life sciences

VIROLOGY

Cell metabolism rules viruses

Scientists have generally assumed that viruses are not controlled by the metabolic systems of the cells they infect. University of Pennsylvania researchers find that, in some viruses at least, they may be controlled by cellular metabolism.

Dr. William C. Lawrence reports that when Herpes strain viruses infect a cell, new viral DNA is synthesized only at those times in the cycle when the cell would normally be making its own genetic material.

"The mechanism that controls the synthesis of DNA in a normal cell apparently controls the synthesis of viral DNA in an infected cell," Dr. Lawrence told a meeting of the American Society for Microbiology in Miami. In comparative experiments, normal and infected cells synthesized DNA during only 6 hours of their 16-hour cycle. The Herpes virus tested causes respiratory diseases and abortions in horses. Other Herpes strains which may be subject to cell matabolic control affect the skin, eyes and nervous systems of humans and may be associated with leukemia.

ANTI-TUMOR AGENTS

Platinum stops mouse tumors

Inorganic platinum compounds have been added to the list of potential tumor-inhibiting chemicals. In a case of scientific serendipity, Michigan State University scientists discovered that these compounds stop division and replication of leukemia and sarcoma cells in mice. Leukemia is a cancer of the blood; sarcoma of connective tissue such as cartilage and muscle.

Dr. Barnett Rosenberg and Loretta Van Camp, testing the effects of an electrical field on bacterial growth, noticed that contamination from a platinum electrode was halting cell division. To determine if a similar effect occurs in animal cells, they injected cancerous mice with the platinum compounds and found that, in some tests tumor inhibition was achieved in 100 percent of the animals without causing damage to healthy cells.

Following up on the finding, researchers at the National Cancer Institute in Bethesda, Md., showed that the platinum compounds eliminated tumors in 30 percent of test mice, extending average life expectancy in the animals by more than 83 percent. Now tests are underway to learn what, if any, side effects the drugs may have in normal mice.

BIOCHEMISTRY

Clotting clue from rat poison

Warfarin, a potent poison used to exterminate rats, is giving scientists insight into the ways vitamin K affects the blood's ability to clot. Researchers know that the poison, in large doses, causes animals to die from internal bleeding and, in small doses, is an effective anti-coagulant for use in surgery. Vitamin K reverses its effects, though how it does that is unknown.

Dr. John W. Suttie of the University of Wisconsin suggests that vitamin K directs the production of several clotting factors, among them one called prothrombin. When an injury calls blood-clotting factors into action, prothrombin, through a rapid series of biochemical events, becomes the clot-producing enzyme, thrombin. Both Warfarin and vitamin K, Dr. Suttie finds, compete for the same available spaces on protein molecules involved in producing prothrombin. Studies of Warfarin in rats, he believes, could show how vitamin K works and how it is distributed through the body.

VIROLOGY

Technique boosts vaccines

A substance derived from peanut oil and a chemical that induces production of interferon, the body's anti-virus agent, enhance the activity of virus vaccines.

In one test, in which interferon-stimulating Poly I:C (polysinosinic-polycytidylic acid) and peanut oil adjuvant were combined in an experimental flu vaccine, 64 times as many virus-fighting antibodies were produced as from conventional water-based vaccines, reports Dr. Maurice R. Hilleman of the Merck Institute for Therapeutic Research in West Point, Pa.

Dr. Hilleman, in 1967, discovered that Poly I:C, a synthetic chemical that structurally mimics the double-stranded RNA core of some viruses, induces interferon manufacture in the body (SN: 7/19/67, p.173). So far, tests of the Poly I:C oil booster effect in vaccines have been limited to animals, he says, adding that extensive safety studies must be completed before he can consider tests in man.

Monkeys given vaccines boosted only by the peanut oil adjuvant produced 16 times more antibodies than those receiving conventional vaccines. Poly I:C alone produced only a slight increase.

The high levels of antibodies present in monkeys given the souped-up flu vaccine persisted for the entire 11-month period during which the animals have been studied. "There appears to be a synergistic reaction between the oil adjuvant and the interferon inducer," he explains, though full details of its mechanism of action are unknown.

The studies, he adds, indicate no relationship between the synergistic reaction of adjuvant and Poly I:C and Poly I:C's separate ability to induce the production of interferon.

ICTHYOLOGY

Trout parasite control sought

The entire 1968 crop of trout at a commercial fish hatchery in Ohio was killed off by a disease caused by parasitic protozoa. Symptoms of the disease, which affects the nervous system, include a sunken patch in the skull, blackening of the tail and swimming in circles by affected trout fry.

Efforts now are under way by Ohio State University biologists to determine if other state waters are affected. Dr. Richard Tubb will study ways in which the protozoan spores are transported and picked up by the fish, in an attempt to find ways of controlling the disease and limiting its spread.