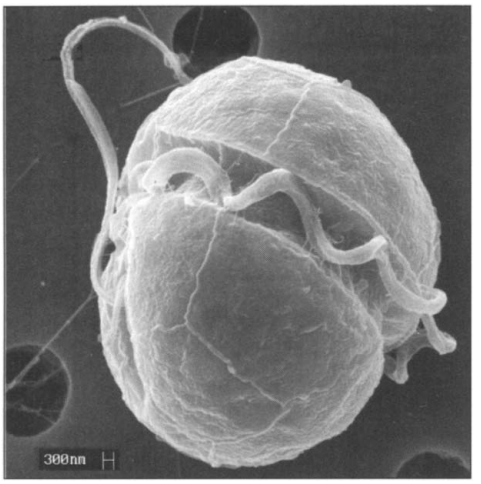
they could not find a toxin, and that *Pfiesteria* can kill larval fish by feeding on them (*Science*, 11 October, p. 346).

Last week, at the 10th International Conference on Harmful Algae in St. Petersburg, Florida, Burkholder said that her critics had not established the right conditions for making *Pfiesteria* produce toxin. Her lab coaxed the strain of *Pfiesteria shumwayae* used in the VIMS experiments to kill juvenile tilapia in less than 4 hours, which meets her criteria for toxicity. Collaborating chemist Peter Mueller of the National Oceanic and Atmospheric Administration in Charleston, South Carolina, described a toxic chemical isolated from Burkholder's fish-killing *Pfiesteria* strains. Burkholder says the NOAA lab also detected this chemical in water and cells from the VIMS strain. It appears to be a glycoside, a molecule that's half sugar, half some other chemical group that hasn't been identified.



Toxic or just hungry? Scientists disagree on how deadly a sugarlike molecule reportedly made by the *Pfiesteria* microbe (above) is to fish.

Other algal toxin researchers remain skeptical. Wayne Carmichael of Wright State University in Dayton, Ohio, says that, although he knows of one other algal toxin that's a glycoside, this kind is unlikely to cause the neurotoxic effects reported in fish and humans. "It would not explain the range" of observations, he says. VIMS fish pathologist Wolfgang Vogelbein points out that nobody has yet shown that this purified toxin produces the lesions he sees on fish physically attacked by *Pfiesteria*.

Burkholder's critics want the chance to test her toxic strains. Burkholder, who has long been criticized for not sharing her strains, says that "there were discussions" at the meeting of organizing blind testing of her cultures by other labs, but it's "still in the planning stages." The key issue, she says, is for other scientists to follow her protocols.

–JOCELYN KAISER

INTERNATIONAL COOPERATION

NATO Ordered to Cut Science Program

CAMBRIDGE, U.K.—The idea was to celebrate science at the North Atlantic Treaty Organization (NATO). But 2 days before last week's first-ever "Grand Gathering" in Brussels of researchers and others connected with NATO's science program, the alliance's political overseers slashed the program's $24 million budget by 13%. The fete quickly turned into a self-examination of a program that has struggled to find a suitable mission to replace its former role in helping Western nations stand up to Soviet hegemony. It also spawned a behind-the-scenes effort to reverse the cuts.

The science program supports research grants, fellowships, and workshops for scientists from NATO's 19 member countries and 34 nations in Eastern Europe, Central Asia, and North Africa. Its budget—a slice of NATO's civilian budget, which itself is only 14% of the alliance's roughly $850 million war chest—"is peanuts," admits Jean Fournet, NATO's assistant secretary general for scientific affairs. But after a decade of budgetary stagnation, "this is the first year we've had a substantial cut," says University of Oslo mathematician Jens Erik Fenstad, a 10-year veteran of the science committee that helps set program policy. "NATO has to decide whether it wants a science program or not," adds committee member Charles Buys, a medical geneticist at the University of Groningen, the Netherlands.

Science has never been a high priority for NATO's military masters. The program survived a temporary Canadian withdrawal in 1997, thanks in part to a report by a blue-ribbon panel that urged NATO to expand its scientific efforts in Eastern Europe (*Science*, 31 October 1997, p. 795). But the program is under renewed scrutiny along with NATO itself, which next month prepares to welcome up to nine new members.

In recent years, the science program has won praise for funding security projects in such flash points as the Caucasus and Central Asia and for its innovative "Virtual Silk Highway" Internet project that links scientists from Vancouver to Vladivostok. The program responded to the 11 September terror attacks by bolstering its portfolio of nonclassified research and workshops on nonproliferation and fighting terrorism. And its robust ties with Russian scientists have aided that country's integration into the NATO family.

But just as the science program appeared to be adapting to the changing geopolitical landscape, the overlords of the alliance's civilian affairs—NATO ambassadors from each member country—delivered a harsh setback by lopping off a big chunk of its budget. Although their 22 October deliberations were secret, a few of the smaller member nations have been demanding cuts in NATO's civil budget, says Thordur Jonsson, Iceland's representative to NATO's science committee. The science program, the largest civil line item apart from salaries, proved a tempting target.

When word filtered out the next day, representatives on the science committee from 18 of the 19 member states immediately signed a statement denouncing the cuts. The lone holdout was the U.S. representative, physicist Vic Teplitz of Southern Methodist University in Dallas, Texas. "I didn't particularly want to sign it," says Teplitz, adding that he favors "a more thoughtful reaction." The letter was expected to go this week to NATO's secretary general, George Robertson, who according to committee members can weigh in before the decision is finalized.

Anticipating bad news, Fournet's team had already decided to revamp the popular fellowships program, which places a few hundred scientists a year from Eastern Europe and other disadvantaged regions in Western labs. It hopes to save money by awarding salaries and equipment grants to about 1000 scientific émigrés a year who are willing to return East for at least 3 years. "We'll do more with less" by taking advantage of the large differential in salaries, says Fournet. But Jonsson and other committee

Propped up. A NATO science project on seismic risk is studying the aftermath of a 1988 quake that devastated Gyumri, Armenia's second largest city.

CREDITS: (TOP TO BOTTOM) VIRGINIA INSTITUTE OF MARINE SCIENCE; MUTSUMI STONE

members worry that the fellowship program might have to be scrapped altogether. Buys, the Dutch representative, warns that "further cuts will be disastrous."

Science committee members hope to convince Robertson of the value of science in strengthening the alliance. "If only they would forgo buying one F-16, you could use the money to transform NATO science," notes one member. At $25 million, such a financial transfer would more than double the science budget. On the other hand, a continued decline in the science program might leave it too poor to buy even spare parts for the fighter plane. **–RICHARD STONE**

DNA SEQUENCING

Venter's Next Goal: 1000 Human Genomes

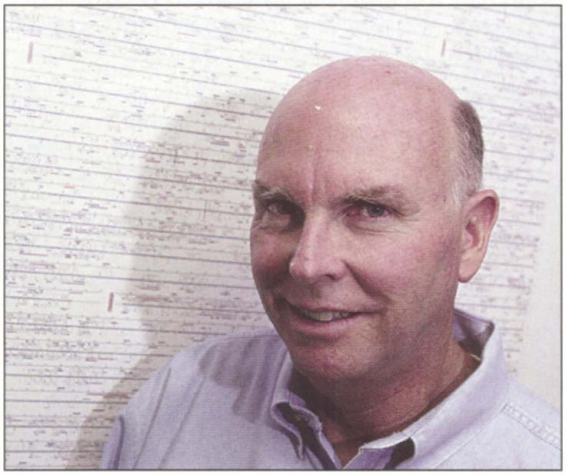
Fundraising campaigns often repay donors with mugs, buttons, or books as a token of thanks, but DNA sequencer J. Craig Venter is offering something more personal. People who donate $500,000 to his recently formed J. Craig Venter Science Foundation can have their genome analyzed and get the results on a disk.

Venter, who left the position of CEO at Celera Genomics in Rockville, Maryland, in January, is making this offer as he drums up support for several research projects that his nonprofit foundation will oversee. They include a scheme to develop hydrogen-producing organisms, a genetics policy shop, and a lab for high-speed DNA sequencing. The lab is a high priority, and Venter says he hopes to get it launched by January 2003; within 2 years, he expects it to sequence the genomes of 1000 individuals, including those of interested sponsors. It will also test new technologies, including an efficient DNA sequencing system patented last month by U.S. Genomics of Woburn, Massachusetts (*Science*, 25 October, p. 735).

Venter is steering $50 million of the funds he controls into the sequencing facility, much of it originating from the endowment of The Institute for Genomic Research (TIGR), also in Rockville. He founded TIGR in 1992; it is now run by his wife, biologist Claire Fraser, and it receives 95% of its funds from grants and contracts. Venter expects to find strong private support for human sequencing based on initial reactions, but he hasn't received any pledges as yet.

Donors to the project will have a chance to learn about their own DNA and at the same time contribute their genetic information to a pooled database for use in medical research, according to Venter. The data will be placed in the public domain, possibly in the National Institutes of Health's GenBank, he says. These human genomes will not be as complete as those produced last year by Celera and the public Human Genome Project led by the National Human Genome Research Institute, as the plan this time is to sequence only the "essential" gene-coding regions. Venter adds that he intends to publish his findings in a scientific journal.

Venter does not plan to collect medical data on donors, but he hopes to team up eventually with a health center that will be able to interpret the results and possibly even offer clients diagnostic information. He does not yet have such a medical partner. Venter believes that his new human DNA database will be more valuable than earlier ones containing "homogeneous genome sequence," because it will include many more individual genomes, making it easier to "identify associations between traits and genetics." Because this research involves human subjects, the project will follow "standard procedures," according to Venter, including securing informed consent from participants and approval by an institutional review board.



Premium offer. J. Craig Venter is proposing to analyze the genomes of interested major donors to his foundation.

Despite such assurances, Arthur Caplan, director of the University of Pennsylvania Center for Bioethics in Philadelphia, is concerned that volunteers who offer to donate DNA be told that they are unlikely to receive much benefit from participating. Caplan says that any genetic risk profile emerging from this effort is likely to be "loose, weak, and unreliable," because the field is so young. According to Caplan, proper informed consent should communicate "how poor the information is likely to be." This would not be a strong selling point for the foundation's fundraising efforts.

Richard Gibbs, director of Baylor College of Medicine's Human Genome Sequencing Center in Houston, Texas, also thinks that the plan to sequence the genomes of 1000 individuals is "flawed in some of its details," although he praises Venter for "pushing the envelope." The computer models used to identify genes in DNA data have not been fully validated, Gibbs says, suggesting that ramping up to do human genomes at high speed might yield unreliable results. He also is concerned that the road map for dealing with ethical issues is not clear, either, as there is no federal legislation in place to protect against genetic discrimination. In addition, he wonders whether Venter will find many people who are willing to participate in the project and can afford a $500,000 donation, the projected cost of a genome analysis.

Venter has faced skepticism before. He remains confident that his collection of 1000 human genomes will become a powerful tool for identifying the causes of disease, and that public fears about misuse of such data can be overcome. Venter explains that he donated his own DNA to the Celera genome sequencing project—and announced this fact—because he wanted to lead by example.

His new lab, in addition to probing human genomes, will test new high-throughput sequencing technologies available from a variety of companies such as U.S. Genomics and Solexa, a U.K.-based biotechnology company. The 3700-square-meter facility will also house biological energy research activities already under way at the Institute for Biological Energy Alternatives (IBEA)—established by Venter earlier this year—in addition to new microbial genome sequencing initiatives and environmental projects. "Researchers at TIGR and IBEA are simultaneously looking for new organisms and analyzing known organisms that metabolize carbon or create hydrogen," according to a TIGR statement.

TIGR will not be involved in the 1000-human-genomes sequencing effort, but Fraser hopes to use some of the new capacity for the 40 simultaneous sequencing projects it has under way, including genomes of *Plasmodium vivax*, a human malaria parasite, and other organisms. With TIGR's current backlog, Fraser says, "we could immediately make use of a 50% increase in sequencing capacity." The total capacity of the new sequencing lab will represent a fivefold increase over TIGR's current capability.

As Venter sees it, the critical challenge for scientists in his field is to connect with clinical medicine. "The most important thing now," he says, "is to make the human genome relevant to the general population."

–REBECCA SPIELER TRAGER

Rebecca Spieler Trager is an editor for *The Blue Sheet* in Chevy Chase, Maryland.

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