non-ruminants to live on low protein foods, such as grass, that contain mainly cellulose. Mammals cannot digest cellulose. Bacteria of certain types can; these are found in the rumen or first stomach of cows, and in the caecum.

A second advantage of the voles is that they are small and easy to handle, and cheap to feed and raise, especially compared with horses and pigs. At the moment they are being used to study the digestibility of various forage plants and the toxicity of some molds that infect forages.

Female voles are ready to breed when 30 days old and can have a litter every 21 days. Males take on a harem of three or four females. The colony is being developed by physiologist G. P. Lynch.

HUSBANDRY

Shearing by drug

A drug developed originally to halt cell growth in tumors is finding an unlikely application: sheep shearing.

E. H. Dolnick, a biologist with the Agricultural Research Service in Beltsville, Md., reports that wool can be removed from treated sheep down to the bare skin with none of the usual infection-prone nicks and cuts, and no undesirable side effects. Most importantly, he says, the job can be done with unskilled labor at \$2.50 an hour, instead of \$12 for a skilled shearer.

The drug, cyclophosphamide, acts by alkylating a cell's deoxyribonucleic acid (DNA). The net effect is the prevention of hair protein synthesis in the hair root cells, which causes a constriction in the hair. This constriction appears at the skin surface six or seven days after the drug is given. The wool fibers break easily at the constriction and the fleece can be pulled off by the handful. If cold weather threatens, fleecing can be delayed another week. This gives new wool a chance to grow out below the constriction, and leaves the animal with some cold protection after fleecing.