

## Red tide kills with toxins

Both Florida and Southern California sometimes experience a "red tide," swarms of dinoflagellate algae in seawater that can turn the water dark brown. Fish kills sometimes result.

It had been recognized that the organism involved in the Florida red tide, *Gymnodinium breve*, killed by means of a powerful neurotoxin. But it had been thought that the California organism, *Gonyaulax polyhedra*, caused fish deaths by the more usual oxygen depletion route; decay of dead algae raises biological oxygen demand and thus lowers dissolved oxygen levels to the point where some species of fish are asphyxiated.

A team of researchers at the University of Southern California's Allan Hancock Foundation, working under a sea grant, have shown that the California fish kills—usually far less severe than the Florida ones—also result from a toxin, although perhaps not the same one that causes the Florida deaths. The USC researchers have isolated the material in a gross form and demonstrated its toxicity. The algae release the material when they die, unlike the Florida organisms which release toxin while still alive.

The next step in the research, says Dr. Zei Paster of Tel Aviv University, one of the USC researchers, is to correlate the California red tide—which comes every two to three years—with factors such as water temperature and amounts of organic runoff from coastal mountains and cities. He says it is conceivable that man-contaminated runoff may play a role, but there is no evidence as yet.

Although the Florida toxin has been isolated in fairly pure form, Dr. Paster says neither toxin has been chemically analyzed or identified with precision. The Florida toxin appears to be a material of low molecular weight that blocks nerve conduction in vertebrates.

## DDT replacements

The major reason environmentalists oppose continued use of large amounts of DDT is that the water-insoluble metabolites of the insecticide tend to be concentrated in fatty tissues of animals up the food chain. Large predators at the top of the food chain—perhaps including humans—accumulate concentrations large enough to interfere with reproduction.

Researchers at the University of Illinois at Urbana-Champaign say they have found biodegradable analogues of DDT persistent enough to do the insecticidal job but which soon are metabolized into harmless water-soluble compounds not stored in fatty tissues.

The Aug. 2 CHEMICAL AND ENGINEERING NEWS reports on the five-year search for the analogues carried out by Drs. Robert L. Metcalf, Inder Kapoor and Asha Hirwe.

Common to the compounds discovered is replacement of DDT's *p*-chloro-phenyl groups with other phenyls to produce asymmetric molecules. Dr. Kapoor says two of the analogues are especially promising. They are more selective than DDT but are as toxic to flies and mosquitoes as DDT.

Dr. Metcalf says the new compounds are converted by enzymes to water-soluble metabolites. The metabolites are excreted instead of being stored in tissues.

Companies are now negotiating for rights to produce

the new compounds. Dr. Kapoor says existing DDT plants should require only small changes to manufacture the analogues, which are synthesized by a condensation process similar to that used for making DDT.

The University of Illinois work was done under a Rockefeller Foundation grant.

## Should utilities pay R&D costs?

Philip Sporn is one of the best-known names in electric utility circles. Now a consultant, Sporn is author of *Integrated Power Systems*, regarded as a pioneer work in the theory of integrating thermoelectric and hydroelectric facilities into large grid systems. His theoretical proposals have since been put into practice with great success. He is a former executive of an investor-owned utility.

Writing in the July NUCLEAR INDUSTRY, Sporn proposes that electric utility systems devote about one percent of their gross revenues toward research and development into new power generation techniques and pollution abatement. The figure would come to about \$200 million a year.

In the case of the liquid metal fast breeder reactor (LMFBR), Sporn proposes that utilities contribute 50 percent of R&D costs, the Federal Government 25 percent and electric equipment manufacturers 25 percent.

"... Our electric utility industry—public and private—," says Sporn, "is under a mandate to supply our society with all the electric energy it needs. . . . The utility industry has not focused sharply enough on the [R&D] implications of this commitment."

Other R&D projects that Sporn suggests be funded by the industry are fusion power, new transmission systems using such techniques as cryogenic superconductivity, magnetohydrodynamics and pollution-free power production from both nuclear and fossil fuels.

## Farm runoff is major pollutant

A major index of water pollution is biological oxygen demand (BOD). BOD is raised when organic materials in water require oxygen for decay; in severe cases this causes fish kills because of oxygen deprivation, and consequently upsets the ecological balance.

Dr. Douglas Wallace of the University of Iowa used system analysis techniques to study 2,950 square miles of the Iowa River to determine whether municipal or agricultural wastes were the largest contributors to BOD in the river. His conclusion: Agricultural wastes by far make the larger contribution to pollution of the river.

Dr. Wallace did the study as his doctoral thesis. In it, he says farm runoffs during rainfall cause "serious depressions in dissolved oxygen levels in the . . . river," but the effects of municipal and industrial wastes are "negligible."

The farm runoff affects reaches of river as long as 50 miles for periods up to 24 hours, "sufficient duration to harm aquatic life," he says.

Dr. Wallace used data gathered by other researchers and by Federal agencies, as well as his own. Such considerations as rainfall, geophysical characteristics of the basin and agricultural land uses were fed into a computer to produce his results.