Chemistry

UN panel finds some signs of yellow rain

U.S. charges of Soviet or Soviet-assisted chemical warfare against resistance forces in Southeast Asia and Afghanistan received only lukewarm support in a recent United Nations report. The report was prepared by a special four-member team that the UN assembled two years ago to investigate the U.S. government's allegations that a Soviet-supplied fungal toxin, dubbed "yellow rain," is being used against insurgents in Laos, Afghanistan and Kampuchea (SN: 10/17/81, p. 250; 12/4/82, p. 358).

The team—led by Major General Esmat A. Ezz of the Egyptian Armed Forces Scientific Research Branch — reviewed reports submitted by the United States and Canada and visited Thailand and Pakistan. However, Ezz and colleagues reported, they never were able to proceed to any alleged sites of chemical attack. They did receive presumed contaminated foliage samples from various resistance fighters, but "in most cases, no presence of chemical warfare agents beyond the detection limits of the analytical methods used could be demonstrated." On the other hand, the UN team found "significant" the presence of synthetic substances such as polyethylene glycol and lauryl sulfate in yellow powder samples collected in Laos.

The team concluded that it could not prove allegations of chemical arms use, and it could not "disregard the circumstantial evidence suggestive of the possible use of some sort of toxic chemical substance in some instances."

Olin agrees to DDT cleanup

The Environmental Protection Agency and Olin Corp. have just resolved four lawsuits stemming from the former DDT-manufacturer's pollution of river water near the Redstone Arsenal in Alabama. Though details are being negotiated, Olin has agreed to clean up residues from 837 tons of the insecticide that entered a branch of the Tennessee River during the 23 years that Olin (and before it, the Calabama Chemical Co.) produced it locally. (DDT use was banned in 1972.) Cleanup must bring DDT levels in fish to 5 parts per million within 10 years. Olin will also pay $19 million to compensate nearly 1,000 DDT-contamination victims near Triana, Ala. (SN: 8/9/80, p. 88), and $5 million for health-care monitoring of humans living downstream of the source of massive DDT contamination.

Chemistry capsules

- Six months after the Soviet government promised her an exit visa, chemist Tatyana Lozansky and her daughter finally were allowed to emigrate to the United States to join her husband Edward, who teaches at American and George Mason Universities in the Washington, D.C., area (SN: 5/15/82, p. 325; 7/24/82, p. 58). The plight of the Lozanskys — who had been separated for six years — last year drew several statements of protest from the American Chemical Society.
- Prenatal zinc deficiency in mice impairs immune function later in life, Richard S. Beach and colleagues of the University of California at Davis reported in SCIENCE (Vol. 218, No. 4571). Beach and associates fed pregnant mice a diet moderately deficient in zinc from day 7 of the pregnancy until term. "Offspring of these mice showed depressed immune function through 6 months of age," the researchers wrote. Moreover, they found, second and third generations — which were fed a normal diet — continued to show signs of impaired immunological function. "This study has important implications for public health and human welfare," Beach and cohorts stated, "as the consequences of fetal impoverishment may persist despite generations of nutritional supplementation."

The main dietary source of zinc—which is an essential part of certain enzymes, the protein molecules that aid biochemical processes in the body—is meat (SN: 4/17/82, p. 262).

Earth Sciences

Identifying mid-ocean sand hazards

Ever since the spectacular collapse of several mid-ocean oil drilling rigs in recent years, engineers have been trying to learn how to avoid unstable areas of the ocean floor where rigs might collapse. Pedro DeAlba of the University of New Hampshire believes he has found a way of identifying unsafe ocean bottom sediments. Rigs sometimes collapse because the unconsolidated sands of the ocean floor liquefy during an earthquake or intense wave action. The energy of the quake forces sand grains closer together, causing the pressure of water between sand grains to rise. At the same time, the pressure the grains exert on each other falls, the grains are forced apart, and anything on top of them collapses.

DeAlba is trying to determine which sands are more prone to liquefaction by measuring the velocities of acoustic waves traveling through the sand. By studying laboratory-prepared samples, DeAlba has learned that the velocities, or acoustic signatures, depend on the composition and packing (whether they were tamped or poured into a sample tube) of the sand. He subjected the samples to forces simulating an earthquake to determine at what point the sample liquefied. DeAlba is now modifying a device that samples ocean bottom sediments to measure sand velocities in the field. Eventually, he hopes to determine liquefaction potential by direct measurement.

A horizontal oil drill

Petroleum engineers may soon be digging with drills that travel horizontally through the ground. Advanced Drilling Corp. in Palo Alto, Calif., is developing and testing a drill that could angle into the ground from a stationary platform, and even move horizontally through rock. The drill, invented by Robert Horstmeyer, consists of an electric motor, a hydraulic pump, an anchoring system and the drill bit. The anchoring system grips the side of the hole as the drill penetrates the ground. The hydraulic pump then pushes the whole assembly down and the anchor lets go of the sides of the wall.

"One of the main benefits of the tool is the ability to drill horizontally," says Horstmeyer. "Nobody's ever been able to do that cheaply." Since most geological formations lie horizontally, he adds, companies could recover more oil from a formation by burrowing straight along it. The drill will also include an electronic sensing device that will send back information about the rocks in the borehole as the drill passes through them. Horstmeyer and his associates have built a prototype that they plan to test in shallow California wells in the coming months.

Aqueous foams for geothermal energy

Drilling for underground steam reservoirs can be a tricky process. The fluids that carry particles away from a drill can ruin a geothermal reservoir by clogging the reservoir's steam-bearing porous rocks. Researchers at Sandia National Laboratories in Albuquerque, N.M., have been developing new drilling fluids — aqueous foams that can withstand a geothermal source's high temperatures without overly contaminating it. The foams are a mixture of water, gas and an organic surfactant — surface active chemicals that are also used in dishwashing liquid and detergents to make them foam up.

"[The foam's] primary application is in underpressured formations," says Peter Rand of Sandia's Physical Properties of Polymers Division. An underpressured formation, he explains, is one in which "if we filled up a drill column with water, it would drain away."

Rand has identified several surfactants that produce a stable foam at high temperatures. The foams that they have produced have low densities, which helps reduce the damage done to steam circulation from the invading drill hole fluids.