RANDOM SAMPLES

edited by RICHARD STONE

Rooting out Waste in Academia

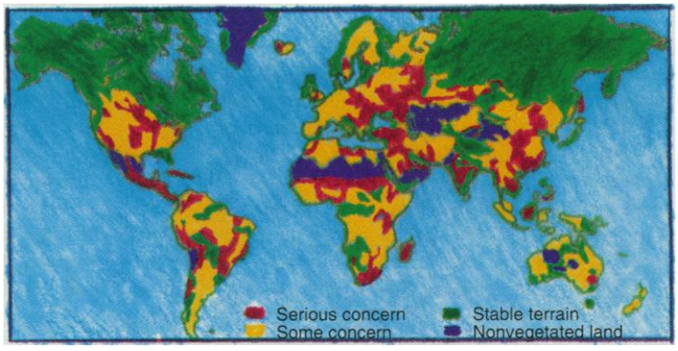
Professors love to boast about a key freedom of academia: the ability to set your own schedule. Fearing that such a system is ripe for abuse, however, North Carolina state officials last year conducted an audit to determine just how university professors while away —or waste—their time. Their conclusion?

After spending $37,000 (roughly a year's salary for an assistant professor) and 1100 hours surveying nearly 300 faculty members at four state universities, state auditors revealed last month that professors confessed to having to work more than 50 hours a week occasionally!

Comforting news, you'd think, but not to these bureaucrats: They're alarmed that "the current system," in which professors aren't required to punch time cards or otherwise document how they spend their days, "does little to dispel the general public's perception that university faculty are not being productive."

Oh, and it isn't only the public's perception: These auditors expressed concern that professors engage in some work practices that "many non-university employees would not consider part of a 'job-related' function"—such as reading professional magazines (*If you're reading this, get back to work!*), consulting with colleagues, and "thinking."

In an election year, you might not be surprised to learn that the audit was ordered up by state auditor Edward Renfrow, who happens to be running for lieutenant governor. Ironically, his platform calls for cutting government waste. Calls to the candidate were forwarded to Renfrow's deputy, Jimmy Benson, who said that to tighten up procedures, department heads ought to at least have a "written work plan" for their professors. Officials of the North Carolina university system have received these thoughtful suggestions and responded, thanking the auditors for their concern.



SOURCE: INTERNATIONAL SOIL REFERENCE AND INFORMATION CENTRE, WAGENINGEN, THE NETHERLANDS; ILLUSTRATION: D. DEFRANCESCO

Soil and Trouble

Around the world, fertile soil is rapidly washing away or becoming dust in the wind. So goes a global assessment of soil conditions released last month by the World Resources Institute (WRI) and hailed by the Washington, D.C., think tank as the first of its kind. Said WRI president Gus Speth at a press conference releasing "Toward Sustainable Development," this "confirms our worst fears" about the degradation of arable land since World War II.

The data were produced from a 3-year study sponsored by the United Nations Environmental Program, in which hundreds of experts compared contemporary conditions with those tracked over the last 45 years. The report concludes that more than 3 billion acres of fertile land—an area the size of China and India combined—have been seriously degraded, mainly because of overgrazing, damaging agricultural practices, and deforestation. In the Indian state of Uttar Pradesh in the Ganges Valley, for example, alkalinity, salinity, and waterlogging have squeezed 29% of cropland out of production.

Speth calculates that the world's nations may have to triple food production in the next 50 years to keep up with population growth. Crop rotation and other on-farm practices will remedy mild soil degradation, but national programs are needed, the report says, for large-scale soil conservation and watershed management projects. Supporting its sense of urgency, WRI printed its report early in hopes of influencing the negotiations over worldwide environmental treaties that are preceding the United Nations Conference on the Environment and Development, to be held in Rio de Janeiro in June.

Propping up Cold Fusion

Cold fusion may be the butt of many jokes in the physics community, but it continues to garner a few million dollars' worth of respect from an organization not known for chasing rainbows—the Electric Power Research Institute (EPRI), the research arm of several electric utilities.

Last December, the EPRI board of directors quietly authorized $3 million in funding for cold fusion research at Menlo Park-based SRI International, a 50% increase over the $2 million EPRI has already spent there. Chief beneficiary of this interest in the troubled field is Michael McKubre, lead researcher in an ongoing SRI experiment that has had its successes and failures. On the one hand, McKubre's team has reported achieving low but steady levels of excess heat in deuterium-palladium electrolysis cells; on the other, it experienced tragedy when an explosion last January killed one scientist and injured three others (*Science*, 10 January, p. 153).

EPRI, however, is fairly tight-lipped about this research. It did not reveal its decision to increase SRI funding until 19 March, a day after *The Wall Street Journal* reported that the institute would be spending an additional $12 million on cold fusion studies. An EPRI spokeswoman was quick to say that there was no substance to the $12 million figure, and the press release finally issued by EPRI pointed out that the SRI funding is subject to periodic review because of the work's "exploratory nature." One more sign of EPRI's sensitivities: The institute shuns the phrase "cold fusion," instead referring to the work as "excess heat production in electrolytic experiments involving palladium as the host metal for deuterium."

Immunology: Pollutants a Growing Threat

In the 1980s, human immune systems were first faced with the blatant, destructive power of AIDS. Now, in the 1990s, humans—and immunologists—are encountering dramatic increases in yet another disturbing, though far more subtle, problem: Environmental pollutants are having a deleterious effect on immune systems. Indeed, everywhere these days doctors are seeing increasingly severe cases of immune-related diseases. For example, some pollutants increase the severity of asthma, which has risen in incidence 58% since 1970.

To address this gathering scourge, a recent report* from the National Research Council recommends that immunologists redouble their efforts to identify biochemical changes that link immune system problems to environmental chemicals. Such markers might be changes in the numbers of immune system cells or in antibodies stimulated by environmental pollutants, to name two of many. "There's a variety of good markers that detect immunological competence," says David W. Talmage, an immunotoxicologist at the University of Colorado and chair of the committee that wrote the report.

But that doesn't mean Talmage thinks the tasks before immunologists are trivial. It's difficult, he

*"Biologic Markers in Immunotoxicology," National Research Council, March 1992.

says, to determine when a change in a marker reveals immune dysfunction, and when it merely indicates a normal fluctuation seen in a healthy individual. Still, if they could identify those changes, says the report, immunologists might at last be able to puzzle out the mysterious syndrome called "multiple chemical sensitivity." That's the diagnosis for people who have claimed that pollutants may have triggered their arthritis, hay fever, depression, even hallucinations or a combination thereof.

The report's authors apparently don't think it is necessary to await a tighter connection between air pollutants and the rise in asthma, though; they urge stricter regulation of indoor air pollutants, adding that tougher standards might also help alleviate "sick building syndrome," a catch-all phrase used to describe mucous membrane irritation and other symptoms some people experience in tightly insulated office environments.

A Case of Orbital Alzheimer's

The Compton Gamma Ray Observatory has become the latest NASA mission to develop technical glitches. This time, it's a mysterious failure in which the spacecraft's data recorders "forget" random bits of information in the 32-kilobit-per-second data stream they are supposed to be storing.

Soon after the observatory began its mission last April, both of its 72-megabyte digital tape recorders picked up this annoying habit of dropping random bits. Early on, scientists could interpolate the missing data, but the probe's Alzheimer's kept getting worse. Finally, on 18 March the error rate had become so high that project directors were forced to find a way to bypass the recorders.

A network of data relay satellites known collectively as TDRSS (pronounced TEE-dris) provided a partial answer. The observatory transmits its data directly to the satellites, though only half the time because none of the relays is in the right location during half of the observatory's orbit. This has forced it to rely on its forgetful recorders to the point that only about 75% of the probe's data is reliable. That figure continues to degrade as the errors worsen.

NASA scientists are known for their stiff upper lips. "We're not losing any primary science—it's just a matter of observing things longer than we had planned," says Neil Gehrels, the mission's project scientist. Still, the problem is worrisome enough for NASA and its contractors to have put together a 30-member team to figure out just what is wrong with the recorders, which were manufactured by Odetics Inc., based in Anaheim, California. Odetics recorders on the Magellan Venus mission also had problems, says a NASA spokesman. But an Odetics spokeswoman contends that it's premature to compare the problems.

Mercury's Metabolic Fingerprint

In debating the dangers of mercury dental fillings, toxicologists and dentists have had more success at shredding each other's reputations than at shedding light on the level of public risk. Most everyone agrees that mercury is one of the most toxic environmental substances known, and that it accumulates in the brain and kidneys. However, no one knows for sure whether low levels of exposure to mercury can subtly damage the body, because toxicologists who've studied mercury poisoning know, as University of Washington toxicologist James S. Woods puts it, "that there's no correlation between symptoms of mercury poisoning and concentrations of mercury in the urine or blood." Which is why, to end the debate, scientists need a test that would link mercury exposure to the biological effects of mercury in the body. Soon they may have it.

Woods and his colleagues are devising just such a test, which they describe in the August 1992 issue of the *Journal of Laboratory and Clinical Medicine*. The idea is to correlate mercury exposure to changes in urinary levels of porphyrins, which are intermediate molecules in the formation of heme, the body's oxygen-transport molecule. To catch mercury in the metabolic act, Woods isolates urinary porphyrins from rats exposed to mercury. Several ordinary porphyrins are present in much higher levels in the exposed rat urine, he says, as well as "precoproporphyrin," a substance unique to mercury exposure. The altered levels of porphyrins arise from mercury's effect on the kidneys, he says.

Woods is quick to acknowledge that he doesn't yet know whether his test is sensitive enough to detect the mercury that leaks from dental amalgams. However, he says, the test should be able to detect exposure to mercury from seafood or occupational sources.

GREENING GREENS THE OLD-FASHIONED WAY

PHOTO: CORNELL UNIVERSITY/CHARLES HARRINGTON; PHOTO ILLUSTRATION: D.DEFRANCESCO

Do scientists have time to play golf? If the answer is sometimes, do they get teed off by excessive greens fees? Eric Nelson, a turfgrass pathologist at Cornell, thinks he can save golf courses some of the greenbacks they coax out of weekend duffers–and make the environment safer as well.

Knowing that fungi can make greens go brown, and knowing how much money golf courses sink into the synthetic chemicals that fight fungi, Nelson is developing cheaper and safer "biofungicides." Specifically, he recently discovered that several batches of microorganisms derived from compost heaps can subdue such pleasant-sounding lawn diseases as pythium blight, root rot, red thread, and brown patch.

"We may someday be able to offer a whole cocktail of natural antagonists that will replace the use of chemicals for turfgrass altogether," Nelson posits. And he isn't waiting for someday. Nelson applied microorganisms from a foul mixture of poultry manure and other composts to two holes at Cornell's newly renovated golf course. Gone was the need for synthetics, he boasts. Plus, he hopes to help scientists more interested in a greener thumb than a greener green: The biofungicides should work on home lawns too, he says.