environment

Cold-flowing oil

One of the major hazards of the proposed Trans-Alaska pipeline results from the need to heat the oil to about 180 degrees F. to keep it fluid in the arctic temperatures. The heat threatens to thaw permafrost and cause erosion unless difficult problems of insulation can be overcome.

Experiments by a Stanford University petroleum engineer, Sullivan Marsden, indicate that oil could be piped in arctic climes at around 20 to 30 degrees F. if it were emulsified with brine. In fact, pipe would have to be refrigerated to cope with heat caused by the friction of the emulsion moving through the pipeline.

He used non-ionic polyethylene oxide derivatives as emulsifying agents to create an oil-in-water emulsion with up to 70 percent petroleum content. The emulsion can be broken, and oil and brine separated, by heating. The emulsifying agent stays in the petroleum and thus the brine poses no water-quality problem in disposal.

There is additional cost over conventional methods, of course, but Marsden believes it would not be excessive. He says Alyeska, the Alaska pipeline consortium, does not appear to be interested.

Carbon monoxide from plants

The study of the sources and sinks for ambient carbon monoxide is complex. Earlier it was assumed that internal-combustion engines were the major source of atmospheric CO and that the oceans were the major sink. The first assumption has been revealed as only partly correct and the second as mostly incorrect.

Now the Coordinating Research Council reports that Argonne National Laboratory scientists it commissioned to study organic sources of CO have discovered that plant life—including marine algae—is a major source. The bulk of the CO from plants is generated from their chlorophyll when they die and decay, but certain kinds of freshwater algae produce CO while alive and healthy.

Henry L. Crespi, Argonne's project scientist, says the decaying cuttings from an acre of mowed lawn produce about the same amount of CO as driving a mile in a large American car without emission controls.

Living pollution monitors

In efforts to arrive at pollution standards, scientists have tried to determine the amounts of various pollutants that might be harmful to living organisms, including man. A unique twist to this approach may provide a way to determine when ambient pollutants have gone too high in any given aquatic environment.

Herpetologist F. Harvey Pough of Cornell University says embryonic frogs, newts, salamanders and toads may be uniquely valuable in studying the effects of pollution. These animals have a high sensitivity to small environmental changes. The clear, gelatinous eggs of amphibians, Pough says, can provide ideal environmental signals because embryonic irregularities are easily perceived by trained observers.

So far, says Pough, he has determined that some pollutant acids curtail hatching, while others do not. He is now attempting to establish baselines of an ideal environment for the amphibians as correlated with ideal embryo condition.

natural sciences

Hummingbird efficiency

Hummingbirds may be speedy, but are they efficient? Larry L. Wolf and F. Reed Hainsworth of Syracuse University and F. Gary Stiles of the American Museum of Natural History have calculated the amounts of energy three species of hummingbird expend in extracting nectar from three flower species. By comparing these results with the energy value or calorie concentration of each nectar, they were able to judge the efficiency of each bird at each flower.

They report in the June 23 SCIENCE that a given hummingbird species is more efficient at extracting nectar from some flowers than from others; conversely, at a given flower, some birds were more efficient than others. If flower species are equally available, a given hummingbird species would thus tend to prefer those where it gets the most for its efforts. The biologists conclude that flowers dependent on hummingbirds for pollination would evolve characteristics that would make it more profitable for certain hummingbirds to visit them repeatedly.

Rare observations of plankton

Little is known about some species of plankton. Because of their extreme fragility only a few badly damaged specimens have been collected. In the June 16 SCIENCE, Ronald W. Gilmer of the University of California at Davis describes field observations of two such species, *Gleba cordata* and *Corolla spectabilis*, in the Florida current west of Bimini.

He discovered that these plankton employ a novel feeding technique. Like deep-sea spiders, they secrete free-floating mucus webs about two meters in diameter in which small phytoplankton and zooplankton become caught. The webs are then drawn toward lateral grooves in the feeding animal's proboscis where they are consolidated into a mucus string and pulled through the mouth.

Contrary to a previous report, says Gilmer, both *Gleba* and *Corolla* are very rapid swimmers and could actively avoid the nets used in traditional sampling programs. He believes that information such as he reports "could only have been obtained by a diver making direct observations of live, undisturbed animals in their natural habitat."

Ion levels and satiation

Evidence is accumulating that the ratio of certain ions in the brain may determine a "set point" to regulate hunger and body weight. Four neuropsychologists at Purdue University, R. D. Myers, S. A. Bender, M. K. Krstić and P. D. Brophy, found that an excess of calcium ions in the cerebrum of a rat that had already eaten to satiation induced it to resume eating voraciously. The magnitude of the response depended on the concentration of ions injected.

To determine if the calcium acts by releasing transmitters in the central nervous system or if the feeding response is mediated by adrenalin, the researchers administered blocking agents for adrenalin and neurotransmitters. The effects of excess calcium were the same. The mechanism governing the set point appears to be an independent ionic one, they conclude in the June 9 SCIENCE.