lope postmarked in Sacramento.

An informal survey by *Science* of more than a dozen universities found that most had not instituted any special security precautions, such as mail inspections or x-ray screening. But nearly all had alerted campus mail service employees to watch for suspicious packages and distributed lists to faculty of danger signs to look for in examining packages. In the past, the university bomber has concealed explosives in wooden boxes (from small crates to cigar boxes), a book, and a burlap sack. Two other bombs were in envelopes, one of which claimed to contain a manuscript and the other a notebook. Brigham Young University (BYU) security officials, in a memo to faculty, noted that the bomber usually employed plastic explosives, which would feel like putty in a letter. Because the letter had traveled safely through the postal system, it would not be dangerous to feel it, although BYU stressed that the letter should not opened.

In another of the earlier attacks, the bomber disguised the package to look like a scientific instrument. That bomb, which exploded at the University of California, Berkeley, in 1982, was in a wooden box disguised with dials and gauges. Attached to it was a note that read "Wu—It works! I told you it would—R.V." A handle attached to the box was wired to the bomb. When Berkeley electrical engineering professor Diogenes Angelakos picked it up, it exploded, mangling his hand and wounding him in the chest and forehead. Many of the other bombs were in homemade boxes that had been carefully assembled with polished wood, a feature that the FBI considers the bomber's trademark.

In the absence of any solid clues, research groups began to speculate last week on the bomber's possible motives. Americans for Medical Progress, a group that opposes animal rights terrorism, called for a congressional investigation into "violent hate crimes against researchers." The National Association for Biomedical Research, another animal-research advocacy group, told its members that, while there was no evidence linking the attacks to animal rights activists, the incidents were a reminder that "members of the scientific community can be vulnerable and should remain vigilant."

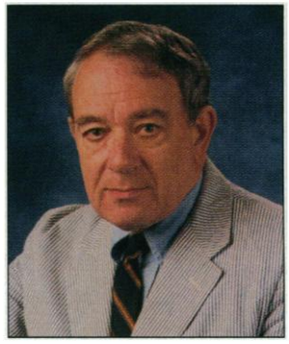
The pattern of the attacks does suggest a bomber with a grudge against science or technology (or their practitioners), according to a 1989 FBI personality analysis. And the grudge may be rooted in personal experience. Based on some of the techniques the bomber has used in the past, including the use of a type of packaging similar to that used by makers of artificial human joints, the FBI is considering the possibility that he may have been, or still is, a lab technician, research assistant, or medical salesman.

–Christopher Anderson

EASTERN EUROPE

Joining Forces to Probe Environment-Health Links

PRAGUE—When Czechoslovakia split into two separate states in January, epidemiologist Vladimir Bencko, of Prague's Charles University, was a year away from completing a major study in a highly polluted district of central Slovakia. For 15 years, he has documented the incidence of several types of cancer in some 140,000 people living near a power plant that burns coal laden with arsenic. But after the so-called Velvet Divorce, his project was nearly orphaned in a reverse custody battle in which both sides tried to give the baby away. Bencko needed only a further $20,000, but that was too much for the new Czech and Slovak health ministries. "The Czech authorities didn't want to pay for it, because it was in Slovakia," he says. "And Slovakia wouldn't pay for it, because...well, I work in Prague."



Prime mover. Conte Institute head Arthur Bloom.

Fortunately, the International Agency for Research on Cancer, based in Lyons, France, stepped in to help complete the project on schedule. But Bencko's problems in obtaining funding are typical of what's happening throughout eastern Europe. Despite widespread evidence of health problems caused by more than 40 years of unrestrained pollution, Europe's impoverished new democracies are unable to release more than paltry sums for environmental health research. "This year my institute received only 65% of last year's budget," says Bencko. And Hungary's total 1993 budget for environmental health research is a minuscule $50,000. Like Bencko, many scientists therefore see collaboration with their Western colleagues—and the influx of funds that this can bring—as the best way to keep their research programs alive.

That's why a meeting* held here in April, which brought together more than 50 scientists from East and West, could be the key to ensuring that important research opportunities don't slip away. The meeting launched the International Scientific Committee on Environmental Health (ISCEH), which aims to pry money from the West to fund environmental research in central and eastern Europe. After all, says Arthur Bloom, a geneticist who heads the Conte Institute for Environmental Health Research in Pittsfield, Massachusetts, and is the driving force behind ISCEH, the results could be as valuable to Western researchers as to those in the East. By studying the pollution blackspots of eastern Europe, he says, it should be possible to resolve some of the uncertainties that make environmental risk assessment a notorious scientific quagmire.

"The situation in this region is analogous to that in Hiroshima after the atomic bomb was dropped," University of Colorado biometrician Philip Archer told the Prague meeting. "There is a window of opportunity to study the health effects on these populations." Ultimately, Bloom says that ISCEH aims to raise some $20 million to launch a network of 10 or more research "centers of excellence" across eastern Europe. With Western research agencies currently short of cash, however, Bloom accepts that this is a distant goal. So in the short term, ISCEH's steering committee of two dozen leading environmental health researchers is putting together a program costing perhaps a few hundred thousand dollars, which it expects to raise from sources such as the March of Dimes Birth Defects Foundation. The Conte Institute, an environmental "think tank" founded by Bloom in 1986, will coordinate and channel grant money to ISCEH if the funding agencies want it to.

The committee's initial priorities include improving east European birth defects registries, and launching a region-wide cancer epidemiology research project in collaboration with Alfred Knudson of the Fox Chase Cancer Center in Philadelphia, which will draw eastern Europe's isolated epidemiologists into a cohesive network. To coordinate the research, and help with fund-raising, Bloom aims by the fall to have opened an ISCEH office in France. And while some of these plans might sound like small potatoes, "there are a lot of basic scientific questions that can be answered in this region, with very modest amounts of money," says Bloom.

Take risk assessment, which still relies heavily on animal testing to evaluate the danger to humans from suspected toxins. Western molecular epidemiologists such as Richard Albertini of the University of Ver-

* Human Health and the Environment in Eastern and Central Europe, April 12-15.

mont, who was at the Prague meeting, are eager to work with scientists in eastern Europe to identify "biomarkers" of genetic damage caused by exposure to chemicals and radiation—such as chromosomal translocations, and subtle alterations in DNA structure. Ultimately, they hope to identify possible risks from pollutants long before they cause disease. But first, they need a better understanding of how the occurrence of biomarkers varies with exposure to pollution.

The industrial heartlands of eastern Europe are an ideal place to study these associations, and East-West collaboration in this field is already showing promise. Columbia University epidemiologist Frederica Perera, for instance, working with scientists from the Polish region of Silesia—an area that suffers from extraordinary pollution levels and has a high cancer death rate—is studying exposure to polycyclic aromatic hydrocarbons, potent carcinogens produced by burning coal. Perera and her colleagues have found that exposure results not only in so-called DNA adducts (covalently bound DNA-carcinogen complexes), but also increases in chromosomal aberrations, and overexpression of the *ras* oncogene, a key indicator of cancer risk. Furthermore, these biomarkers peak during the winter, when pollution levels skyrocket as domestic coal burning increases.

So far, most East-West collaborations in the field are small, ad hoc efforts like Perera's project. But the few major programs that have been initiated—such as the U.S.-Czech Teplice Program (see box)—are getting a glowing report card from participants on both sides. Perhaps the strongest argument for plowing more Western funds into such projects, however, is the benefits that could accrue for the pollution-exposed study populations themselves. With a suite of informative biomarkers, says Bloom, it may be possible to identify particularly susceptible subgroups of the population. "We would then be able to target efforts at human health protection more precisely," he says.

By the same token, Bloom also argues that Western agencies could save money in the long run by diverting modest sums into research over the next few years. In May, at a meeting in Lucerne, Switzerland, environment ministers from 50 countries pledged an initial $30 million in aid for cleanup projects in eastern Europe. But Bloom believes much of this money will be wasted without better data with which to select cleanup sites. "The research must be paramount," he says, to avoid repeating mistakes made in the United States, where cash has been poured into cleansing waste sites "with little evidence that some of them have caused human health effects...I think we would do everyone a favor by making these important studies objective."

–Michael Balter

Michael Balter is a science writer based in Paris.

An Environmental Laboratory

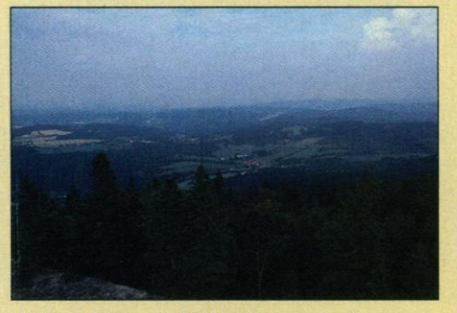
The district of Teplice, at the heart of the Czech Republic's north Bohemia coal belt, is one of the most polluted areas on Earth. In winter, when temperature inversions trap pollutants for days at a time, Teplice's industrial plants turn the air breathed by its 132,000 inhabitants to a smoky gray. Levels of sulfur dioxide often reach six times the World Health Organization's maximum admissible concentration (MAC), while carcinogenic polycyclic aromatic hydrocarbons can exceed 100 times their MAC value.

Small wonder, then, that Teplice has been chosen as the site for an ambitious environmental health research program, linking Czech scientists with experts at the U.S. Environmental Protection Agency (EPA). The aim is to track reproductive, neurobehavioral, and respiratory conditions among Teplice residents and compare them with a control population from the rural district of Prachatice in south Bohemia. On the Czech side, some 80 researchers are participating, while EPA has assigned eight of its scientists to work full-time on the program.

"This is the largest research project on environmental problems ever carried out in the Czech lands," says Radim Sram of the Institute of Experimental Medicine in Prague, who is coordinating the research on the Czech side. He adds that it wouldn't have been possible without the participation of Western scientists. "There are still problems doing good epidemiological studies here," says Sram, "because people are not properly trained.... The involvement of EPA has helped to put the program on a much higher level."

Sram's counterpart at EPA, molecular biologist Joellen Lewtas, notes that the program provides an opportunity to examine hypotheses about pollutant toxicity that have been difficult to test in the United States, because of confounding variables like passive smoking. "If we can confirm that the health effects we think we are seeing at low doses can be extended to higher exposures," says Lewtas, "it will give us more confidence that these effects are real." Lewtas is quick to add, however, that "Czech scientists are full partners in the research," and EPA isn't simply plundering the region for data that will help tackle U.S. environmental health problems.

JOELLEN LEWTAS



Health effects. U.S.-Czech project will compare Teplice *(above)* with rural Prachatice.

Preliminary studies already indicate that Teplice schoolchildren suffer from neurobehavioral deficits. Lewtas and Sram, meanwhile, are correlating pollutant exposure with biomarkers of genetic damage. Although several other studies have similar goals (see main story), Lewtas and Sram are measuring individual pollution exposure for part of the study group, rather than simply correlating biomarker occurrence with local atmospheric measurements of pollution. Individual exposure varies markedly—depending partly on exposure to tobacco smoke—but can be studied using portable "personal exposure monitors" that can be worn for 24 hours at a time.

Yet despite this promising beginning, the Teplice program is in financial trouble. EPA has spent most of its $250,000 allotment for the project, and the Czech government has not released $500,000 it had approved for 1993. "If we don't get this money soon, we will have to stop the project," says Sram. "That would be very sad, because we are just beginning to see some fruits from this collaboration."

–M.B.