natural sciences

Bugging the bugs with a virus . . .

As the furor over broad-spectrum chemical pesticides grew, scientists and farmers began to search among insects' natural enemies for more selective means of controlling the pests. Viruses that attack only one insect species or a few related species seemed ideal, but the precedent of beginning this kind of all-out biological warfare on bugs created a long-standing attitude of caution among Government regulatory agencies (SN: 10/11/69, p. 334).

Now the Environmental Protection Agency has apparently cleared the way for the first commercial viral pesticide to be produced and marketed nationally. By exempting International Minerals and Chemical Corporation's "Viron/H" product from the requirement for establishment of a residue tolerance on cottonseed (implying the product is harmless to humans and animals), EPA has effectively lifted the last obstacle preventing its use for control of the cotton bollworm and tobacco bollworm, both moth larvae. The product consists of residues of the nuclear polyhedrosis virus, a common, naturally occurring, rod-shaped organism that attacks only insects. It will replace the highly toxic insecticide methyl parathion and now-prohibited DDT.

. . . or trapping them in their skins

A Boston College biologist, Maria Bade, may have found another selective way of killing insects without harming other species—interrupting their molting process. When a larva is about to undergo metamorphosis, it secretes a molting fluid that destroys the old exoskeleton and helps form a new one. By spraying the larvae of the tobacco hornworm *Manduca sexta* with a metal chelator, orthophenanthroline, Bade inhibited the molting fluid enzymes of the insects, thus killing them.

Bade says that by coinciding spraying with the molting period of the insect pest in question, farmers may be able to selectively control such destructive insect species as the gypsy moth and the tobacco hornworm. Praying mantises and insect-eating spiders would not be affected. Further research will concentrate on finding which metal chelators work best, how safely they can be used around higher animals and how species-specific their effect can be made.

Postmortem for a lake

Strictly speaking, Lake Erie did not "die," though that term has often been applied to it. Rather, the convergence of overfishing, overpopulation along its shore and a malevolent neglect made it unfit for the life of its choicest fish. In the June 22 SCIENCE, Canadian zoologist H. A. Regier and American fisheries specialist W. L. Hartman present the dreary chronicle of the lake's decay, but find a ray of hope for the future of the Erie.

As commercial fishing developed in the lake in the middle of the 19th century, and severe pollution, in the 20th, first the giant sturgeon and later the lake's herring, pike, trout and whitefish were reduced to commercial extinction, to be replaced with smelt, perch, carp and channel catfish. Algae density rose over a factor of 20. The Detroit River alone dumps 6 billion liters of industrial and domestic waste into the lake daily.

Regier and Hartman say a current clean-up effort can never restore the lake to its pristine beauty or reestablish many of the lost species, but introduction of fingerling salmon from the Pacific and clearing the cold bottom water of oxygen-robbing plankton could help reestablish a more desirable fish community.

earth sciences

Lunar clues to earth avalanches

An unusually long avalanche, located at the Apollo 17 landing site on the moon, may hold new insights into the mechanisms of terrestrial avalanches.

Several of the most "efficient" terrestrial avalanches, those which move the farthest relative to their fall, have been attributed to air-cushion sliding. An example is the Sherman avalanche in Alaska caused by the major earthquake there in 1964. If not created by impact, the "Apollo 17 avalanche" was as efficient as air-lubricated avalanches despite the absence of air on the moon.

In the June 8 SCIENCE geologist Keith A. Howard of the U.S. Geological Survey suggests that such avalanches flow "like fluid composed of rapidly moving particles."

This idea implies two things: that air lubrication may not be the sole cause for efficient avalanches on earth, and that base surges and similar radial flows produced by impact events could occur in the absence of a gas phase.

Oldest parasitic copepods

Paleontologists from the British Museum have made the first discovery of parasitic fossils belonging to the class Copepoda (crustaceans lacking compound eyes and the calcified part of the dorsal exoskeleton). The fossils are the oldest known form of copepods, dating back approximately 100 million years, and are the first fossil (as opposed to modern-day) parasitic copepods ever found. Until now, the only fossil copepods found have been the free-living form, which dates from the middle and upper Miocene (10 million to 20 million years ago).

The specimens were found in the gill chambers of two fish in a Lower Cretaceous limestone formation in Brazil.

It is a generally accepted belief that parasites evolved from free-living forms. Thus, the discovery of parasitic copepods indicates that the free-living form existed before 100 million years ago.

Until recently caligid copepods (copepods which are parasitic on fish) and another type of copepods called siphonostomes were classified as separate groups. The new parasitic copepod finding, reported in June 22 SCIENCE, brings conclusive evidence to theories suggesting a link between the two.

Evolution at the grass roots

Though sudden and violent geologic and cataclysmic events have had a dramatic effect on the evolution of life on earth, gradual changes in plant life also play an important secondary role in the evolution of animal life. For instance, the appearance of Graminae, a hollow stemmed grass, helped bring about the age of mammals by providing vast amounts of food previously unavailable to herds.

A present-day example of a new type of flora changing an existing ecosystem is beach grass. Beach grass is stabilizing coastal dunes and enabling new ecosystems to emerge on what was formerly barren sand.

In the June 8 NATURE, research by M. D. Brasier of the Institute of Geological Sciences in England has brought to light still more evidence of floras influencing fauna evolution. Brasier has discovered that marine grasses that first appeared 12 to 15 million years ago near Florida were partially responsible for changes in seafloor animal life. Some types of foraminifera began prospering when seagrass first appeared. Other types became extinct. Brasier suggests they were adapted to unstable sediments; the seagrass stabilized the sediments, and the animals died out.