RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Yellowstone's Cutthroats in Peril

Life was good for the cutthroat trout in Wyoming's Yellowstone National Park before the lake trout crashed the party. Now lake trout, a predator population apparently introduced in the late 1980s, are threatening to wipe out the cutthroat, according to estimates published earlier this month. To prevent this, Yellowstone officials are mounting an aggressive campaign against the lake trout. "It's an ecological crisis of the first order," says John Varley, director of the Yellowstone Center for Resources.

The problem hooked scientific attention in July 1994, when an angler caught a lake trout—not a native species—in Yellowstone Lake. The silvery, iridescent fish not only compete for cutthroats' resources but eat them as well. Worried park scientists began fishing for clues to the extent of the danger. Over a 6-week period in 1994, they caught about 1400 cutthroat trout and only two lake trout. But the lake trout were both 5 years old, and visiting anglers later turned in two fish aged 2 and 4, which convinced researchers that the trout were breeding in Yellowstone, says Lynn R. Kaeding, project leader for the Yellowstone Fisheries Assistance Office. A second fishing experiment in summer 1995 brought in 153 lake trout and over 1000 cutthroats in 4 months. The researchers estimated that if this population ratio held true throughout the lake, the numbers of lake trout were into the hundreds of thousands. "It is alarming," says Kaeding, whose team presents its research in the March issue of *Fisheries*. "The horse has been out of the barn for quite some time now."

PETER RISSLER

Losing ground at Yellowstone. Cutthroat trout.

Park officials are trying to devise ways to control the lake trout population without harming the cutthroats. One way is to troll with wide-mesh gill nets so that cutthroats slip through but the large female lake trout are stuck in them. Another idea is to attach a radio transmitter to a "Judas fish" and follow it to find spawning grounds, and then use extra nets at those sites during spawning season. Meanwhile, park officials have advertised an "all you can fish" policy for lake trout and made it illegal for anglers to throw live ones back. It's a war that must be won, say park scientists—otherwise they predict the cutthroat population could be reduced by 90% in as few as 20 years.

Mix and Match for New Drugs

Combinatorial chemistry—where researchers combine a few chemical building blocks in many ways to produce a large library of compounds—has met the bacterial drug factory. The result may be a faster pace of drug discovery, according to a report in the February issue of *Molecular Diversity*.

Bacteria have played a large role in the search for new drugs: Researchers collect microbes from all over the world and then isolate and test their metabolites for pharmaceutical activity. One class of bacteria-derived drugs, the polyketides, includes powerful antibiotics, immunosuppressants, and anti-cancer agents which together account for sales of about $5 billion a year. But the search is a costly one: Of all the polyketides examined, only about 1% have turned out to be new compounds, and far fewer show any useful activity.

Bacteria produce polyketides with the help of a family of enzymes known as polyketide synthases (PKSs), which convert starting compounds into powerful drugs. Researchers have been attempting—with modest success—to speed their drug discovery process by altering the genes that code for these enzymes, in hopes that this will result in changes in the structure and activity of the polyketides produced.

Now, however, Stanford chemical engineers Chaitan Khosla and Hong Fu say they're shifting the search into high gear, using what they call "combinatorial biosynthesis." The duo reports that—like combinatorial chemists working with small building blocks—they mixed and matched engineered PKS genes from different organisms to create 100 different bacterial clones with unique combinations of PKS genes—the largest such collection to date. Only about 25 of these clones produced unique compounds. But when the compounds were tested for antibiotic activity, four of them were just as active as a known reference compound.

The work shows that "you can generate a lot of compounds in a hurry," says Leonard Katz, a polyketide expert at Abbott Laboratories in Abbott Park, Illinois. It remains to be seen, however, whether the technique can produce compounds that show entirely new kinds of antibiotic activity, he adds. And that, in the end, will be the test of a winning combination.

AIDS Report Doesn't Bomb

The recommendations—more scientific oversight, for instance—in the National Institutes of Health's evaluation of its AIDS research program were not terribly startling (*Science*, 15 March, p. 1491). But one senior official thought they just might be explosive.

On the afternoon of Saturday, 9 March, a 2-kilogram padded envelope appeared at the Bethesda, Maryland, home of the official, whose name has not been released by the police. His suspicions were immediately aroused. No package was expected—and this one showed at least one hallmark of suspicious postal matter that scientists have been warned about in the wake of the Unabomber: It bore no return address. The official called the police, who arrived and were soon joined by the moon-suited bomb squad, a bomb-detecting robot, and sniffing dogs. TV trucks followed shortly.

There were some technical difficulties—the robot's video kept bringing up the home shopping network. But x-rays finally revealed there was no metal in the package. A water cannon was then used to blow open the contents. The upshot of the matter? A soggy lump of documents that turned out to be a copy of the AIDS report, a somewhat red-faced official—and disappointed television crews.

A spokesperson for the Office of AIDS Research says most senior officials were notified that a review copy of the report would be delivered to their homes, but some apparently never got the message. The spokesperson adds that a contractor charged with delivering the reports failed to put return addresses on them, a mistake they promise will not be repeated.

Science Policy Facelift For Canada

After nearly 2 years of review, the Canadian government has released a new science and technology policy, grandly titled "Science and Technology for the New Century," that places heavy emphasis on private-sector science as an engine of growth.

The 38-page plan, released on 11 March, notes with alarm that Canada placed 18th out of 48

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national economies in science and technology, according to a 1995 World Economic Forum ranking. The Canadian plan hopes to remedy this with an investment fund, called Technology Partnerships Canada, designed to narrow the "innovation gap" between basic research and successful commercialization. The fund will eventually be putting $250 million a year of tax money into industry to help ready high-tech projects for the marketplace. It will "share risk ... gain royalties ... and reinvest these repayments to help support new initiatives," especially in areas such as aerospace, biotechnology, environmental research, and advanced manufacturing, according to the plan.

Some influential Canadian scientists are less than enthusiastic about the direction things are taking. "I find it alarming that there's so little mention of basic science," says Nobel Prize–winning chemist John Polanyi of the University of Toronto. "Though I'm all for transferring knowledge to industry, the thing that alarms me is that too little attention is paid to creating the knowledge that we must transfer." Jon Gerrard, the secretary of state for science, research, and development, says, however, that the plan aims to redress a long-standing imbalance. "We've made a lot of discoveries here, but we've done less well in building the industries and having the jobs here," he told *Science*.

The plan, ironically, was released a day after budget cuts had forced the government-owned Atomic Energy of Canada Ltd. to close several of its research divisions, including the neutron-scattering facility where physicist Bert Brockhouse did the work that led to his 1994 Nobel Prize.

End of the Line for UV Explorer

The "grandfather" of orbiting observatories is finally at the end of its run. The International Ultraviolet Explorer (IUE) satellite, launched in January 1978, will be switched off some time before September. A joint venture between the European Space Agency (ESA), the United Kingdom, and the U.S. National Aeronautics and Space Administration (NASA), the long-running satellite is the first victim of the freeze imposed on science spending by the ESA's ministerial council last November.

Its departure is only somewhat premature, however. IUE was scheduled to be shut down at the end of 1997, so the new date robs the satellite of about 16 months of observing time. Willem Wamsteker, the IUE's project scientist, now has to decide which of the tasks planned for it will have to be scratched.

The spacecraft has spawned more than 3000 refereed papers and opened a new branch of astronomy during its 18 years. After its launch, scientists got their first-ever glimpses of the ultraviolet emissions of supernovas, active galaxy cores, and comets; Wamsteker calls these the "gee-whiz years." Then the field settled down to investigate questions these early observations raised. A highlight in its history was the IUE's observations of the massive Supernova 1987A.

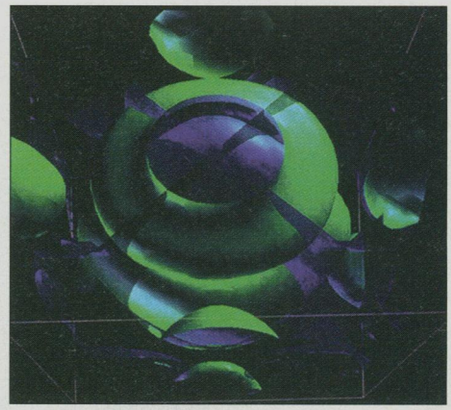
NASA has already bowed out of the IUE for cost-pruning reasons. ESA now expects to save between 6 million and 6.5 million ECUs (less than $8 million) with the premature shutdown. But, given the science budget's straitened circumstances, any savings are welcome.

Astronomers working in the ultraviolet part of the spectrum will not, however, be entirely bereft. Although it is in a different orbit and covers different ultraviolet frequencies, the Hubble Space Telescope can take up much of the slack.

Going First-Class on The Internet

To scientists who want to exchange a lot of data in a hurry, the data superhighway is looking more and more like a Los Angeles freeway: slow and prone to delays. Now the National Science Foundation (NSF) is looking for ways to open up some fast lanes for scientists.

There's "a lot of frustration out there," says Mark Luker, director of the NSF's networking program. The frustration is especially sharp among scientists hoping to set up far-flung collaborations or to control instruments remotely over the Internet. So last week, NSF announced a program that will fund high-performance links from campuses and laboratories to the NSF's dedicated high-speed Internet backbone.



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Computing in concert. A new NSF program will provide high-capacity network connections like the ones used to compute these gravity waves.

The program, called Connections to the Internet, will favor schemes that rely on the existing Internet, upgrading it and cutting through its congestion, over ones that call for new, dedicated links, he said. The links might, for example, give messages racing between two collaborating supercomputers priority over ordinary e-mail and Web traffic, just as highway traffic gives way to fire trucks. But ordinary service won't suffer, says Luker, because the entire network will gain capacity. He adds that ultimately the approach "could give everyone the chance to use 'overnight express,' 'first class,' or 'third class' depending on content."

These types of schemes are already incubating at computer science centers, Luker adds. One example is the so-called Resource Reservation Protocol (RSVP), which asks the Internet's router computers to recognize high-priority data streams and give them the right of way. To test it and other approaches, the Internet connections program will fund 10 or more 2-year grants at a time, at several hundred thousand dollars apiece.

Paul Woodward, director of the University of Minnesota's Laboratory for Computational Science and Engineering, lauds the NSF effort as "a very creative approach—trying to share fibers that are already there." He says that he and other researchers developing high-performance network tools are counting on the effort to succeed: "If you just put [high-performance uses] in with the other traffic—that's a very discouraging thing."

MATH POWER

High school algebra "completely turned around the nature of the school [for me]. ... Instead of being in the same classrooms with [other] Chicano and black students, I now found myself [headed for college] with the Japanese and the Jewish students."

—Engineer George Castro, speaking on *BreakThrough: The Changing Face of Science in America*, a six-part series on minorities in science to be launched by WGBH-TV in Boston on 8 April