

RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Artificial Glaciers to Help Farmers

Glacier melt is the most plentiful source of water for the peasants of Ladakh, who eke out a living in a high desert region of the Indian Himalayas. But it's not always reliable. Now a local Indian civil engineer has mastered the art of making "artificial glaciers" that deliver water when it's needed most—in the early spring, right after farmers sow their single crop of wheat, barley, or peas.

Chewang Norphel, 62, a retired civil engineer, has made five artificial glaciers ranging in size from 60 to 300 meters

long to harvest water in five Ladakh villages. His technique is disarmingly simple. In the fall, water from an existing stream is piped to a shady part of the valley. There it flows down a mountainside, where it is trapped at regular intervals by small stone embankments. The water soon freezes, forming a thick sheet of ice down the mountain-side. In the spring, the artificial glacier melts, and its water—which comes from a lower altitude than natural glacier water—arrives just in



Stone walls trap water (Inset: Norphel).

time for the growing season. The largest glacier, about 17,000 cubic meters, can supply irrigation water for a 700-

person village.

Norphel's work was recognized earlier this month at a National Conference on the Potential of Water Harvesting in New Delhi. Conference organizer Anil Agarwal, a mechanical engineer and director of the Center for Science and Environment, praised his "simple but elegant technology," and Indian President K. R. Narayanan hailed him as the "invisible rural engineer."

Researchers have long known that most bats use the echoes from high-pitched sounds they emit to pinpoint moths and other objects. But a report in the 13 October *Proceedings of the National Academy of Sciences* shows their talents are even more finely tuned than scientists had suspected.

James Simmons, a neuroscientist at Brown University in Providence, Rhode Island, and his colleagues have demonstrated that the big brown insectivore, *Eptesicus fuscus*, can process overlapping echoes arriving just 2 millionths of a second apart and distinguish between objects that are just 0.3 millimeters apart. "That's something which seems intuitively impossible," comments Alan Grinnell, a neuroscientist at the University of California, Los Angeles. Grinnell was among those who were skeptical of earlier research by Simmons showing that bats could distinguish objects 1.7 mm apart. But the new evidence is "pretty good," he says.

Bats Push The Limits Of Sonar

Simmons's team revealed the bat's amazing discriminatory ability by putting a bat on a platform and electronically manipulating the echoes from the sounds it made so that they came back in different patterns. The creature was rewarded with a mealworm whenever it moved toward the variable echoes rather than to the side that produced regularly spaced echoes. The researchers tested the limits of the bat's discriminatory powers by playing the echoes back closer and closer together until the animal could no longer differentiate between them.

Simmons's group has re-created the bat's echo processing prowess in a computer that was able to chart its way through a virtual obstacle course almost as well as the bat itself. The U.S. Navy has given him a grant to see if he can apply bat sonar, which is three times as sharp as humanmade sonar, to defense technology.



Bat and mealworm.

Old Dental Pulp Points to Plague

Applying a bit of detective work to centuries-old dental pulp, researchers have captured an actual piece of antique *Yersinia pestis*—the bacterium that causes the plague. The work, which uses DNA-detection techniques, confirms that the disease was responsible for epidemics centuries ago in southern France.

Until now, historians and scientists studying ancient plagues have relied on symptoms recorded by contemporary observers. But a team of researchers led by Michel Drancourt at the Université de la Méditerranée in Marseille reasoned that dental pulp, which is both durable and likely to harbor infection, would be a good place to find intact DNA evidence. After locating two mass burial sites for plague victims dating from the 16th and 18th centuries, the scientists removed a dozen teeth from five skeletons. They also took seven teeth from corpses buried elsewhere that showed no obvious signs of the disease. By using only pulp from unerupted teeth, which were surrounded by jawbone, the researchers helped ensure that their samples hadn't been contaminated from subsequent contact by microbial DNA.

DNA amplification showed

nucleotide sequences in the plague victims' pulp that matched segments in the modern plague strain, which infects 1000 to 2000 people worldwide every year. The seven nonplague teeth yielded no trace of the deadly sequences, the researchers report in the 13 October *Proceedings of the National Academy of Sciences*.

The work "paves the way for us to look at past epidemics at a molecular level," says George Sensabaugh, a professor of biomedical and forensic sciences at the University of California, Berkeley. The next step, he says, is to show how *Y. pestis* strains have evolved by uncovering infected teeth from other eras and regions.

New IOM Members

The Institute of Medicine (IOM), which honors people for contributions to health, medicine, and related fields, has elected 55 new members, bringing the total active membership to 574. Names, including six new senior members and five new foreign associates, are at www2.nas.edu/iom

CREDITS: (BOTTOM): BROWN UNIVERSITY/STEVEN P. DEAR; (TOP PHOTOS): PALLAVA BAGLA