

Science at Stockholm: A worldwide Earthwatch

Earthwatch, a proposed worldwide environmental monitoring system, has caused no controversy at the United Nations Conference on the Human Environment in Stockholm. The need for such a system, which will tell mankind with precision just where the environment is going, appears to be well recognized. The only disagreement is over the funding of the system.

Earthwatch was devised by the conference secretariat with the advice of many scientists, including members of the U.S. Study of Critical Environmental Problems (SCEP) and other such groups. The conference gave the plan overwhelming approval.

Some of the features of the proposed system:

- Ten baseline stations in representative remote areas, ranging from tundra to desert and jungle. The stations would monitor worldwide environmental changes, uniquely observable from stations where there is no local pollution. They would also do baseline studies of local ecosystems—perhaps on the order of the International Biological Program biome studies—to produce data on systems not yet affected by man.

- More than 100 stations for monitoring regional air quality. The evidence grows that there are three basic categories of air pollution mankind must deal with: the local kind, mostly in urban areas; the regional (and often international) kind, which can average as much as half the urban levels; and the worldwide kind.

- Water-borne stations, including undersea habitats and perhaps submarines, to produce baseline data on aquatic and marine ecosystems, as well as to monitor changes in these systems wrought by man's activities.

- Research centers and biological stations—also perhaps comparable to some of the IBP biomes—to monitor and analyze changes in soils and in plant and animal life.

- A system for monitoring food contamination by chemicals or pathogens.

In a related separate action, the conference approved a long-urged (by SCEP and others) move: An international registry for chemicals, so that amounts, use and transfer of toxic materials can be internationally monitored.

In another, more diffuse, scientific area, the thesis of *The Limits to Growth* and "Blueprint for Survival"—documents which claim mankind must halt economic development before it results in a tailspin caused by pollution, declin-

ing food and depletion of nonrenewable resources—was hotly argued.

The view that tended to prevail was the in-between one expressed by Canada's Maurice F. Strong, organizer of the conference, and World Bank President Robert S. McNamara. Strong and McNamara said economic development cannot be halted without dire consequences but that there should be a major qualitative shift to kinds of development that meet real human needs and at the same time have minimal impact



on the local and world environment.

In the area of natural resources, delegates passed resolutions on the preservation of whales, forests, wildlife and water. But the nonrenewable resources of the kind discussed in *The Limits to Growth*—mainly minerals and fuels—were little mentioned, at least in terms that recognized the perils of depletion. For instance, there appeared to be a sanguine acceptance of the need for huge numbers of nuclear power plants as coal and oil resources decrease, but little recognition of the menace of the thermal pollution they cause. In this as in many other areas, the assumption seemed to be that technology would solve all the problems.

It appeared there would be no agreement on proscription of ocean dumping of toxic or otherwise harmful materials. Maritime nations meeting before the conference were unable to agree on the terms of the proscriptions. Much of the progress at the meeting had taken place earlier, and was merely reported at Stockholm. British scientists, for instance, reported major gains in development of viral agents against insect pests. The major scientific gain at the conference itself appeared to be the initiation of Earthwatch, and this is a significant gain. But a scientifically meaningful deceleration of environmental principles seemed unlikely to materialize, as Chinese delegates demanded a highly political, anti-West, statement.

Politics at Stockholm: National foot-dragging

Important gains for scientific understanding of environmental problems were made at the UN Conference on the Human Environment in Stockholm. But many of the gains require political action to turn them into substance, and the world's leading industrial power, the United States, appeared to be dragging its feet as far as meaningful political reforms are concerned. Although the U.S. delegates often found themselves alone in their predetermined positions, whether the decisions of the conference will have any teeth without U.S. support is still moot.

Britain, Canada and Japan called for major new aid programs by the industrialized nations to help poor nations with nonpolluting kinds of economic development and with abatement of already existing pollution. Buichi Oishi, the Japanese delegate, went so far as to label Japan's phenomenal postwar industrial growth as "tragic." He called for industrial nations to "help the developing states so as to prevent them from fol-

lowing the path of environmental destruction that Japan has trodden."

But chief U.S. delegate Russell Train, acting on apparently inflexible instructions, was adamant in his opposition to any formula for increasing aid to the poor nations. He was even opposed to compensation to poor nations that had suffered environmental and economic loss due to the activities of their richer neighbors. An example is the damage to Peru's fisheries from mercury contamination which originated in the industrial nations. But the conference passed such a compensation resolution over U.S. objection. If the resolution became international law, Peru, for instance, could be compensated if it lost U.S. markets for its tuna because mercury levels exceed Food and Drug Administration guidelines.

The United States was equally adamant in opposing more than an \$8 million annual expenditure as its contribution to a UN environmental agency. The conference secretariat estimates a global monitoring system under such an agency will cost \$164 million. The \$8 million a year offered by the United States would be the U.S. proportionate share of an amount about two-thirds less than called for by the secretariat.

But it was on the issues of poor versus rich nations that the United States found itself so often in the minority that at one point it appeared U.S. delegates might walk out if a Peoples

Republic of China resolution passed. The Chinese resolution claimed the social causes of the environmental crisis lay primarily in "monopolistic capitalist groups" and the "imperialistic policies of the super powers and their wars."

And the United States came under fire from leaders of developed nations, too. Swedish Premier Olaf Palme, in a statement of rare frankness from a Western nation, termed U.S. devastation of the Vietnamese countryside an envi-

ronmental "outrage." Train suggested it was in bad taste for Palme to introduce such a controversial topic.

In an area where the United States no longer has any direct interest, a U.S. proposal for a 10-year moratorium on commercial whaling won unexpected unanimous approval (with Japan, Brazil and South Africa abstaining). But the same majority that gave such resounding approval to this obviously beneficent U.S. proposal voted against the United States most of the time.

Human cancer viruses: Long haul ahead

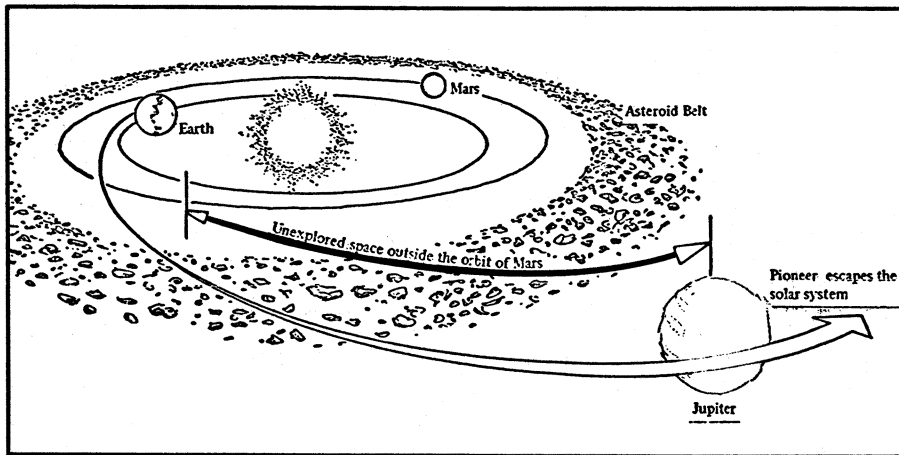
If anything came out of the national symposium on membranes, viruses and immunity sponsored by the Bell Museum of Pathology at the University of Minnesota last week, it is that there is a lot of work ahead for scientists in trying to prove that a virus causes human cancer. As George Todaro and Wade Parks of the National Cancer Institute emphasized, no human candidate tumor virus has yet been confirmed to be the real McCoy. One of the problems is that relatively few laboratories have the expertise to isolate and identify candidate tumor viruses from the tissue of cancer patients, and even these scientists are pushing available techniques to the limits to indirectly show that tumor cells contain viruses closely related to animal tumor viruses.

For example, one of the biochemical techniques being used by Sol Spiegelman's group at Columbia University and by Maurice Green of St. Louis University is hybridization. They have found that DNA synthesized by a mouse tumor virus interacts with RNA from human tumor cells. Assuming that there is a crossing-over of genetic information, one might logically assume that a virus similar to the mouse RNA tumor virus has altered the genetic makeup of the human tumor cells in some manner. But the crossing-over Spiegelman and Green have obtained so far is low, so most cancer scientists are not convinced that this evidence proves that a tumor virus has altered human cancer cells.

Another approach several groups are investigating is a viral antigen competition assay. Viral antigen from animal tumor viruses is put into an animal so that the animal makes antibodies against it. The antigen is then made radioactive. The radioactive antigen and antibodies are mixed with a candidate human tumor virus. If the candidate virus competes with the radioactive antigen for the antibody, then one can conclude that the human virus is closely related to the animal tumor virus.

But neither hybridization nor immunologic detection of viral antigens, Todaro and Parks concur, will prove that a human virus is really a tumor virus in natural cancer. Todaro declared at the symposium that the strongest proof that a virus transforms a normal cell would be to detect some new messenger RNA in a cell that hybridizes with DNA made from viral RNA. Such evidence would strongly suggest that the DNA form of the virus in the cell, the m-RNA and, in turn, viral proteins, are directly involved in transforming cells to tumor cells. Todaro says he and some other researchers are now working in this direction. □

Pioneer 10: Hoping against a hit



Pioneer 10 passes the orbit of Mars and prepares to enter unknown territory.

Pioneer 10 was launched March 2 on a flight to Jupiter (SN: 3/11/72, p. 167). It has now survived the perils of the "Great Galactic Ghoul" and is headed toward its next big test—the asteroid belt. (The region scientists call the "Great Galactic Ghoul" is just inside the orbit of Mars. Several spacecraft have encountered difficulties in this region believed to be from meteoroid hits.)

The craft, traveling 120,000 kilometers per hour, will enter the asteroid belt July 15 when it is 299 million kilometers from the sun. If the amount of cosmic dust already encountered by the craft is any indication of what it will see inside the belt, Pioneer 10 may be hit more often than had been expected. "We really don't know what we might see inside the belt," says Robert K. Soberman of the General Electric Co. Soberman is in charge of "Sisyphus" an array of four meteoroid/asteroid telescopes aboard (SN: 11/13/71, p. 330). The instruments have recorded from two to ten times more dust than he had expected. The particles are about 10 times brighter than expected and traveling about 16,000 kilometers per hour. The largest ones have been millimeters to centimeters in size.

Another instrument aboard records particle hits as small as 10^{-9} grams. It is composed of 234 pressurized cells mounted on the outside of the space-

craft. William H. Kinard of NASA's Langley Research Center has recorded 41 penetrations so far—about five times as many particle hits as predicted.

According to one theory called the Poynting-Robertson effect, dust particles move into the sun in a slow spiral. The smallest particles move very fast, are not caught up by planets and fall into the sun. The largest particles and intermediate-sized particles move slowly enough so that they spend a long time in the orbits of planets and eventually are swept up by them. This is exactly what Pioneer saw as it entered the orbit of Mars in May. Kinard saw no decrease in the number of smaller particles. Soberman, however, did see a decrease in the number of intermediate-sized particles, confirming the theory.

One other theory has been verified by Pioneer 10 data. According to Jerry Weinberg of Dudley Observatory, the gegenschein (SN: 4/4/70, p. 354) is not of terrestrial origin. The gegenschein is a spot of light at the antisolar point believed to be sunlight reflected off debris in space.

Pioneer's chances of surviving the asteroid belt are variously estimated from one chance in 10 for a lethal hit to less than one chance in 100 million of a hit. If it does emerge unscathed after seven months in the 280-million-kilometer-wide belt, it will get to Jupiter Dec. 3, 1973. □