biological sciences

Gathered at the 22nd annual meeting of the American Institute of Biological Sciences last week in Fort Collins, Colo.

Crude oil spills and phytoplankton

Increasing concern about crude oil spills both in the oceans and in fresh waters has prompted Dr. T. C. Hutchinson of the University of Toronto to examine the effects of crude oil on phytoplankton. He simulated oil spills on cylinders sunk in a pond at the side of Lake Huron in September 1970. Although the oil was dissipated somewhat by harsh winter snow and ice, there was still a considerable amount of oil in the cylinders by spring 1971. Of the phytoplankton which burgeoned in the cylinders at that time, Dr. Hutchinson found several unexpected results.

One was that the oil caused only a minor reduction in oxygen content in the plants. Another was that some phytoplankton species were stimulated by the oil, while others were inhibited. Even small amounts of oil may be toxic to the plants, he reports, and toxicity seems to relate to acidity and sulfur content of the oil.

Dr. Hutchinson then tested growth of various phytoplankton species in the presence of different concentrations of oil. Growth of some species was inhibited, growth of others was not. Even within one species certain cells were found to resist the oil's growth-retarding effects.

Herbicides and saltwater algae

Beginning with 2,4-D studies during World War II and in subsequent years, especially the past four, extensive information has been gathered on the effects of herbicides and insecticides on lower aquatic animals. Little is known, however, about herbicides' effects on saltwater algae. Dr. Gerald Walsh of the Environmental Protection Agency in Gulf Breeze, Fla., decided to take a first hard look at herbicides' effects on the saltwater plants.

His results confirm that the widely used urea and triazine herbicides inhibit photosynthesis and growth of saltwater algae by preventing the plants from properly using solar energy. (Higher energy bonds in the plants were dissipated as fluorescence rather than used by the plants as energy.)

The results are important because herbicide usage around the world has even outpaced widening insecticide applications during the past eight years. Knowing how herbicides act on algae is crucial not only for selectively destroying the plants when designing recreation waters but also for protecting plants where desired. The effects of herbicide-treated algae on animals that feed off them are not known. In the next few weeks Dana Beth Tyler, a colleague of Dr. Walsh, will start feeding herbicide-treated algae to invertebrates to determine the effects on their reproductive capacity.

Success of the snake

Most reptiles have climbed the evolutionary ladder with limbs, but the snake has come up the hard way—limbless. And his success isn't exactly due to his scaring off his competitors, Dr. James Waters of Humboldt State College in Arcata, Calif., has found.

Basic physical or mechanical laws explain the snake's evolutionary survival, the California biologist reports. Snakes have considerably more vertebrae than their reptilian relatives with legs. These vertebrae are also shorter and wider, which allows quick lateral undulation through grass and over rough and precipitous terrain. Increased rigidity of the spinal column also means more resistance to stress from lateral pushes, as do more muscles per body length. The snake's neural spine, to which its back muscles attach, is also raised, giving these muscles more leverage.

Fecal waste and waterways

Most sewage treatment in the United States is primary, which means that only the rough stuff is cleaned up from rivers, streams and lakes. Thus the Environmental Protection Agency is now encouraging local governments (with Federal monetary incentives), and industries, to provide secondary sewage treatment. To help local governments and industries pinpoint the source and concentration of finer excrement in waterways for a secondary cleanup, Dr. Henry Tabak and his research team at the Environmental Protection Agency in Cincinnati have devised a sensitive marker to be used along with the classical bacterial counts from water samples.

The marker is coprostanol, one of the sterols present in human and large animal excrement. Dr. Tabak and his team found it was a sensitive indication of the source and concentration of finer fecal wastes after sampling 57 points along the Mississippi, Missouri, Ohio and North Platte Rivers. The marker should prove especially useful, Dr. Tabak reports, where industrial outfalls destroy bacteria that usually indicate the presence of excrement in water.

Promising new disinfectant

Commonly used antimicrobial agents aren't altogether satisfactory. Ammonium compounds used in surgery scrubs lose some of their effectiveness in hard water. There is concern that phenols, widely used as disinfectants in homes and to control slime in water towers, are polluting waters and rivers. Now that mercury is a dirty word in ecology circles, mercury antimicrobials are also suspect.

Thus Dr. William Cannon of the Eli Lilly & Co. in Greenfield, Ind., has come up with a new kind of antimicrobial—oxiodinium (tricyclic polyvalent organoiodine) compounds. The oxiodiniums resemble iodonium compounds both chemically and in antimicrobial activity, but the former are far more stable. The oxiodiniums, Dr. Cannon found, are also effective against bacteria, fungi, algae and yeast. They stand up in the presence of soaps and detergents and in large organic wash loads, which commercial disinfectants don't always do.

Dr. Cannon foresees use of the oxiodiniums in homes, poultry houses and especially in hospitals where staphylococcus infection is rampant, provided Eli Lilly decides to see the compounds through the high costs of development and stringent Food and Drug Administration new drug tests.