Slow progress worldwide

That man is significantly altering his environment has been suspected for a long time. Lately, however, there have been some strong and startling indications of just how significantly. The revelation earlier this year that Great Lakes fish and North Dakota waterfowl, just to mention two examples, contain probably toxic levels of mercury compounds was one (SN: 9/5, p. 201). Another was the Smithsonian Institution's finding that solar radiation reaching Washington, D.C., was reduced by 16 percent during the last 50 years due to man-made particulates in the atmosphere.

Many scientists are beginning to think these revelations are merely the part of the iceberg that shows. The discovery of mercury in Great Lakes fish, for example, was by Canadian Government scientists and was almost accidental; United States pollution control agencies had been oblivious to the mercury threat for years.

Sorely needed, say many scientists, is a global environmental monitoring network that would precisely register not only what man is doing to his environment but also what changes are occurring naturally. Such a network would establish baselines against which changes—for better or worse—could be measured. Out of such measurements could come rational pollution-control policies. Because of the increasingly worldwide nature of much pollution, the monitoring system would need to be under the control of an international body.

Slow steps are now being taken toward the establishment of such a system. In Rome last week, the General Assembly of the International Biological Program accepted a report from a three-nation IBP team (the United States, Sweden and the Union of Soviet Socialist Republics) providing a basic outline for a global environmental monitoring system. The program has now been turned over to the International Council of Scientific Unions special committee on problems of the environment (SCOPE). The committee, which is set up around the same three-nation structure, will work to collate more detailed reports from teams of scientists from the three countries. Final recommendations will be made to the United Nations Conference on Man and the Environment in Stockholm in 1972.

The fate of the system after the Stockholm conference is unknown. But scientists hope that the studies will finally be over then and that a United Nations agency, or combination of agencies, will be able actually to put a system into operation. The United States delegate to the three-nation group, Dr. W. Frank Blair of the University of Texas, admits that nothing much will happen on the international level until 1972.

In the meantime, of course, there are numerous ongoing monitoring programs. The Bureau of Sport Fisheries and Wildlife has long monitored pesticide levels in animals. The National Air Pollution Control Administration has monitored the more obvious air pollutants such as sulfur oxides and particulates, as well as at least some trace elements. But the monitoring has often been gross and imprecise; for some weeks after the Great Lakes mercury scare, officials were unable to say for certain whether the mercury in the fish was in the form of the highly toxic methyl mercury. The agencies simply did not have the sophisticated equipment necessary for such fine analyses.

But even if the agencies had unlim-

Pollution watching by telescope

While biologists and diplomats struggle with the vast problems involved in setting up a worldwide pollution monitoring system, scientists at the University of Washington in Seattle suggest a novel idea using equipment already in existence: astronomical telescopes.

The university has formed an interdisciplinary group of astronomers, geophysicists, atmospheric scientists and civil engineers called project ASTRA—Astronomical and Space Techniques for Research on the Atmosphere.

"We came to realize," says Dr. Paul W. Hodge, astronomy professor and chairman of ASTRA, "that some of the astronomical techniques for studying extraterrestrial sources can be applied to the earth's atmosphere and can complement and in many cases far surpass in accuracy the existing equipment used in air pollution studies."

The project proposes three methods for the study: high-dispersion spectroscopy, atmospheric extinction measurements and particulate sampling.

Spectroscopy is one of the most powerful tools for analyzing the composition of objects in space (see p. 299). The spectrum of light coming from these sources contains bright and dark lines which vary according to both the source and the environment it passes through, including the earth's atmosphere.

Astronomers have traditionally treated the lines from the earth's atmosphere as annoyances. But if the lines are analyzed, they can be a highly accurate source of information on air pollution molecules.

Thus molecules of carbon dioxide, ozone, carbon monoxide, nitrogen oxide and nitrous oxide can be separated.

The extinction method is another source being used at the university. A paper Dr. Hodge recently submitted to NATURE outlines the results of such a study at Mt. Wilson Observatory above Pasadena, Calif. Archive data and his research shows that between 1910 and 1960 there was a 26 percent loss of light in the ultraviolet and a 10 percent loss in the visual light due to atmospheric constituents.

The third method, particle sampling and analysis, also supplies long-term data for pollution comparisons. For 18 years, Dr. Hodge has been looking for micrometeoritic dust. "Each year we find more and more man-made dust," he says.

By analyzing new data being obtained by astronomers all the time at observatories all over the world and old data stored for over 50 years, a curve-of-growth analysis can be made. "We will be able to check the controversial report of a secular increase in the CO_2 concentration in the atmosphere (SN: 11/15/69, p. 458) by measuring existing plates in observatory archives," he says.

A proposal by ASTRA now being studied by the university administration, prior to request for Federal funding, calls for a telescope to be placed on the university campus to compare urban pollution with data obtained from a 16-inch photoelectric telescope (now at the Rattlesnake Ridge Observatory) to be moved to a new site on Manastash Ridge, in dry, central Washington. The over-all proposals include extraction of all possible data from records of astronomers worldwide; establishment of a center for the accumulation, storage and dissemination of the data and publishing of monthly reports.

"This is an example of the sort of spin-off that comes from basic scientific research that cannot be predicted," says Dr. Russell Drew of the Office of Science and Technology in Washington, D.C. "And a very fortuitous one at that." □

ited funds for personnel and equipment, current levels of scientific knowledge would hamper realistic monitoring in many areas. The threshold versus linear controversy—whether a given toxin causes some damage in the smallest amounts, or no damage until a certain threshold is reached—is still not resolved for many pollutants.

A further difficulty is that scientists often do not know the subtleties of how a given ecosystem works, and thus it is difficult or impossible to measure subtle sublethal effects of pollutants on such a system. The IBP's terrestrial biome studies (SN: 9/5, p. 204) will be of great help in establishing some of these basic parameters, but the studies have just gotten under way. The undersea habitat approach to marine ecosystems developed by Tektite 1 and 2 (SN: 10/3, p. 283) will provide some of the same kinds of parameters for marine environments could.

Establishing baselines poses some difficult problems, too. Since so much pollution now touches even remote areas, it is difficult to learn what these areas were like in their natural state. But there are approaches to this problem, says Dr. Blair: Museum specimens can be analyzed, and locked-up water in glaciers can be studied.

Although the reports of the three nations are not yet public, Dr. Blair indicated some of the general outlines. Baseline stations would be established in more-or-less remote locations, manned by interdisciplinary scientific teams, perhaps using some of the current biome study sites. Also to be established: impact stations near developed areas to measure the effects of industrialization and urbanization. In addition to the effects of pollutants, natural changes—such as genetic alterations—would be studied at the baseline stations.

No clear-cut cost estimates for such a system are available yet. But Dr. Glenn Hilst of the National Academy of Sciences, a member of Dr. Blair's U.S. IBP committee, says monitoring is "definitely feasible on a global scale." He admits, however, that the systems grow more costly as they are narrowed down to precise studies on a national or multinational scale. Both Drs. Hilst and Blair cautiously conceded that existing systems in Western Europe and Japan may be ahead of those in the United States—because, Dr. Hilst says, the crunch on resources came sooner in these more thickly populated areas.

While the international discussions continue, the President's Council on Environmental Quality is working to ready the United States for participation once the worldwide system is established. But the council, in its recent first annual report (SN: 8/15, p. 133) made it clear this country has a long way to go. □

Montreal Children's Hospital

Lead-glazed pot: A killer in Montreal.

LEAD POISONING

Earthenware pitcher hazard

A two-year-old boy died not long ago in Montreal Children's Hospital from an overdose of apple juice and lead. His desperately ill elder brother recovered after five days in the hospital.

A physician in Buffalo was hospitalized with severe intestinal problems. It seems that for some time he had been drinking a little lead with his evening Coke.

None of these victims of lead poisoning had any idea he was ingesting lead. For the Buffalo doctor, the road to chronic lead poisoning began when his son presented him with an earthenware mug made in a university ceramics class. Each night thereafter he unwittingly consumed about 3.2 milligrams of lead, released from the mug's glaze. At that level, the poison worked slowly; it was two years before lead poisoning was diagnosed.

The children in Montreal were poisoned more quickly. Because they liked warm apple juice, their parents kept it on a kitchen shelf in a handcrafted pitcher having a lead glaze. (The parents themselves stored their apple juice in its container in the refrigerator.) It never occurred to them that apple juice, or any other drink with high acidity, might be dissolving the glaze and releasing lead into the juice. When scientists tested the apple juice in the ill-fated pitcher, they discovered lead levels above 1,000 milligrams.

Lead poisoning in North America is generally presumed to be confined to slum children who eat paint off the walls of buildings constructed prior to World War II, at a time when lead was a usual constituent of household paint. This presumption, according to Dr. Michael Klein, may be dangerously false. The flourishing interest in handcrafted pottery, the proliferation of potters clubs and the increasing number of small shops and boutiques that market their wares are three good reasons to fear that chances of exposure to lead are rising, not falling.

After treating the two boys in Montreal, Dr. Klein and his colleagues, particularly Rosalie Namer, herself a potter, examined hand-crafted and commercial earthenware purchased from shops, large and small, in the Montreal area. The results, reported in the Sept. 24 NEW ENGLAND JOURNAL OF MEDICINE, are disconcerting. Testing of 264 earthenware glaze surfaces revealed that 50 percent released sufficient lead to make them unsafe for culinary use. Almost 25 percent released enough lead to cause severe, acute poisoning.

While all of the pieces studied were purchased in Canada, Dr. Klein, who is now at Strong Memorial Hospital in Rochester, N.Y., points out that virtually all of the frits, or raw glazes, used by Canadian potters come from chemical companies in the United States. "Thus," he says, "there is no reason to think the risk is peculiar to Canada." Furthermore, he observes, many potters are under the mistaken impression that the lead in commercially prepared frits is tightly bound to other chemicals and cannot be leached out.

In considering whether it is safe to use pitchers, mugs and the like, it is important to distinguish between earthenware and stoneware. Earthenware, by definition, is made with a lead-based glaze, which will produce a shiny surface to pottery fired at relatively low temperatures—no higher than 2,050 degrees F. By contrast, stoneware is never made with a lead-based glaze and is fired at considerably higher temperatures in larger kilns than earthenware.

"Unfortunately," Dr. Klein comments, "it is next to impossible for anyone but a real expert to tell the difference by merely looking. The only way a customer can know what he is buying is to ask."

Lead poisoning from pottery is nothing new. It was known to the Romans of antiquity, and has been rediscovered periodically by various cultures. In 1723 the Massachusetts Bay Colony forbade rum distillation from leaded stills. Warnings against lead-glazed pottery have even cropped up from time to time in the last decade. As the number of amateur potters soars, it is urgent that the warnings be repeated because, in spite of existing regulations aimed at checking the problem, there is no way any regulations can constitute a sufficient guarantee in an era of mass amateur potting for fun and profit. □