RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Chernobyl Power Proposal

A New Jersey–sized swath of forest contaminated by Chernobyl could become fuel to power the energy-poor republic of Belarus under a plan hatched by the U.S. and Belarus governments. Although some experts are skeptical that the wood can be burned without releasing dangerous radioactivity, teams at Sandia National Laboratories and the Belarus Institute for Power Engineering Problems near Minsk are poised to begin building a $1.6 million pilot power station.

The project is a real groundbreaker, says Larry Baxter, a specialist in biomass combustion at Sandia: "No one has ever tried to burn forest litter as a fuel before." The trick will be to burn everything—tainted trees and up to half a foot of the thick, spongy mat of leaves, twigs, and humus from the forest floor—without releasing cesium and strontium isotopes into the air, says Baxter. As part of the pilot project, scientists must develop a burner that prevents radionuclides from vaporizing into fine aerosols and keeps them large enough to be filterable by conventional air-pollution control devices. The process would produce about 4.5 kilograms of radioactive ash per tree, but this is low-level waste that could be safely buried, the scientists say.

L. ANSPAUGH/LLNL

Fallout probe. U.S. and Russian scientists extract soil specimen during 1993 survey.

The pilot project still has to win formal approval from a U.S. company, Wheelabrator Environmental Systems Inc. Wheelabrator, which is expected to cover half the cost, is to generate data from test burning of nonradioactive forest materials in its California plants, and will help design and build the pilot plant.

It's not hard to find skeptics of the project. Forest radioecologist Rudolph Alexakhin, who directs an agricultural institute in Obninsk, Russia, fears the environmental consequences, noting that the felling of the Ukraine's so-called "red forest," pine trees killed by the Chernobyl accident, caused the spread of radionuclides into rivers and ground water. "To be honest, I'm embarrassed by this proposal from my Belarussian colleagues," he says. Chernobyl researcher Lynn Anspaugh of Lawrence Livermore National Laboratory in California dismisses the plan as yet another grand but unrealistic scheme for cleaning up the Chernobyl mess.

But if all goes as planned, a hundred power stations might ultimately be built, cleaning up some 19,000 square kilometers of contaminated woodlands in 30 to 40 years, the researchers say. Otherwise, says Baxter, Belarus may have to wait 300 years for forest radioactivity to fade to negligible levels.

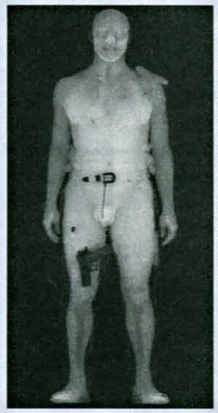
The World's Fastest Computer

Two University of Tokyo researchers have built what they say is now far and away the fastest computer in the world, able to perform up to 1.08 trillion floating-point operations per second—Tflops for short. That's about four times as fast as the current record holder for general-purpose supercomputers, a machine made by Fujitsu Ltd. for Japan's National Aerospace Laboratory with a theoretical peak speed of 280 gigaflops.

The computer, GRAPE-4 (GRAPE stands for GRAvity PipE), is a highly specialized beast, designed only to do certain astrophysical calculations. Astrophysicist Junichiro Makino, who developed it with computational physicist Makoto Taiji, says the effort grew out of so-called N-body simulations, in which large-scale astronomical systems such as galaxies and globular clusters are expressed as groups of individual bodies interacting through gravity.

Astrophysicist Piet Hut of the Institute for Advanced Study in Princeton, New Jersey, who collaborates with the Tokyo group, explains that in stellar dynamics the heavy work involved in computing gravitational forces makes for a "computational bottleneck." While a conventional supercomputer does the work through a series of software operations, Makino and colleagues created a special-purpose chip to do the job, hardwiring the equations as circuits on 1692 custom integrated processors. This makes for a quantum increase in speed: For example, Makino estimates that a simulation of the evolution of a 32,000-body globular cluster that took about 3 months on GRAPE-4 would take at least 5 years on an ordinary supercomputer.

Of course, the scientists do not plan to stand pat with GRAPE-4. Makino, who describes the GRAPE family in the July/August issue of the journal *Computers in Physics*, says they are now hoping to harness 20,000 of their specialized processors into a $10 million petaflop ($10^{15}$ operations per second) machine by the turn of the century.



AMERICAN SCIENCE AND ENGINEERING INC.

The visible passenger. So you don't like walking through the metal detector at the airport that squeals alarmingly in response to your belt buckle? Here's what could replace it: Backscattering x-rays, a new technology, far less invasive than medical x-rays, that harmlessly bounces x-rays off the body. Now used in some prisons to scan visitors, it can detect not only metal objects but plastic explosives and hidden drugs, as shown in this image which reveals bags of cocaine as well as various weapons. The image is in a report by the National Research Council (NRC), which is exploring future airport security systems at the behest of the Federal Aviation Administration. NRC panel member Harry Martz of Lawrence Livermore National Laboratory says some of the new technologies, including computerized tomography for checking out luggage and systems to detect traces of bomb-making materials on passengers, are going to get field exercise at the Atlanta airport during the Olympics—"a high-visibility event for terrorists"—in August.

Calibrating Ozone Damage

Few researchers dispute that a vast ozone hole develops over the Antarctic each austral spring. And they agree that the ozone drop can cause a 10-fold jump in the region's exposure to the sun's ultraviolet-B (UVB) radiation. But whether the extra radiation harms organisms such as ocean plankton is a matter of some debate. It's "not a subject which is at room temperature," says biologist Alexander Glazer of the University of California, Berkeley.

Glazer and Berkeley physicist Kaiqin Lao have now come up with a simple test that they hope may cool the debate, at least for a

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class of ocean plankton known as cyanobacteria. In the 28 May issue of the *Proceedings of the National Academy of Sciences*, Glazer and Lao present laboratory data showing that elevated UVB radiation quickly breaks apart a group of proteins involved in photosynthesis. Called the light-harvesting complex, these proteins absorb mainly green light, the first step in converting sunlight to chemical energy. As the proteins break apart, organisms lose their ability to absorb green light.

The simple way to measure this light absorption directly is by probing individual cells with laser light to monitor green light fluorescence, which increases as absorption is reduced. Glazer and Lao say that by looking for this fluorescence spike in cyanobacteria samples taken from the ocean under the ozone hole, researchers should be able to determine whether increased UVB exposure is damaging the organisms.

"This kind of test would be very useful," says John Cullen, an oceanographer at Dalhousie University in Halifax, Nova Scotia, because "no one has been wildly successful in finding markers of UV damage in ocean organisms."

The scientists warn that lab experiments may not replicate what's actually happening out in the ocean, in part because water readily absorbs UV light and thus mitigates some of the effect. But, says Glazer, oceanographers already use the same laser-based instruments for other ocean sampling measurements, so they can easily add this to tests they do in the field.

Higher-Ups in Charity Scandal Nabbed

Jacques Crozemarie, former president of France's scandal-ridden Association for Cancer Research (ARC), has been charged with "breach of trust, forging documents, complicity in forging documents, and making use of forged documents" in the wake of allegations of mismanagement of the charity's funds. He was arrested on 26 June at Paris's Orly airport as he was returning from a trip. Later that evening, during police questioning, Crozemarie suffered a "minor cardiac malaise" and was hospitalized. An examining magistrate read the charges to him at the hospital the next day. As of late last week, the magistrate was considering whether Crozemarie's health would permit his remaining in police custody.

Two others were arrested in the case, including the chief executive of a company which controlled several contractors whose exclusive contracts with ARC—and close relations with Crozemarie—are under investigation. Crozemarie's attorney did not respond to an interview request, but the arrests were welcomed by Michel Lucas, the former government inspector who replaced Crozemarie as ARC president when the scandal broke wide open last January. "This should help clarify things," Lucas told French television. Lucas has had the tough job of trying to restore ARC's credibility. Last month, for example, he persuaded most of the charity's council to resign following accusations that it had ignored the developing scandal (*Science*, 17 May, p. 941). Lucas's efforts are being closely watched by French biomedical researchers, for whom ARC funding is an important supplement to laboratory budgets at a time of shrinking support from the government.

Depressing Questions

Terminally ill patients who want euthanasia or physician-assisted suicide (PAS) should undergo rigorous psychiatric evaluation because clinical depression may be skewing their judgment, according to a study published last week.

Investigators at Boston's Dana-Farber Cancer Institute found that cancer patients with "significant" pain were actually less likely to find euthanasia and PAS acceptable than those without pain. Patients who were depressed, as judged from scores on a standardized questionnaire, were far more likely to have taken actions regarding euthanasia or PAS, such as discussing the topic with their physicians, hoarding drugs, or reading the "suicide manual" *Final Exit*. Of the 155 patients, 49 were in pain; 23 were depressed. About half of the depressed patients were also in pain.

Dana-Farber oncologist Ezekiel Emanuel, lead author of the study which was published in the 28 June issue of *The Lancet*, says it raises the question "If patients in pain don't want this, is it the right thing to be doing?"

Other researchers say the results fit with previous findings that terminally ill patients' desire for euthanasia or PAS often wanes after treatment with antidepressants. "Good care of all patients with terminal illness involves an assessment of whether or not they are depressed," says Susan Block, a psychiatrist at Harvard Pilgrim Health Care in Boston. "It's great to have confirmation of this." But the policy implications are by no means clear. Bioethicist Peggy Battin of the University of Utah worries that findings such as those of the Dana-Farber study could lead some people to conclude that "any shred of depression in a person who is terminally ill should disqualify such a person from making end-of-life decisions."

New Center to Press Chimp Rights

A famous quotation from the animal-rights movement goes: "A rat is a pig is a dog is a boy." Now activists are seeking firm legal grounds for the equation, at least as far as primates go.

Steven Wise, who for a decade headed the Animal Legal Defense Fund in San Rafael, California, is now setting up a Center for the Expansion of Fundamental Rights in Boston. Its purpose: to push for the courts to recognize that chimps and their pygmy cousins, bonobos, have rights to "bodily integrity and bodily liberty." The center has a three-person board comprising Wise, his wife, lawyer Debra Slater-Wise, and noted primatologist Jane Goodall.

"The immediate object of the center is to try to topple the legal wall that exists between human beings and every other kind of being," says Wise, who adds that he's not drawing the line at chimps—or at the two rights he has so far enunciated. But "common law works in incremental ways." He explains the "arbitrary" distinction favoring people has been an anachronism ever since Darwin showed that humans are on the animal continuum.

Goodall could not be reached for comment. Primate researcher Sue Savage-Rumbaugh of Georgia State University says she favors Wise's project because she is "in principle supportive of the idea that apes deserve some of the rights that human beings have." Others are less enthusiastic. One scientist, who asked for anonymity because of unfortunate experiences with animal activists, says: "It's a terrible idea. It opens up unbelievable cans of worms. ... It represents part of a not-so-hidden agenda by rights groups to prohibit animals in any kind of research whatsoever." Gordon Gallup, psychologist and primatologist at the State University of New York, Albany, adds that there are practical considerations: "Unfortunately, to the extent that Great Apes survive into the next century, their best chance of survival is going to be in captivity."

S. WINTER/BLACKSTAR

Different species, equal protection? Activists say chimps have human rights.

Wise, who has a $5000 grant from the National Antivivisection Society to kick off his fundraising effort, says he and Goodall will be tackling lawyers head-on at the meeting of the American Bar Association in Orlando, Florida, in August, with a presentation entitled: "Are chimpanzees entitled to fundamental legal rights?"