environment

Mosquitoes' resistance to insecticides

The resistance of malaria-carrying mosquitoes to various insecticides is on the increase in Central America, reports entomologist George P. Georghiou of the University of California at Riverside. The increase is due largely to overuse of agricultural chemicals by farmers.

Georghiou says the Central American situation may be a warning of worldwide trends unless alternative means of insect control are developed.

DDT is still the most common insecticide used against the malaria-carrying mosquitoes, but about 20 percent of the areas of infestation have DDT-resistant strains. And now in Central America, says Georghiou, resistance toward two organophosphorus and one carbamate insecticide has appeared. These are classes of chemicals distinctly different from DDT. Not long ago they were hailed as useful, and more degradable, substitutes for DDT.

One promising substitute for broad-spectrum chemical insecticides had been juvenile hormone analogue (JHA) insecticides. Ideally, they would cause growth abnormalities and death of insects. But Georghiou and colleague David C. Cerf report in the Oct. 13 NATURE that house flies resistant to the broad-spectrum chemicals appear to have a degree of cross-resistance to JHA.

Cooler, quieter, and more scenic

Urban and suburban developers recently have come in for heavy criticism by environmental groups. Removing vegetation to make way for concrete and asphalt is an important target of the critics; reduced vegetation eliminates much of the natural cooling provided through plant transpiration and evaporation and through the lower solar energy absorption of plants. Thus removing vegetation contributes to the energy crisis by requiring more air conditioning. Vegetation is also useful as a sound barrier.

During the last five years, the University of Utah in Salt Lake City has been removing campus roads and streets and replacing them with gently sloped "berms," or mounds, which are then planted in grass. The payoff is evident, say university planners. Campus temperatures are 8 to 15 degrees cooler than in heavily paved-over downtown areas, and the berms have greatly reduced noise from peripheral roads. An added benefit is that the campus is far more scenic.

Profits and pollution abatement

Although steel industry profits have been down in recent years, the long-term outlook is for profit growth even with the additional costs of pollution abatement, says a report prepared by the Department of Commerce for the Environmental Protection Agency and the President's Council on Environmental Quality. The report thus appears to refute industry claims that new clean air and clean water laws might seriously damage profitability.

"While effects of pollution abatement costs on the industry's growth and profits are not inconsequential," says EPA, "they will not be the controlling factors. . . ."

The report says steel prices will increase less than 1 percent a year over the next five years due to pollution abatement. In 1975, abatement costs will be about $1 billion, compared to revenues of $30 billion. But rising demand for steel is expected to allow the higher prices and thus offset the environmental costs.

medical sciences

How antibiotics help their makers

Because antibiotics can, in dilute solution, inhibit and kill microbes, they are considered to be among the most valuable drug finds of this century. The importance of antibiotics to the microorganisms that make them, though, has remained elusive. In the Oct. 25 NATURE NEW BIOLOGY, Nilima Sarkar and Henry Paulus of Harvard Medical School report "the first evidence for a biological function of a peptide antibiotic in the life cycle of the organisms producing it."

They knew that peptide antibiotics are produced only by microorganisms that, at certain stages, make spores (resting forms for themselves). They knew that peptide antibiotics and spore formation are equally sensitive to certain inhibitors and to changes in culture conditions. So they hypothesized that the antibiotics might assist their makers in forming spores. They found that antibiotic synthesis is one of the first events of the spore-forming cycle. They also found that the antibiotics inhibit RNA synthesis by the microorganisms and that when RNA synthesis stops so does the microorganisms' regular growth. So they conclude that the microorganisms first make antibiotics, and the antibiotics in turn help the microorganisms switch from regular growth to spore formation.

Animal model for muscular dystrophy

Muscular dystrophy is an inherited disease characterized by progressive weakness due to degeneration of muscle fibers. The biological cause has not been identified. Some investigators think it is biochemical; others, that a nerve or blood vessel disorder sets muscle deterioration into motion. Research has been hampered by lack of a good animal model for the disease.

In the Oct. 27 NATURE, J. R. Mendell, W. K. Engel and E. C. Derrer of the National Institute of Neurological Diseases and Stroke report they now have what appears to be an appropriate model. By tying off the abdominal aortas of rats and giving them small doses of nerve chemicals, they reproduced in the animals muscle lesions comparable to those in muscular dystrophy patients. The rats also experienced enzyme fluctuations that muscular dystrophy patients experience.

The authors anticipate that their model will not only help researchers get at the cause of muscular dystrophy but to try out drugs that might help patients.

Fusing mammalian cells by microsurgery

Viruses or chemicals can be used to fuse different kinds of mammalian cells in culture. The problem, though, is that they cause all the cells to fuse, and in all sorts of nucleus and cytoplasm combinations. Then the desired hybrid cells must be picked from the whole batch for further study. Also, where the desired fusion is between virus-infected and uninfected cells, the addition of another virus to bring about fusion is undesirable.

In the October PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, Elaine G. Diacumakos and Edward L. Tatum of Rockefeller University report that microsurgery can now be used to fuse specific mammalian cells and not an entire cell population. With microsurgery the cells can also be used at a specific time in the cells' cycles.