RANDOM SAMPLES

edited by CONSTANCE HOLDEN

New Research Chief at NIH

NIH director Bernadine Healy last week named Lance Liotta as her new deputy director for intramural research. Liotta, currently chief of the Laboratory of Pathology at the National Cancer Institute (NCI), was considered a dark horse among the handful of finalists for the top intramural slot. He takes over from National Eye Institute director Carl Kupfer, who has served as acting intramural chief since Healy fired J. Edward Rall, an 8-year veteran in the post, last spring. Liotta, who holds both an M.D. and a doctorate in biomedical engineering and biomathematics, has been at NCI since 1976 and in his current position as lab chief for the past decade. His research has focused on biochemical and genetic mechanisms of tumor invasion and metastasis.

Lance Liotta

A Brush with a Comet for Giotto

In the current uncertain economic climate, the world's space agencies are in love with "cheap and cheerful" science missions. The European Space Agency's Giotto probe is scheduled to provide a model of that approach on 10 July, when it will pass within about 600 miles of the comet Grigg-Skjellerup, collecting data on its emission of gas and dust and interaction with the solar wind.

The encounter is an unexpected, cut-price bonus from Giotto, one of a flotilla of probes sent to investigate Halley's Comet when it swooped past Earth in 1986. Giotto was the star of the bunch, yielding stunning data by flying closer to Halley than its Soviet and Japanese rivals. The comet's dusty tail was expected to damage Giotto beyond further use—but most of its instruments stayed more or less intact.

So the Giotto team charted a new course for their probe, sending it on a neat gravity-assisted "slingshot" around Earth so that it could afford a similar close look at a very different comet. Around Halley, a large, active comet, Giotto found a number of very sharp boundaries between plasma of different densities, temperatures, and flow velocities formed as the solar wind flowed around the comet—including a "bow shock," similar to the shock wave generated by supersonic aircraft. But no one is sure whether these features will be similarly marked around Grigg-Skjellerup, a much smaller, quieter comet. "It may be that the theories we have from Halley break down for these [smaller] comets," says project scientist Gerhard Schwehm of the European Space Research and Technology Center in Noordwijk, the Netherlands.

Unfortunately, Giotto's camera is not expected to produce any images—its aperture is thought to be blocked by a dislodged piece of shading baffle. But for $6.3 million, only 2 percent of the original project's cost, the mission is quite a bargain.

MAX WESTBY

Gymnotus. Strangers send out bad vibes.

High-Tech Fish Signatures

Birds do it, we do it...and so, it seems, does the nocturnal Amazonian fish *Gymnotus carapo*. The "it" in question is individual discrimination—the ability to recognize particular members of the same species. That in itself is not unusual, but *Gymnotus* has added a fresh slant: In the June issue of *Animal Behaviour*, two British ethologists describe how the fish recognize one another by detecting subtle differences in the pulsed electric discharges that each emits. That's the first time the electric sense has been implicated in individual discrimination.

Gymnotus is a weakly electric fish, able to navigate in almost total darkness by emitting charges from modified muscle tissue, and then using electric sensors spread over its body to build up a radarlike picture of the immediate environment. Behavioral biologists had suspected that these discharges were also used in individual recognition, says Max Westby of the University of Sheffield, but attempts to train the fish to discriminate between different recorded discharges had all failed.

Scientists finally devised a successful experiment, however, by drawing on knowledge gained from another species—the great tit, a small European songbird. Behavioral ecologist Peter McGregor of the University of Nottingham, who studies the great tit, has found that like most territorial songbirds, great tits respond aggressively not only to the songs of strangers but to familiar songs (those of a neighbor) coming from the wrong territorial boundary—probably meaning that the usual occupant of a neighboring territory is no longer there to defend it.

Knowing that *Gymnotus* are also territorial animals, Westby and McGregor tried the same experiment with them—using electrodes to play back the discharges from neighbors and strangers. The results were striking: *Gymnotus* behaves much like an "underwater great tit," says McGregor—the fish recognize their neighbors and strangers by their electric discharges alone.

Brand 'z' Less Hazardous to Health?

Better the devil we know than the devil we don't, the saying goes. But such logic doesn't seem to hold when scientists are asked to weigh the risks of environmental substances. In a recent survey, scientists were far more apt to villainize radon and environmental tobacco smoke (ETS) when these were explicitly named than when presented with unnamed substances whose health effects were described identically.

In the telephone survey of 1461 scientists—mainly epidemiologists and toxicologists—scientists heard thumbnail sketches of dioxin, radon, and ETS, then were asked to rate these substances' health threats. Another batch of scientists listened to the same vignettes, except that the substances were identified only as 'x,' 'y,' and 'z.' Dioxin by any name seems to get bad reviews: Evaluations differed little between dioxin and substance 'x.' But while 90.5% of respondents who heard the "radon" vignette called it a health hazard, only 78.2% felt similarly after listening to the anonymous version. As for tobacco smoke, the disparity was striking: ETS was seen as twice as likely to cause a serious environmental hazard as substance 'z.'

What's the upshot of this seemingly capricious risk assessment? "We wanted to see what kinds of thought processes scientists would bring to assessing the risk of a popular compound," says epidemiologist George Carlo, chairman of Health and Environmental Sciences Group Ltd., a Washington, D.C.-based research firm that conducted the survey. Carlo says

the survey shows how "values and experiences" can influence how scientists interpret the facts. The study appeared recently in *Risk Analysis*.

A Boost for Cosmic Mapmakers

Call it kind of a genome project in the sky: Astronomy's most ambitious and technologically advanced survey project now seems well on its way toward a 1995 start-up. With a promise of $8 million from the Alfred P. Sloan Foundation—one of the largest single grants ever given by that institution—the project that is now known as the Sloan Digital Sky Survey will build a special telescope at Apache Point, New Mexico, equipped with new-generation, solid-state detectors, to map the 3-D distribution of some 1 million galaxies and 100,000 quasars. "That's about 100 times more than in any catalog that's ever existed before," says Princeton University's Jeremiah P. Ostriker.

By charting the precise distribution of clusters and superclusters of galaxies on scales approaching a billion light years, says Ostriker, the survey could help astronomers settle some fierce and long-standing debates about how those structures arose. "All the technical and bureaucratic pieces of the project are finally coming together," adds Ostriker, who chairs a committee managing the survey on behalf of the seven-member Astrophysical Research Consortium, four of whom—the Institute for Advanced Study, the University of Chicago, Johns Hopkins, and Princeton—have major responsibilities in the project.

The telescope's primary mirror was recently cast at the University of Arizona, where it now awaits polishing. With a diameter of 2.5 meters, it will have four times the light-collecting power of the telescope used in the 1950s-vintage Palomar Sky Survey and will be optimized for a wide field of view and minimal optical distortion. Meanwhile, the first of the new telescope's 30 charge-coupled device light detectors are now being tested; unlike the photographic plates used in the Palomar survey, which could record only 0.3% of the photons that reach them, the detectors will capture 60%—and will produce their images in digital form directly, ready for immediate processing to sort out stars and galaxies from the sea of data. The telescope will also be equipped to find redshifts—an indication of distance—for up to 600 galaxies at a time. If all goes as planned, the $25 million survey will be completed by the turn of the century.

Cracking Secrets in Greenland Ice

First their country disintegrated, then their wages plummeted, and now the scientists of the former Soviet Antarctic research program have suffered a new indignity: the loss of a proudly held world record. In the past few weeks, European scientists drilling through the Greenland ice sheet have extended their ice core beyond the 2546-meter depth reached by drillers at the Russian Vostok Antarctic research station.

The European competition is coming from the Greenland Ice-core Project (GRIP), an 8-country collaborative effort begun in 1989. GRIP's core had reached 2827 meters by 28 June, and with drilling proceeding at about 120 meters per week, it could hit bedrock—around 3050 meters down—by late July, says Niels Gundestrup, director of the operations center at Strømfjord, southwest Greenland.

GRIP's claim to preeminence doesn't just rest on its depth: Team members say that chemical and physical analyses of the ice and the air bubbles trapped in it are yielding unrivaled paleoclimatic data. For a start, Greenland is more informative than Antarctica is about past climatic variation, since glaciations were mainly Northern Hemisphere events. GRIP is also special because the core is at the very center of the ice sheet, where the ice has come from snow that has fallen on the same spot. Previous Greenland cores have all been taken from the outer parts of the ice sheet, where paleoclimatologists must correct their data to account for the slow drift of ice from the center of the sheet out toward the sea.

When it's complete, GRIP and a companion U.S. core—now approaching 2000 meters, being drilled some 20 miles away—should give a complete climate record for the past 200,000 years. Paleoclimatologists are interested in the changes that took place around 11,000 years ago, during the transition from the last glacial period. That was when the rate of temperature rise was similar to that being predicted by climate modelers for the coming century. Says Bernhard Stauffer of the University of Bern, chairman of GRIP's scientific steering committee: "It's the closest event we can investigate for a global change of a similar order of magnitude."

U. OF COPENHAGEN

Ice-coring camp. Lab and drilling equipment are under the domes.

The Hottest Fields of 1991

Rank	Field	# core papers	% core papers
1	Laparoscopic cholecystectomy	3	100
2	Serotonin's effects on blood vessels	3	100
3	Origin of HIV isolates	2	100
4	Adverse events in hospitalized patients	2	66
5	Properties of fullerene molecules	23	42
6	Baby Check scoring system	3	19
7	Site of fragile X mutation	4	17
8	Hypoglycemia risk with human insulin	2	17
9	Atmospheric chemistry of CFCs	3	9
10	Atomic interferometry	2	9

SOURCE: ISI RESEARCH FRONT DATABASE, 1991

Science on the move. The above is the result of a fancy method, called "co-citation analysis," the Institute for Scientific Information (ISI) uses to determine what are the hottest—that is, fast-emerging and very likely controversial—fields in science. To ascertain "core" papers for 1991 in a particular field, ISI identifies publications (from any year) that were cited at least five times in articles published in 1991 and goes on to identify pairs of papers that are cited in the same article. The purpose is to highlight clusters of related publications that represent specialty areas. ISI then identifies the specialties that contain "core" works published in the same year as the citing papers. In other words, says ISI's David Pendlebury, "We are looking for research areas with a very, very young foundation literature." The highest rankings go to areas whose core literature contains the highest proportion of 1991 papers. In the laparoscopy specialty area, for example, all the core papers were published in 1991. The same was the case for the serotonin and HIV areas. In atomic interferometry, by contrast, only 9% of material cited in 1991 papers was published in the same year. But that still makes it hot. "Only a fraction of 1% of all scientific papers are cited in the same year they're published," says Pendlebury.