environment

Safe PCB's possible?

Polychlorinated biphenyls (PCB's) are widely used industrial compounds that have caused increasing concern to scientists because of their toxicological similarity to chlorinated hydrocarbon pesticides and their persistence in nature. The major manufacturer of PCB's in the United States has stringently curtailed their use, but foreign use continues.

A University of California, Riverside, researcher says it is possible to alter PCB's chemically so they will be biodegradable and thus not be persistent in nature. But he adds that more research will have to be done to determine if the altered PCB's are commercially useful and otherwise desirable.

Microbiologist Maqsud Ahmed says biodegradation of PCB's depends on the position and numbers of chlorine atoms in a PCB molecule. Reporting at the American Society for Microbiology annual meeting in Philadelphia, Ahmed stated that he and D. D. Focht determined that pure cultures of bacteria isolated from sewage are capable of breaking down unsubstituted biphenyl and monochlorobiphenyl molecules by attacking at a particular site of the molecule. If the compound is altered by placing a chlorine atom at the site, however, the bacteria no longer can degrade the compound.

Further research will aim at determining biodegradability by the bacteria of a number of PCB molecules with different chlorine atom configurations.

Rural air pollution

The Environmental Protection Agency considers one milligram per cubic meter of urban particulate air pollution severe. Two Kansas State University researchers say that the level from dust storms in Midwestern rural areas goes as high as 15 milligrams. The high levels occur for as many as 423 hours annually at one research point, Goodland, Kans.

The dust levels are clearly correlated with farming. In Glasgow, Mont., where the researchers say there is little cultivated land in relation to grazing land, there was little dust. But in Lubbock, Texas, where the surrounding area is heavily cultivated, there were 47.5 days annually of high levels.

The average level of the agricultural dust at the Midwestern research sites during dust storms was 4.85 milligrams per cubic meter. Data were from the 1950's, a period of drought, and the two researchers, Lawrence Hagen and Neil P. Woodruff, are now looking at 1960's data. The agricultural particulates are larger than urban ones, and likely differ in many other ways. But the researchers say their findings may justify imposing limits under air pollution laws.

Substitute GNW for GNP

Sicco S. Mansholt, the new president of the Commission of the European Communities, says overemphasis on a growing gross national product is "diabolical" and should be replaced with a new concept, "gross national welfare."

He says Europe must take the lead in worldwide action for pollution control, population limitation and the bettering of human life. The United States, faced with domestic political pressures, cannot carry the burden alone, he emphasizes.

natural sciences

The real thirst quencher

Cold water really does quench thirst faster than warm water, but the body may not get as much water as it needs. There is a lag between the time when enough water is consumed and the time when extracellular fluid reaches normal levels (hydration). To prevent excess intake, some mechanism must anticipate hydration and signal the organism to stop drinking.

Gregory Kapatos and Richard M. Gold of the State University of New York at Cortland deprived rats of water for 23.5 hours and then allowed them to drink at will for half an hour. Water temperature was varied from 12 degrees C. to 48 degrees C. They found that the amount of water consumed by the rats increased with temperature to a peak at 36 degrees, the body temperature of rats, and then declined as temperature approached pain thresholds. The researchers suggest in the May 12 SCIENCE that rats drink less cool water because cooling of the tongue signals satiation. Evolution apparently favored a temperature-based water-intake regulation, say the researchers; in wild animals and primitive man water needs correlate with the temperature of the environment.

Trout, heat and ATP

Many species of fish are sensitive to temperature changes. Thermal pollution that raises water temperature by only a few degrees may, for example, disrupt the migratory behavior of exposed fish. The Environmental Protection Agency has recommended that heat added to streams should not raise their temperature more than 2.8 degrees C., and suggests that migration of salmonids would not be affected by temperatures 20 degrees C. or lower.

From studies of steelhead trout, W. S. Zaugg, B. L. Adams and L. R. McLain of the Western Fish Nutrition Laboratory of the Bureau of Sport Fisheries and Wildlife in Washington conclude that those temperature limits are much too high. In the spring, young trout spawned in the Columbia River undergo adaptive biochemical and physiological changes and migrate seaward. The reseachers report in the April 28 SCIENCE that one of these changes, an increase in adenosine triphosphatase activity, is prevented or reversed if fish are exposed to water above 12 degrees C. Fish with diminished adenosine triphosphatase activity die in seawater.

Homing pigeons and the lagena

How a pigeon released in alien territory finds its way home is unknown, but it has been suggested that either of two organs, the lagena and the cochlea, may aid navigation by sensing changes in atmospheric pressure. The function of the lagena, a well-developed sense organ in the inner ear of birds, is unknown.

Hans G. Wallraff of the Max-Planck Institute for Behavioral Physiology in Seewiesen, Germany, removed both cochleae and lagenae from 14 homing pigeons, paired them with normal birds and released them at two locations 151 kilometers and 159 kilometers from the loft. In both cases, the operated pigeons performed as well in finding the loft as did control pigeons. Wallraff concludes in the April 19 NATURE NEW BIOLOGY that whatever the function of the lagena is, it does not seem to be essential to homing.