AIR POLLUTION

Three Asian Nations Launch Joint Study

SEOUL—Pollution from China's booming industrial northeast has long rained down on its richer neighbors, South Korea and Japan, damaging ecosystems and degrading public health. But scientists in all three countries hope that a 5-year project to measure the extent of the problem will provide critical information to help China clean up its act.

The research, which began last month, is the first of nine projects among the three countries dealing with transboundary pollution from a variety of sources. Others will focus on the effects of water pollution, acid rain, and desertification—which generates the airborne "yellow sand" that clogs Korean lungs—along with ways to meet the CO_2 emissions goals of the Kyoto protocol. They are the outgrowth of agreements struck by the environmental ministers of the three countries, most recently at a February meeting in Beijing (www.temm.org).

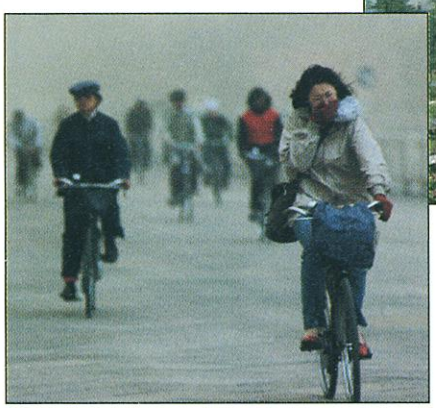
The new initiative will feature computer modeling of the flow of pollutants as well as the compilation of a list of major sources. Prompted by public pressure to deal with the problem, Korea is taking the lead with a promised $6 million next year. Japan's contribution is a modest $200,000 annually for the next 2 years, while China has not yet settled on an amount.

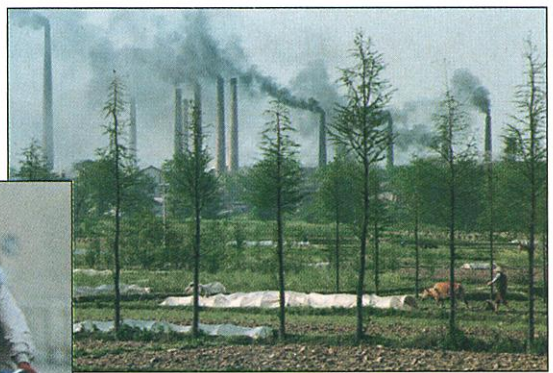
The project is seen as an important extension of Japan's Acid Deposition Monitoring Network in East Asia (EANET), which will soon begin to collect data after a decade spent setting up 38 monitoring sites in 10 countries, from Indonesia to Mongolia. "We expect this [new project] will develop into a regional framework for acid rain," says Eisaku Toda, assistant director of the air pollution control division in Japan's Environmental Ministry.

EANET, which lags 15 to 20 years behind similar tracking in Europe and North America, has been slow to get off the ground due to a limited budget and the difficulty of winning political support. Toda says the current monitoring network—which includes 10 stations in Japan, two in Korea, and nine in China—falls short of what is needed, and that Japan alone should have 40 to 50 stations. "But it's a good start," he says.

For years any type of international cooperation on environmental matters was plagued by political obstacles. Until the mid-1990s China "vehemently denied the existence of such a problem," says Kenneth Wilkening of the Nautilus Institute, a nonprofit organization in Berkeley, California, that works on security and environmental issues throughout Asia. Wilkening, who is organizing a meeting this summer in Seattle to discuss the transport of air pollutants across the Pacific, says that although most of China's pollution remains within its borders, the 5% to 10% that travels abroad can represent a significant part of a neighboring country's load. Depending on which computer model is used, Wilkening says, as much as half of Japan's acid rain could be blown in from China and Korea.

Chinese officials deny erecting any roadblocks to monitoring transboundary pollution. Instead, says a spokesperson for the environmental agency, China was reluctant to join international efforts until it had a better handle on the domestic sources, transmission routes, and impacts of the dirty air. Clean air is now a government priority, he noted, and Chinese cities regularly announce public air quality bulletins and forecasts. The country's emissions of sulfur dioxide and particulates dropped by 7.8% in 1998, he says, thanks to a campaign to reduce emissions in 47 cities hard-hit by acid rain and by the closing of many small, inefficient factories that use high-sulfur coal. "There has been equal and mutually beneficial cooperation between China and Japan and Korea on pollution control and environment management, and we hope to continue such cooperation," the official says.





Clearing the air. New project will model pollution from smokestacks like these in northeast China that darken skies over Korea and Japan.

CREDITS (LEFT TO RIGHT): WORLD RESOURCES INSTITUTE; J. STEVENS/LAWRENCE LIVERMORE NATIONAL LABORATORY

ScienceScope

Counting on NIF The true cost of building the world's largest laser is proving elusive. Earlier this month, Department of Energy (DOE) officials admitted that the cost of building the troubled National Ignition Facility (NIF) at California's Lawrence Livermore National Laboratory would nearly double, to $2.1 billion (*Science*, 5 May, p. 782). This week, however, a leaked government accounting study pegged the cost at $3.6 billion for an instrument (above, with project manager Ed Moses) that will shoot 192 laser beams at a BB-sized target. The experiments are aimed at developing fusion energy and modeling nuclear weapons without actually testing them. Livermore officials, however, say the bigger number includes R&D projects that aren't directly tied to NIF's construction.

The true size of the overrun has implications for other programs. Senator Pete Domenici (R–NM) is vociferously resisting any attempt to rechannel cash from his state's Sandia and Los Alamos labs to NIF. And he will use his power as head of the Senate Energy Committee, which oversees DOE's budget, to block any shift, Domenici vowed to the *Albuquerque Journal*: "It's not going to happen while I'm chairman."

Rat Race The rat will be the next target of publicly funded gene sequencing efforts in the United States, Francis Collins, director of the National Human Genome Research Institute (NHGRI), told his advisory council this week.

Until recently, no researcher would have considered taking on the burden of another mammal's genome while jammed sequencing centers worked through the human and mouse. But high-throughput labs in Massachusetts, Texas, Missouri, and California have added machines and increased their capacity some 10-fold, says Robert Waterston, director of the center at Washington University in St. Louis. Now their output, plus that of Britain's Sanger Centre, is "enough to do a working draft of a mammalian genome in 4 to 5 months," Waterston told the council. As a result, the NHGRI-funded centers want to sequence the rat, mouse, and human genomes in parallel—if NHGRI and the National Heart, Lung, and Blood Institute can carve out funds from the still undecided 2001 budget.

Contributors: Jeffrey Mervis, Pallava Bagla, Andrew Lawler, Constance Holden, David Malakoff, Elizabeth Pennisi

Once the data are collected and analyzed, scientists hope they will point the way to new policies. But even if China is found to be the culprit in most of the airborne pollution, it will probably need help from its neighbors in addressing the problem. "Unfortunately, China is not a rich country," says Park Chul Jin of Korea's National Institute of Environmental Research in Seoul. Instead, Park and others foresee Korea and Japan providing money for technical fixes and other steps aimed at curbing the problem. **–MICHAEL BAKER**

Michael Baker is based in Seoul.

HYPERTENSION

A DASH of Data in The Salt Debate

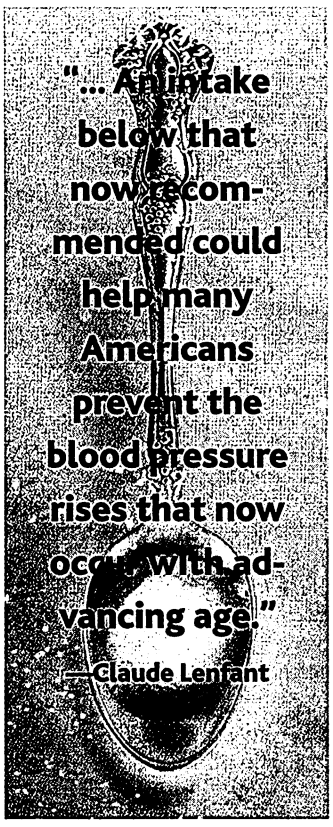
The controversy over salt, blood pressure, and public health has seemed endless and intractable. The National Heart, Lung, and Blood Institute (NHLBI) and the National High Blood Pressure Education Program, among other august bodies, recommend that all individuals, not just those with hypertension, reduce the amount of salt in their diets to lower their blood pressure and improve their health, while a good proportion of the researchers in the field believes such recommendations have not been supported by the data. As a result, an entire field has been mired in acrimony for 4 decades.

On 17 May, Claude Lenfant, director of NHLBI, declared the controversy over. The results of DASH-Sodium, a new NHLBI-funded study to be presented the next day at the annual meeting of the American Society of Hypertension (ASH), had made the health benefits of salt reduction unambiguous, Lenfant said. After the meeting, the controversy showed little sign of abating, however.

DASH stands for Dietary Approaches to Stop Hypertension. DASH-Sodium is the sequel to the original DASH study published in April 1997, which suggested that blood pressure could be reduced dramatically by eating a diet rich in fruits, vegetables, and low-fat dairy products. Salt was not a factor in the original DASH study, which made the blood pressure reductions that much more noteworthy.

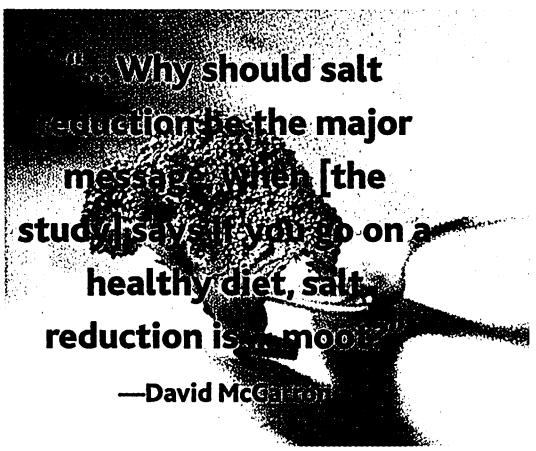
In DASH-Sodium, a collaboration of five institutions, investigators tested both the DASH diet and a control diet, similar to that of the average American, at three levels of salt intake—8 grams a day, which is slightly less than the average American's intake; 6 grams, equivalent to the current government recommendations; and 4 grams. The investigators randomly assigned 412 subjects with either hypertension or high normal blood pressure to either the control diet or the DASH diet for 90 days. They fed them all their meals—assuring that subjects were eating their assigned diets, no more, no less—and changed the sodium level every 30 days.

The results were impressive. The DASH diet alone reduced blood pressure as dramatically as before. And the reductions in blood pressure by decreasing salt, whether on the DASH diet or the control diet, while not quite as impressive, were still substantial. When hypertensives, for instance, went from the high-salt to the low-salt control diet, their systolic blood pressure fell 8.3 millimeters of mercury (mmHg) and diastolic fell 4.4 mmHg (8.3/4.4 mmHg). This drop is comparable to that achieved by blood pressure–reducing drugs. In those with high normal blood pressure, going from high sodium to low sodium on the control diet reduced blood pressure by 5.6/2.8 mmHg, a drop almost five times greater than recent meta-analyses might have predicted. The better part of these blood pressure reductions came when the subjects went from the government-recommended levels of 6 grams of salt a day to the lowest level of 4 grams. "The finding suggests that an intake below that now recommended could help many Americans prevent the blood pressure rises that now occur with advancing age," said Lenfant in a press release.



Protracted controversies, however, can be remarkably resistant to new data, even good data. After hearing the DASH-Sodium results at the ASH meeting, those who were skeptical of the wisdom of recommending that an entire nation eat less salt remained resolutely skeptical. David McCarron, for instance, of the Oregon Health Sciences University in Portland, pointed out that for those with normal blood pressure eating the healthy DASH diet, reducing salt from 8 grams to 4 grams a day made little difference in blood pressure (1.7/1.1 mmHg). "If you are eating the healthy DASH diet and you have normal blood pressure, sodium restriction has almost no effect. ... So why should salt reduction be the major message, when it says if you go on a healthy diet, salt reduction is a moot point?"

A stickier issue speaks to the nature of public health recommendations. The better part of the salt controversy centered not on the size of the blood pressure reductions that could be achieved by eating less salt, but on whether it would improve our health to do so. Over the years, researchers have been unable to demonstrate that reducing salt improves health. The authors of a 1998 comprehensive meta-analysis on salt reduction published in *The Journal of the American Medical Association* concluded that "The optimum solution to the controversy are long-term trials with hard end points, such as stroke, acute myocardial infarction, and survival."



This conclusion was echoed after the ASH meeting by Micky Alderman, a hypertension specialist at Albert Einstein College of Medicine in New York City and a past president of ASH. "They're suggesting as a remedy for 250 million people that they cut sodium intake in a half," says Alderman, "and to do so solely on the basis of showing you can change blood pressure for a 30-day period, without even assessing any other potentially adverse consequences. It seems to me it's a leap of faith."

Although DASH-sodium investigators were much more sanguine about the health benefits of salt reduction, at least one agreed that Alderman's point was reasonable. Biostatistician William Vollmer of the Kaiser Permanente Center for Health Research in Portland told *Science* that he believes DASH-Sodium provides good evidence for recommending lower levels of salt intake. Nonetheless, he added, "it would be nice to see a good, controlled study that shows the long-term effects of a low-sodium diet. The issue has been raised. We can sit here and say it hasn't, or we can do a study that settles it once and for all." **–GARY TAUBES**