or four times larger than that of the flows themselves—too small to encompass all the masses that might be affecting the flows. Nor do they necessarily give an accurate picture of where the galaxies are. "One thing I'm sure of," Bertschinger says, "IRAS galaxies don't trace the mass." Galaxies bright enough in infrared radiation to register on IRAS's sensors are usually young, dusty spirals, and they may not be a good representative of how all galaxies are distributed.

But if both maps are right—and after all they do match in half the sky—then maybe galaxies trace the dark matter only in some parts of the universe and not in others. Some researchers are uncomfortable with such inconsistency. "Why should the universe be that complicated?" asks Davis. But others think it wouldn't be so outlandish. "Maybe galaxy formation is a touch-and-go situation," speculates Dressler, "and things I don't understand could get me twice as many galaxies. Maybe the foam [i.e., the light] isn't directly proportional to the height of the wave [the mass density]. Maybe a little extra sloshing puts twice as much foam on the wave. It's not ridiculous."

Only more data can tell whether that's a real possibility—or whether the bind in which cosmologists seem to find themselves is just an artifact of incomplete maps. So the map makers are pushing onward—Davis' team trying to predict the velocities of fainter and farther galaxies on the IRAS map, Haynes and Courteau analyzing more peculiar velocities in Perseus-Pisces, Willick measuring peculiar velocities at much greater distances, and Dressler reanalyzing known peculiar velocities to test a new distance measure. Until the river and the landscape through which it flows are better known, Faber urges, "don't come to any conclusions about this stuff."

–Ann Finkbeiner

Ann Finkbeiner is a free-lance writer in Baltimore.

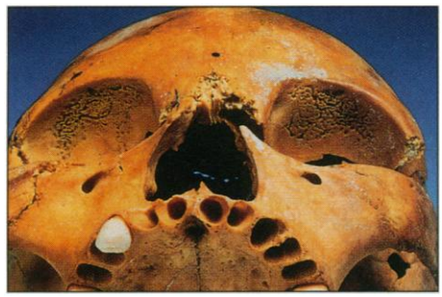
MEETING BRIEFS

The Wide World of Geography Turns in Washington

Geographers from 82 countries convened on 9 to 14 August in Washington, D.C. for the 27th International Geographical Congress. The 2700 participants–double the attendance of the previous congress, held in Sydney, Australia, in 1988–explored their field's full compass, from malnutrition in the ancient world to modern environmental crises.

Tales From the Burial Mound

Dead men tell no tales, but written in their bones are stories of the foods they ate, the diseases they bore, the physical stresses they endured. And sometimes the tales told by these bony remains differ significantly from those in the history texts.



MARK C. GRIFFIN, COURTESY OF CLARK SPENCER LARSEN

The eyes have it. Perforations in the eye sockets reflect porotic hyperostosis, a pathology resulting from iron-deficiency anemia.

At the geography congress this month, 500 years after Columbus' voyage to the New World, archeologists painted a picture of the lives of Pre-Columbian Indians that clashes with popular conceptions of a happy, healthy population in a rural utopia. In fact, researchers now know, many of the New World's original inhabitants led settled, communal lives as maize farmers. And their bones, University of Florida biological anthropologist George Armelagos told his audience, show that with this agricultural lifestyle came malnutrition and a bumper crop of ills ranging from iron-deficiency anemia to bacterial infections.

Armelagos based his contention on an analysis of bones from 595 individuals at the Dickson Mounds burial site in Central Illinois. During the 300-year-long Pre-Columbian agricultural period, Armelagos says, the bones reveal a fourfold increase in iron-deficiency anemia. The tell-tale sign, he says, is an expansion of red blood cell-producing skeletal regions, a pathology known as porotic hyperostosis, dramatically evident as perforations in the eye sockets of skulls. The obvious culprit, says Armelagos, is maize, an iron- and protein-poor, starch-rich crop that constituted up to 50% of the diet of some Indians. Maize decreases iron absorption, he says, and it is "notoriously poor" in zinc, a deficiency that was also evident in chemical analyses of the bones.

Poor nutrition in turn made the population vulnerable to bacterial diseases that also left their signatures on the skeletons Armelagos examined, and the frequency of disease lesions was highest on skeletons with the lowest levels of zinc. Treponemal infections—responsible for skin diseases and nonvenereal syphilis among the Indians—increased from 20% to 73% during the agricultural period.

But is agriculture solely to blame for this sorry picture? Evidence gathered throughout the Americas by Armelagos, Alan Goodman of Hampshire College, and Jerome Rose of the University of Arkansas indicates that agricultural Indians did hunt and gather a variety of foods. They had to rely so heavily on maize, the investigators theorized, because they traded away their bounty to richer neighbors for status symbols such as copper ear thimbles, seashell necklaces, and obsidian arrowheads. "Archeologists are leery of talking of notions of exploitation [between different tribes of Indians]," says Armelagos, "but trade was not equitable."

Not all archeologists agree that these ills can be laid at the door of trade. "People know what they need in terms of diet," counters University of Wisconsin geographer William Denevan, who thinks large Indian populations probably depleted local game rather than traded it. "To give it away or trade it doesn't make sense." Biological anthropologist Clark Spencer Larsen of Purdue University, who used isotopic analysis and tooth cavities to document the adoption and increased consumption of sugar-rich maize, thinks both the rise in trade and the fall in dietary diversity were critical in determining the Indian diet.

But this may be one issue the bones can't settle. After all, says Larsen, bones are "more like incomplete diaries than epic novels. They don't tell the whole story."

–Dawn Levy

Grass-Root Greens in the Former Soviet Union

The dissolution of the Soviet government lifted the veil on a mind-numbing environmental horror story with multiple chapters: nine less serious nuclear power plant accidents before Chernobyl, the draining of the Aral Sea for irrigation, and countless other messes. Even as information began flowing more freely, however, the power of government to try to clean up environmental disasters has waned, said geographer Philip Pryde of San Diego State University at the geography conference. But Pryde and other geographers reported some good news: Private environmental activists, it seems, are filling some of the void.

Pryde, who wrote *Environmental Management in the Soviet Union* and recently returned

from a research trip to the Former Soviet Union (FSU), told his audience that a happy consequence of the breakdown of central environmental management has been the elevation of environmental activists from strident protesters to powerful voices in the new republics. Some even serve as surrogate enforcers of environmental laws. Indeed, Nancy Lubin, a Soviet affairs specialist at Carnegie-Mellon University, says that "any real change is going to happen from below."

The key environmental organization in the FSU these days is the Moscow-based Socio-Ecological Union (SEU), a 4-year-old umbrella organization for about 150 "green" groups scattered throughout Russia and 12 of the 14 other republics. The union grew dramatically in stature in April 1991, when the Soviet Ministry of Justice granted it the right to monitor natural resources and to sue polluters. Two steps forward and one back may be the rule because this March Russian President Boris Yeltsin signed a new law that limits nongovernmental organizations to suing over damage to health and property; no longer could they sue to protect public land or wild animals. Nevertheless, the SEU has made the most of its quasi-official status.

During its brief tenure, SEU has launched dozens of projects, including mopping up oil spills in western Siberia, monitoring dioxin pollution in Arkhangelsk, and saving endangered species such as the Moldavian sterlet, a small sturgeon prized for its caviar. "More often than not, the SEU is more organized than the government is," says Randy Kritkausky, who heads up Ecologia, a Harford, Pennsylvania-based green group that has been collaborating with SEU in monitoring heavy metals, nitrates, and organic pollutants such as benzene and toluene.

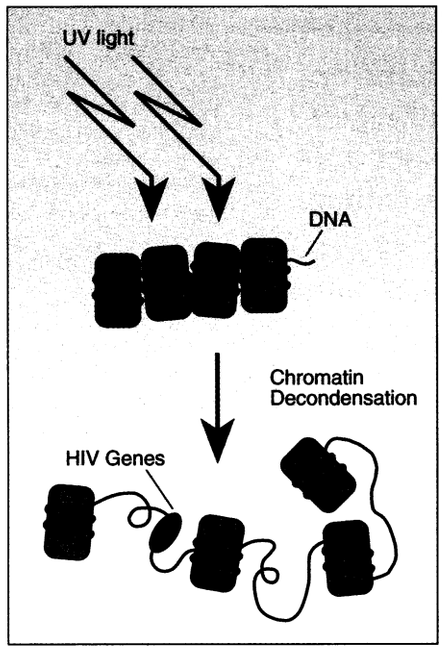
Ecologia is only one of the Western environmental organizations with which SEU has been forging ties; others range from the U.S. Environmental Protection Agency to green groups such as the National Audubon Society and Greenpeace. Such links with the West have brought funding, but also dangers: Some U.S. environmentalists warn that such ties might endanger SEU's position of strength in the FSU. They cite the potential for jealousy in the Russian Ministry of Ecology and Natural Resources, a body to be reorganized next month only a year after it was formed as a replacement for the State Committee for Environmental Protection, the Soviet version of the EPA. Says Kristen Suokko, the FSU project coordinator at the Natural Resources Defense Council: "The government is starting to see the NGO [nongovernment organization] community as a threat, especially when they see all the clout they're getting from the West." All of which may mean tougher times for the former Soviet Union's already beleaguered environment.

–Richard Stone

MOLECULAR BIOLOGY

Awakenings...UV Light and HIV Gene Activation

Like the "mole" in a John LeCarré spy novel, the AIDS virus has a disturbing ability. After entering a susceptible cell, it can go underground, hiding in latent form, often for many years, before flaring up and either destroying the host cell or transforming it into a virus-producing factory. Exactly what reawakens the sleeping virus remains a mystery, but recent work in several labs suggests that one culprit may be ultraviolet (UV) radiation, a worrisome finding given that people are routinely exposed to UV radiation.



ADAPTED BY C. FABER SMITH FROM JILL LASKER

A repair side effect? Chromatin unwinding during UV damage repair may allow the activation of integrated HIV genes.

While most UV exposures come from the sun's rays, millions of people are also exposed through sun lamps and tanning salons, and between 25,000 and 50,000 per year in the United States receive PUVA therapy, which is used for treating psoriasis and certain other skin diseases. And the evidence implicating UV radiation in HIV activation includes a finding by molecular virologist John Morrey of Utah State University in Logan that PUVA therapy, which combines UV with a light-sensitive drug, turns on HIV genes in an animal model, indicating that it might also activate the dormant viral "mole" in humans.

Does all this mean that HIV-infected people should avoid excessive exposures to sunlight and PUVA therapy? The jury is still out, but Janusz Beer of the Food and Drug Administration's Radiation Biology branch in Rockville, Maryland, says that researchers investigating UV's effects on HIV feel that further studies are certainly warranted. Indeed, the FDA itself is sufficiently impressed by the findings that the agency has studies under way aimed at assessing the risks of UV exposures for HIV-infected people. And should those studies show that the exposures contribute to AIDS virus activation, the current work may pay off in another way. Researchers are also beginning to uncover the molecular mechanisms by which UV light activates latent HIV, information likely to aid in the eventual design of drugs that prevent or slow the viral re-awakening.

Awareness that UV light can activate the AIDS virus dates back to work done in 1988 by molecular biologist Martin Rosenberg's group at SmithKline & French Laboratories in King of Prussia, Pennsylvania. Rosenberg and postdoc Kristoffer Valerie embarked on these experiments at a time when there was a strong focus in the AIDS research community on identifying the potential reactivating agents of latent HIV. Rosenberg's group chose to look at UV radiation, which is known to have DNA-damaging effects, since anything that could tweak the DNA might have the potential to trigger HIV activation.

First the researchers needed a good system for assaying the activity of the HIV genome. So they constructed a hybrid gene by fusing an HIV gene sequence called the "LTR" (which contains the "on/off" switch for the viral genes) to a reporter gene known as CAT (for chloramphenicol acetyltransferase) that makes a readily detectable protein. They then put the hybrid gene into human cells growing in culture and exposed them to UVC, the most energetic form of UV radiation having wavelengths ranging from 200 to 280 nanometers. The idea was that any increase in gene expression in response to the radiation would be reflected in increased CAT activity in the cells. And indeed, CAT activity went up 50- to 150-fold in the UVC-exposed cells, comparable to the levels achieved with other factors that had previously been shown to activate HIV gene expression. The Rosenberg team showed in further experiments that direct sunlight also activates HIV gene expression, although only about 12-fold.

Other groups have subsequently confirmed these findings, and Anthony Fauci's laboratory at the National Institute of Allergy and Infectious Diseases in Bethesda went a step further in 1989 by showing that UVB light