RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Cutting Red Tape With Plastic

Give a government scientist a credit card and authorization for a shopping spree—and the government will save a huge amount of money. That's the lesson from a pilot program at the U.S. National Institutes of Health (NIH) that allows scientists to sidestep some of the usual procedures. One researcher saved almost $245,000 on a single item.

Last year, Victoria Puck at NIH's National Center for Human Genome Research (NCHGR) in Bethesda, Maryland, received a government-issued credit card that authorized her to buy any lab or office item costing $2500 or less. Puck, who is also a physician, took it to a discount pharmacy, where she was able to obtain a year's supply of interleukin-2, an immune messenger used in research but also available commercially for boosting the immune systems of people undergoing certain types of chemotherapy. Normally, Puck would have had to fill out government requisition forms, get them approved, and then wait, perhaps weeks, for her order. But at the pharmacy, she simply bought an annual supply of interleukin-2 for $2500—about 1% of what the stuff would cost from a scientific supply house. The pharmacy sold her a bulk order while suppliers provide only single-unit packages, which add up to about $250,000 over a year, explains NCHGR geneticist Jeffrey Trent.

Puck is one of 30 NIH researchers who have spent some $1.23 million on 2500 purchases over the past 9 months by flashing their plastic. The experiment, part of the Administration's attempt to "reinvent" government, is being conducted in many federal agencies, says Donald Kemp, who oversees the NIH credit card program.

Savings have been phenomenal. Researchers are buying common items, such as plastic containers, at local stores for about a tenth their cost at these scientific suppliers. And some of those suppliers have dropped prices by 10% because they're getting paid more promptly, says Trent.

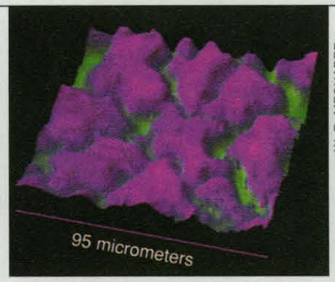
The one snag comes at the end of the month, when the purchasers and then their supervisors have to verify the items on each credit card statement. But Kemp says there are plans to automate this—and then many others at NIH can have their own piece of plastic.

Lilliputian Topography

What does the world look like to the inhabitants of leaf surfaces? To a fungus the surface may seem like the American West, with microbial equivalents of the Rockies or California's San Fernando Valley.

Ecologists may soon be gaining a fungus-level view of these microscopic landscapes with the aid of a tool developed primarily for materials science, the atomic force microscope (AFM). Biologist Wendy Mechaber of the University of Arizona, Tucson, and her colleagues have adapted the scope—whose tip rides over the surfaces of atoms like the needle on a phonograph record—to scan the undersides of cranberry leaves. In the 14 May *Proceedings of the National Academy of Sciences*, the scientists note that hilly leaf undersides erode with time, an environmental change never noticed before, and one that could explain why some leaves are more prone to microbial colonization than others.

Mechaber and her colleagues at Tufts University in Medford, Massachusetts, began atomic-scale examinations of leaves while she was a grad student there. She first used a scanning electron microscope (SEM), but it distorted the height dimension, so she decided to try AFM, which portrays depth well. She mapped the topography of five young and four old leaves. New leaves had broad plateaus along their surfaces, bounded by narrow, steep ravines at leaf cell boundaries. But in older leaves, those ravines had broadened, leaving just peaks of the plateaus behind, Mechaber and her colleagues report. "You're seeing what's left after a lifetime of exposure to the environment," she says.



W. R. MECHABER

Landscape of an old leaf. Peaks and valleys show erosion.

"With SEM, all you have is a moonscape; it wouldn't tell meaningful structure; [now] we're able to look at the leaf on the scale that would matter to a bacteria or a fungus," says theoretical ecologist Timothy Allen from the University of Wisconsin, Madison. In narrow grooves, for example, he says, moisture may build up, creating dampness encouraging to fungal infections. "There's a real good chance we'll get a whole new class of insights," says Allen.

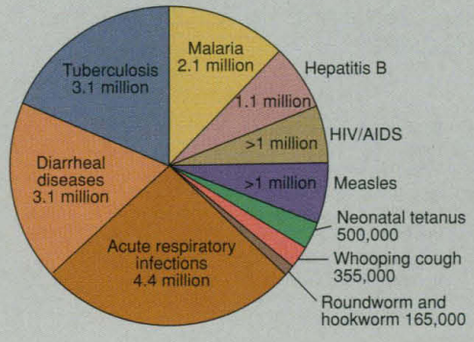
Ominous Trends for Infectious Diseases

Infectious diseases, old and new, are on the rise owing to forces such as population growth and urbanization, the development of drug resistance, civil strife, and withering of public health programs. According to *The World Health Report 1996*, released on 20 May by the World Health Organization, of the 52 million deaths that occurred last year, almost one-third, most of them of young children, were caused by infectious diseases.

And the toll is growing from "new" diseases. WHO names the agents, the years they were identified, and the diseases they cause as follows:

1973: Rotavirus (infantile diarrhea)
1976: *Cryptosporidium parvum* (diarrhea)
1977: *Legionella pneumophila* (legionnaires' disease)
Ebola virus (hemorrhagic fever)
Hantaan virus (hemorrhagic fever)
Campylobacter jejuni (diarrhea)
1980: Human T-cell leukemia/lymphoma virus (HTLV-I) (lymphoma-leukemia)
1982: *Escherichia coli* O157:H7 (bloody diarrhea)
HTLV-II virus (hairy cell leukemia)
1983: *Helicobacter pylori* (stomach ulcers and cancer)
Human immunodeficiency virus (HIV) (AIDS)
1988: Hepatitis E virus (jaundice)
Human herpesvirus 6 (fevers and rash)
1989: Hepatitis C virus (liver disease and cancer)
1991: Guanarito virus (Venezuelan hemorrhagic fever)
1992: *Vibrio cholerae* O139 (cholera)
1994: Sabia virus (Brazilian hemorrhagic fever)
1995: Human herpesvirus 8 (Kaposi's sarcoma)

INFECTIOUS DISEASES: THE 10 BIGGEST KILLERS, 1995



Eye on EPA Science

In the latest of a series of moves to bolster the science behind its rules, the U.S. Environmental Protection Agency (EPA) is setting up a new board of outside advisers to

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take stock of its labs and research programs.

The EPA already has a science advisory board whose main purpose is to review big reports such as the agency's dioxin assessment. Now in-house research conducted by the Office of Research and Development (ORD) will also be subjected to outside scrutiny. The board will assess EPA internal research programs, visit labs, make recommendations, and help develop standards for evaluating scientists' performances. ORD officials are still finalizing the list of board members, but hope the group will hold its first meeting in July.

Entering the Gorilla's World

It's pegged as "the world's first virtual-reality gorilla exhibit"—a project that enables kids to pretend they're a gorilla, go into a virtual gorilla habitat, and interact with the inhabitants. Kids who "beta-tested" the project on 15 May at the Atlanta zoo gave it rave reviews, says computer scientist Larry Hodges of the Georgia Institute of Technology; he also says most described it as "weird."

The educational experience starts when you step into a small circular enclosure, don a virtual-reality helmet, and enter a virtual version of one of the zoo's gorilla habitats, complete with vegetation, downed trees, rock formations, and a moat. You are now an adolescent gorilla and move through the environment using a joystick. There you meet two other gorillas: a silverback male and a female. The virtual gorillas' behavioral repertoires so far include walking on three or four legs, standing, squatting, lying down, staring aggressively, and chest-beating. Depending on the behavior—including body gestures—of the visitor, the male gorilla might hoot and chase him away, or the female might lie down and act nurturing. "At this stage, it's still a *Wizard of Oz* operation," says Hodges, meaning that graduate students at computer keyboards are controlling the gorillas' behaviors.

GEORGIA INSTITUTE OF TECHNOLOGY

In with the big boys. Virtual gorilla habitat.

The project has involved 3 years of cooperation between gorilla experts at Zoo Atlanta and computer and design experts at Georgia Tech. Architect Jean Wineman, who helped design the virtual gorillas' environment, explains that this is "real-time virtual reality" where visitors create "their own scenario." Indeed, says Wineman, although the images look "very crude ... it is incredible how realistic it is when you have the immersive opportunity."

Ultimately, says Wineman, everything will be automated, and more gorillas will be added. The designers also hope costs can be reduced so the exercise can be brought into public schools. This is only the beginning, says Hodges: "If we can do gorillas we can do any other habitat or animal."

Gene Modulates Prostate Cancer Risk

Most of the known genetic defects that increase the risk of cancer are "digital"—one either carries the defect or one doesn't. Now, however, researchers at Boston's Dana-Farber Cancer Institute have discovered an "analog" risk factor for one kind of cancer. It's a genetic stutter of varying lengths that may raise or lower a man's chances of developing prostate tumors.

The stutter is in the gene encoding the androgen receptor molecule, according to Philip Kantoff, who presented his group's results at last week's meeting of the American Society of Clinical Oncologists in Philadelphia. Male hormones such as testosterone bind to the receptor, which leads to the activation of certain genes in prostate gland cells. Several years ago, researchers found that the androgen receptor gene contains a three-nucleotide sequence, CAG, that repeats between 11 and 33 times in different men. It acts like a volume control—the fewer repeats, the more effectively the receptor molecule transmits its "on" signal.

Kantoff and his colleagues have now found that the stronger this signal, the higher the risk of prostate cancer. Using blood samples collected as part of the 22,000-member Physicians' Health Study, they compared CAG repeats carried by 591 physicians with prostate cancer to those in an equal number of healthy controls. For every six fewer repeats, Kantoff found, a participant's risk of prostate cancer increased 30%. The effect was largest among the 269 physicians with the most aggressive tumors: a 70% increase in risk for each decrement of six repeats.

"This is not another *BRCA1*," says Kantoff, referring to a defective tumor-suppressor gene implicated in breast cancer. Rather, he says, it's a continuous variable, comparable to high cholesterol as a risk factor for heart disease.

"It's a credible and fascinating observation," says William Catalona, a urologist and prostate cancer researcher at Washington University in St. Louis. "One of the things we really need is a marker for tumors that ... need to be treated aggressively, and for other tumors that can be left alone. This does have that possibility."

Age of Asteroids?

Two years ago, after comet Shoemaker-Levy slammed into Jupiter, alarmists worried that the same thing could happen to Earth. It hasn't yet—but two asteroids swung by our home planet this very month, with one coming near enough to count as an astronomical close shave.

On 19 May, the 150-meter-wide asteroid 1996 JA1 passed within 453,000 kilometers of Earth, scarcely farther away than the moon and the sixth-closest asteroid approach on record. JA1, discovered on 13 May by University of Florida astronomy graduate student Timothy Spahr, will return every 4 years, but won't come nearly as close again, scientists say.

Another asteroid, 1996 JG, was first sighted on 8 May by astronomer Robert H. McNaught of the Siding Spring Observatory in New South Wales, Australia. It passed within 3 million km of Earth on 24 May. Both asteroids could have made a considerable impact on Earth if their courses had been just a little bit different, says David Kring, an astronomer at the University of Arizona. "If they had hit Washington, D.C., or New York City, there wouldn't be anything left of those cities," he notes. The odds of a 1.4-km asteroid hitting Earth have been put at 1 in 3000 per 100 years.

So "it is unusual to have within a single month two very close approaches," says Gareth Williams, associate director for the Minor Planet Center in Cambridge, Massachusetts. The asteroids triggered a buzz among Internet astrobuffs, with some wondering why they went unnoticed for so long. Williams explains that astronomers have spotted less than 10% of the 1-km objects that cross Earth's orbit; amateurs find the rest.

Ancient Ancestor—New Name

Another human ancestor has turned up in Africa—or at least an ancestor by another name. In January 1995 paleoanthropologist Michel Brunet of the University of Poitiers found a 3-million-plus-year-old partial lower jawbone in Chad. It was preliminarily named *Australopithecus afarensis*, the same species as the famous "Lucy" skeleton found in Ethiopia 2400 kilometers to the east (*Nature*, 16 November 1995). But Brunet and his colleagues suspected it to be a new species (*Science*, 17 November 1995, p. 1117).

It turns out Brunet was right. Last Monday, he told a group of scientists at the Musée de l'homme in Paris that it ranks as a new species: *Australopithecus bahrelghazalia*. His colleague David Pilbeam of Harvard University explains that analyses have demonstrated that "the combination of features in the Chad mandible differs from all known PlioPleistocene hominids."