RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Shoemaker's Final Resting Place

Eugene Shoemaker always wanted to go to the moon, and now part of him will: A small vial containing ashes of the planetary geologist, who died last July, is aboard the Lunar Prospector probe launched by NASA last week.

Shoemaker, who trained the Apollo astronauts in geology and was co-discoverer of the comet Shoemaker-Levy 9, worked at the U.S. Geological Survey in Flagstaff, Arizona, until his death in a car crash in Australia. "We will always know when we look at the moon that Gene is there," says his wife and co-worker Carolyn Shoemaker. Accompanying his ashes is a passage by Shakespeare's Juliet that begins: "And, when he shall die, take him and cut him out in little stars. ..."

Prospector, whose special job is to look for signs of water on the moon, is the first U.S. lunar scientific mission in a quarter of a century (*Science*, 12 December 1997, p. 1885). The voyage will end with a bang—a crash landing on the moon's surface—in about 18 months.

Turning Theses Into Gold

Ten years ago, Spiros Jamas was an obscure Ph.D. student studying yeast beta-glucans, a structural component of the cell wall. Today, he's president of Alpha-Beta Technology, a biotech firm based on his doctoral research. People like Jamas, however, are rare birds: Most dissertations gather dust in the library.

Hoping to change that, the Merrill Lynch Forum, a think tank established by the financial company, has launched an Innovation Grants Competition to turn newly minted Ph.D.s into captains of industry. The program is similar to the Massachusetts Institute of Technology's (MIT's) 50K entrepreneurship competition, which splits $50,000 annually among three teams of students.

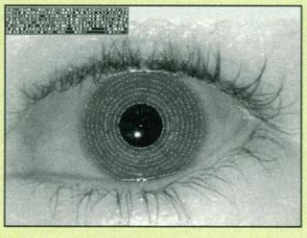
Program director Michael Schrage, a research associate at the MIT Media Lab, says applicants must submit 3000-word business plans explaining how their dissertations could be turned into products or services. Anyone can play, he says: "We would love political scientists as well as molecular biologists to be winners." Judging the proposals will be a panel including venture capitalist John Doerr of Kleiner, Perkins, Caulfield, and Byers—backer of Netscape and Sun Microsystems—and biotech entrepreneur William Haseltine of Human Genome Sciences Inc., in Rockville, Maryland. The top prize is $50,000; there will also be two $20,000 and two $10,000 awards.

Jamas, who hit the big time on his own, predicts that the new program will be good for winners and losers alike. The competition, he says, "helps focus ideas." Entries are due 1 June; winners will be announced in September. See www.ml.com/innovation.

Eyeball ID

Eyes have always been the windows to the soul; now, they're the basis of the latest identification technology—iris recognition, a security system to identify people by their iris patterns. It will be showcased next month at the winter Olympics in Nagano, Japan, where access to rifles for the biathlon will be protected with the aid of iris recognition.

The iris is "stable, rich in discriminators, and unique," says Don Richards, a spokesperson for the product's manufacturer, IriScan of Mount Laurel, New Jersey. It's one of life's more varied landscapes, with lines, dots, rings, pits, crypts, freckles, coronas, striations, stromal fibers, contraction furrows, collagenous filaments, and serpentine vasculature. With 266 physical features that vary from one person to the next, the iris has "vastly more mathematical complexity than any other biometric," including fingerprints, the retina's blood vessels, or even DNA fingerprinting—which, unlike irises, can't differentiate identical twins—says John Daugman, a Cambridge University professor who developed the mathematical equations underlying iris encoding and recognition.



J. DAUGMAN

Unique landscape. Iris is said to discriminate even better than DNA.

The system works like this: A person stands for a few seconds 20 or so centimeters from a video camera, which captures iris images and translates selected landmarks into a 256-byte code. The iris is divided into eight concentric zones, which make it possible to recognize it regardless of how dilated the pupil is—features can be located even when the rings are compressed, says Daugman. The system is foolproof, its makers claim: Because a living pupil oscillates continuously, a glass eye would be a sitting duck. And a contact lens with a faked iris would be convex, not flat like a real iris. Isao Shimozaki, security manager for the Nagano Organizing Committee, adds that iris scanning beats fingerprints for another reason: "Some people find ... systems where they have to touch something unpleasant."

The technology, which is being explored by Asian banks and British Telecom, might also be adapted as a substitute for marking or tagging animals, notes Richards. Indeed, the Japanese Racing Association wants to move to iris identification for thoroughbreds.

Tales of Springy Whales

Whether it's a great big blue or a petite porpoise, cetaceans of all sizes swim at about the same cruising speed. The finding, presented last week in Boston at the annual meeting of the Society of Integrative and Comparative Biology, has led researchers to suggest that whales use their flexible bodies like coiled springs to maximize energy storage and release.

The largest cetaceans—such as the 25-meter blue whale—are up to 30 times longer than the smallest. But size has no relation to how fast a whale travels over long distances, according to biologist D. Anne Pabst of the University of North Carolina, Wilmington. After analyzing reported speed records and videotapes of swimming whales, Pabst and two colleagues calculated that most cetaceans cruise at about 2 meters per second, although some species swim much faster over short distances.

To figure out why whales and dolphins tend to swim at the same speed, the biologists turned to mathematical models often used by engineers to design sleek prows and other energy-efficient structures. One model assumed that as a whale flexes, it stores and releases energy as a coiled spring does. The other treated a whale as an oscillating hydrofoil—a streamlined wing arcing through the water. After defining hypothetical whales optimized for energy efficiency, both models showed that the observed tail-beat frequencies were just the ones predicted to give the most thrust for the least work.

It's unclear which mechanism best jibes with whale physiology, however. The researchers are betting on a mixture of the two. "Cetaceans appear to be using their bodies as optimized oscillating springs," says Pabst. She hopes the findings will help biologists identify which bones, tissues, and physiological adaptations enable whales to be such efficient swimmers.