RANDOM SAMPLES

edited by IVAN AMATO

National Metacenter to Link Supercomputers

Supercomputing is about to be "suped" up.

On 17 November at a supercomputing meeting in Minneapolis, a group of collaborating computer scientists from each of the nation's quartet of National Science Foundation (NSF)-funded supercomputing centers announced a new concept in linking computers, the Metacenter. It's not going to be another new big-science facility eating up small-science funding dollars, though; it's more a disembodied system of procedures and protocols that will enable researchers with computational problems to tap into virtually any of the many machines already available at the nation's supercomputing centers. At the moment, the separate bureaucracies and protocols of each center make this kind of picking and choosing extremely cumbersome.

Explaining one of the advantages of this concept, Malvin Kalos, director of the Cornell Theory Center, one of the NSF supercomputing centers, says: "The national community of [supercomputer] users will be freed from the connection with any single center and with the particular style of operating at any one center."

As they always have, the supercomputers will help users aiming to predict hurricanes, calculate the course of chemical reactions, or simulate air drag on planes traveling at Mach 25. But hooking the machines into the Metacenter should enable users to get more thorough answers faster than in the past, says Ralph Roskies, codirector of the Pittsburgh Supercomputing Center near Pittsburgh University and Carnegie-Mellon University. The reason, say Roskies and Kalos, is "heterogeneous computing," a scheme in which multiple computers work on a single problem, each solving the part for which its architecture is best suited. "In a year or so, all of the centers will have different parallel computers" with different strengths, notes Kalos.

Of course, there's plenty to do before the Metacenter will be all it can be, says Roskies. For example, beefing up communication lines for transferring data between centers and establishing a national file center that would store, track, and shunt files to different centers and computers are crucial near-term projects. Estimated time of arrival? Roskies says the Metacenter will emerge bit by bit over several years. All the while, he adds, metacomputing will get easier and easier for more and more people.

U. OF ARIZONA/LORI STILES

Oily crop. Feed these plants seawater—get cooking oil in return.

How to Grow Oil in the Persian Gulf

Saudi Arabia now spends $1.2 billion a year importing oil—cooking oil, that is. But it has just taken the first step toward cooking oil independence, setting an agricultural milestone in the process.

Halophyte Enterprises, a company in Tucson, Arizona, set up to commercialize technology developed at the nearby University of Arizona's Environmental Research Laboratory (ERL), has sent a team to Jubail, Saudi Arabia. There, it is planting *Salicornia bigelovii*. The seeds of this salt marsh plant yield not only edible oil but even protein meal for animal feed. Gene Koch, Halophyte's president, says that "this 300-hectare [740-acre] farm, a joint venture with our Saudi partner, will be the first commercial [crop] in the world to be irrigated with seawater."

The project, code-named "Operation Desert Bloom," is unfolding on the Persian Gulf coast about 100 kilometers north of Jubail, which was one of the centers of U.S.-led military activity during the Gulf war. Desert Bloom's strategic plan derives from 15 years of studying halophytes, plants that are extremely salt tolerant. It turns out that as many as 1500 plant species are capable of living on salt water, but *Salicornia* showed special commercial mettle during field tests in Mexico using seawater from the Gulf of California.

Halophyte and the Saudis will soon learn if Persian Gulf water is as good at nurturing the crop. Carl Hodges, the retired director of the ERL who is now a consultant in Saudi Arabia, can't imagine it would be otherwise. "The next revolution in agriculture is going to be seawater-based irrigation," he predicts. He believes not only that the project will prove economically profitable, but that the strategy could also help control global warming by covering barren coastal desert with food crops that would soak up carbon dioxide.

Results on Planetary Name Game

"Greetings, Gaians, take us to your leader." These might be the first words from little green men who did their homework with *The Old Farmer's Almanac* before paying a call to their earthling brothers.

Science readers will recall that the *Almanac* lamented last year that Earth (named after dirt) and the moon (a purely generic term) deserved better monikers (*Science*, 13 December 1991, p. 1584). Its call for suggestions brought in 700 responses, according to an article in the *Almanac*'s current issue, and while there were no clear winners, leading contenders were Gaia, after the Greek goddess of the earth, and Luna, the Roman goddess of the moon.

A throng of other deities, from Artemis to Vesta, was put forth, along with Egyptian, Norse, and Indian gods. And then came the creative names like Terraquea, reflecting the dual earth-water nature of our planet. One reader wanted to name the moon Armstrong after the first human to set foot there. Another with a cynical cast of mind suggested Polluto and Polluto Annexia for Earth and its most famous satellite.

The *Almanac* is forwarding all the suggestions to the International Astronomical Union (IAU), the group that selects official names for new celestial bodies. But the IAU may well go along with the small contingent of respondents who like things just as they are. One cited the use of "the earth" in Genesis, commenting: "What's good enough for God is good enough for me."

Science in the Transition

President-elect Bill Clinton and his transition team haven't dropped many hints about their next moves on science and technology (S&T) issues. But it's not for want of advice. As if Vice President-elect Al Gore's input and the unsolicited prescriptions coming from all directions weren't enough, they now have yet more guidance: a report on S&T "transition planning" from a pair of seasoned policy experts.

The report was released last month at a AAAS meeting, on science policy in the Clinton Administration, by coauthors Richard E. Bradshaw, an S&T guru at George Mason University, and William G. Wells Jr., a science policy expert at George Washington University. It urges the transition team to put together a "cross-cutting" S&T group from members of the scientific and technical

communities. The object: to help keep the transition team attuned to S&T issues crucial to U.S. competitiveness and economic recovery.

The authors also urge quick action on naming a science adviser for the president. The Clinton people have heard that one before, and it's apparently sinking in: In recent days the transition team has accrued a "short list" of a couple of hundred scientists.

Caskey Promises a Democratic HUGO

Good intentions haven't kept the Human Genome Organization (HUGO) from being criticized as noticeably lacking in vision. So in January, when geneticist Thomas Caskey of the Baylor College of Medicine replaces Walter Bodmer as the new president of the organization, he'll be adding direction to the venture.

"Caskey is a...good organizer and a well-respected, distinguished scientist," says HUGO member Glen Evans of the Salk Institute. "He can really have an impact on what impact HUGO will have."

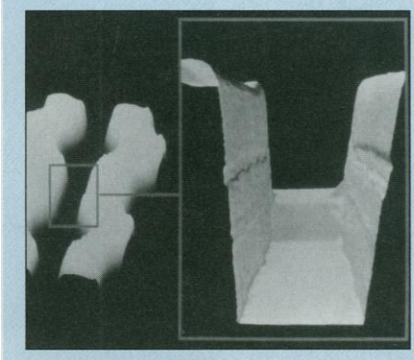
Evans and others say that HUGO, created in 1988 to foster international cooperation on the Human Genome Project, has never really found its mission. Only recently has it begun to carve a niche for itself in organizing the annual Human Gene Mapping meetings. And though HUGO now boasts more than 500 members, it is still seen as elitist, with directives coming down from the officers, despite attempts to combat that image (*Science*, 15 November 1991, p. 932).

Caskey, who was elected to a 3-year term last week, hopes to bolster HUGO's sense of purpose through a more democratic "bottom-up" approach. He has already announced plans for the first ever membership meeting—next year in Kobe, Japan—and the creation of member committees to improve and accelerate the exchange of information and research tools, such as genetic probes, among genome scientists worldwide. That already happens among the big genome centers in the United States, says Caskey, who heads one of those centers at Baylor. "But many members out there would profit from more up-to-date information and access to materials." Fellowships to support the cost of travel between labs to foster both technology transfer and scientific collaborations are also on Caskey's agenda.

Caskey, who recently served as president of the American Society of Human Genetics, concedes that countries with strong genome programs, like the United States and England, "could get along quite nicely without HUGO." That's not so for scientists in other countries who would like to participate in the genome effort. "The pace of genome work has accelerated so quickly that unless we get an international organization formed to draw countries in, more and more will be left out," says Caskey.

A Kinder, Gentler Chip Inspection

Chip factories are strewn with corpses—of expensive, silicon wafers deliberately cracked to pieces. Electron microscopists are the murderers: They do it to check the quality of all sides of the microcircuitry components at each point of the manufacturing process. "There can be as many as 300 steps, so a lot of wafers get destroyed," remarks manufacturing researcher Kumar Wickramasinghe of IBM Thomas J. Watson Research Center in Yorktown, New York. But now, the wafer carnage may be about to become a thing of the past, says Wickramasinghe. Earlier this month at a semiconductor meeting in Austin, Texas, he and IBM colleagues described a new atomic force microscope (AFM) that images all parts of a chip's microcomponents—sidewalls included—noninvasively. In a trial run of the new tool, the researchers imaged the deep contact lines on the 16-megabit memory chip shown above.



IBM

Tinyscape. AFM image of microcliffs—0.5 microns apart—on a memory chip.

To pull off the feat, the workers had to modify a standard AFM. AFMs work by dragging a superfine stylus over a surface. A force sensor monitors its ups and downs and a computer then assembles an image of the surface from this data. But for inspecting chip quality, these tools fall short of the task: Their tips plow into soft surfaces such as the polymeric photoresists used during chip making, thereby distorting the images. The tips also can't probe into deep clefts in the surface, notes Calvin Quate of Stanford University, who helped develop the original AFM in 1985 and is now developing ways of using arrays of AFM tips for ultraprecise manufacturing.

In their variation on the AFM theme, the IBM researchers circumvent the plowing problem by relying on "noncontact" imaging. As the tip hovers slightly above the surface, it taps into subtle attractive forces between molecules—known as van der Waals forces—to assemble the image. The novel "double spike" shape of the tip also allows it to get into nooks and crannies that standard AFM tips have been blind to, Wickramasinghe says. That, he predicts, should mean a dramatic drop in the wafer death rate.

Ex-Yugoslavian Scientists Needed

Serbia and Montenegro—the two republics that make up the rump Yugoslav federation—aren't getting headlines with their science. In fact, the republics' status as international pariahs hasn't brought them many favorable press citations of any kind. But Vlastimir Matejic looks to better days and is counting on science to help

An information scientist, Matejic is Yugoslavia's new science minister. Surveying a community of his peers that had already been depleted by years of brain drain only to be further thinned by the effects of United Nations sanctions, Matejic has sent a personal appeal, in the form of "chain letters," to members of the one group that may be prepared to help rebuild his country's crumbling scientific infrastructure: expatriate researchers.

Most of the researchers Matejic is targeting left Yugoslavia before the country descended into war, but many Serbian science students, uninterested in fighting their Croat and Bosnian brothers, have also fled the country. In the letters, Matejic pleads with émigré Serbian and Montenegrin scientists to make trips to Yugoslavia as visiting lecturers, send journals and equipment, and arrange study trips abroad for the young Yugoslavs who could rebuild the country's science programs.

Matejic says he has begun receiving sympathetic replies. But for expatriates to follow through now would mean violating UN sanctions, which prohibit the import of journals and equipment and ban scientific cooperation with Serbian or Montenegrin government-sponsored researchers.

Is Matejic aiming to bust the UN sanctions? He does question the ethical justification for banning scientific cooperation, but he denies sanction-busting as his motive. Instead, he says his personal appeal for help is an attempt to identify sympathetic ex-Yugoslav scientists early on, so that aid can kick in as soon as the sanctions are lifted.