oligosaccharide takes just minutes.

That simplicity is likely to appeal to biologists looking to study the role of oligosaccharides in cells, says Bertozzi. "The field of carbohydrate biology is the last frontier in a large part because we haven't had the tools to make and study these molecules," she says. The Scripps team still has some big gaps in their library of sugar building blocks, and they have not yet tried to combine the computer control with robotic synthesizers. But biologists may at last be nearing the day when they can cook up these sugars as easily as they can make their other staples.

–ROBERT F. SERVICE

SCIENTIFIC MISCONDUCT

Investigations on Trial In a Texas Court

Kimon Angelides didn't go quietly when Baylor College of Medicine found him guilty of scientific misconduct in 1995 and removed him from his lab. He sued everyone in sight: Baylor; its president, William Butler; seven faculty colleagues who sat on a panel that investigated him; and two junior members of his own lab who gave evidence against him. Angelides, a professor of molecular physiology, claimed that he had been slandered, his career ruined, and a decade's worth of scientific work destroyed. He demanded payment of damages, according to court records, "in an amount commensurate with Baylor College of Medicine's net worth and its outrageous conduct." These demands, and Baylor's finding that Angelides's scientific misconduct called for "the severest of sanctions," are now coming to a head.

Both decisions could affect the way misconduct in biomedical research is prosecuted in the future.

After a detour through the federal courts, Angelides took his complaint last year to the Harris County District Court in Houston, a state court. The trial began on 25 January, and—barring a last-minute settlement—the jury is expected to give its verdict in a week or two. In an entirely separate proceeding, a board at the Department of Health and Human Services (HHS) in Washington, D.C., has finished its own review of the misconduct findings, after an appeal by Angelides. The HHS Departmental Appeals Board reexamined the full record—including a 1997 decision by HHS's Office of Research Integrity (ORI) supporting Baylor and barring Angelides from receiving U.S. grants for 5 years. The chair of the HHS panel, Cecilia Ford, said the ruling will be out "shortly."

Both decisions could affect the way misconduct in biomedical research is prosecuted in the future. A verdict in either venue in favor of Baylor and ORI might strengthen a federal enforcement system that remains a bit shaky after several high-profile setbacks (*Science*, 28 February 1997, p. 1255). But a judgment against Baylor—which tried to follow HHS enforcement guidelines to the letter—might make other universities more cautious about pursuing new misconduct allegations. And a finding of slander against Baylor panel members would send a chilling message to researchers asked to serve on future investigation committees.

The case has its roots in experiments Angelides and his colleagues did in the 1980s on the biochemistry of nerve impulses, specifically in how signals are passed through sodium channels of rat brain cells. Their work seemed to surge ahead in a series of successful grants and papers in 1990 and 1991. But it hit a snag in July 1992, when the chair of Angelides's department at Baylor, Arthur Brown, raised questions about the source of data in a paper. (Brown and Angelides, according to HHS and court records, had clashed professionally and personally.) An initial panel at Baylor dismissed the charges, but a second, assembled after Baylor's president had announced no tolerance of scientific misconduct, made a more complete investigation. It also expanded the scope. After 2 years, this panel found that Angelides had falsified and fabricated data in five grant applications and five published papers.

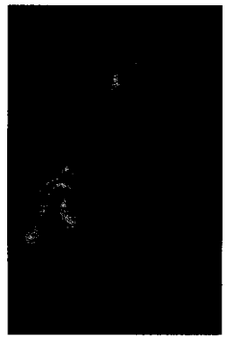
Angelides conceded that some of the data were wrong and some appeared to be falsified. But he argued that they were honest errors or the work of two junior members of the lab, whom he accused in 1993 of scientific misconduct. Baylor's investigators did not find evidence of scientific misconduct by the junior staff, however. And because Angelides refused to take responsibility, the panel said, "the severest of sanctions were warranted and necessary." Angelides was fired and, as his horrified students looked on, a maintenance crew hustled him out of his lab on 6 March 1995.

Angelides declines to comment on the case because it is in trial. But his attorney, James Pianelli of McGehee and Pianelli in Houston, says it has already cost his client and the university "millions" of dollars. To pay his legal bills, Angelides sold his house

CREDIT: RICK KOZAK

ScienceScope

Under the Microscope Psychiatric experiments will get greater scrutiny from funders at the National Institute of Mental Health (NIMH). On 5 February, an advisory panel gave NIMH head Steven Hyman (left) the go-ahead to form a special working group to examine proposed "challenge" studies, in which patients' symptoms are exacerbated by medication, and "drug washout" studies, in which medication is withdrawn. Such experiments have drawn intense criticism from some lawmakers and patient advocates (*Science*, 22 January, p. 464). The group—expected to number up to 10 ethicists and NIMH "outsiders"—may not have much work to do. Hyman estimates that just five of 250 grants made in a recent funding round would have gotten the special treatment. But he says NIMH has "to be proud of and ready to defend" the research it funds.



No Alien Nation Swiss biomedical researchers could soon face a ban on xenotransplants—the grafting of animal organs, tissues, or cells into people. On 7 February, Swiss voters approved by a wide margin a referendum giving Parliament the authority to regulate xenotransplants. After the vote, Swiss president and science chief Ruth Dreifus said that government leaders will ask Parliament to forbid alien transplants, except in special cases. Some scientists and biomedical companies worry that the new rules could begin a regulatory trend in Europe that would endanger proposed xenotransplant trials. Other experts, however, would welcome a ban: They fear the transplants could allow animal viruses to jump to humans, triggering new disease outbreaks.

Presidential Timber? Scientists took a drubbing in a straw poll that asked the public to decide which of 20 prominent women were most qualified to be U.S. president (*Science*, 2 October 1998, p. 21). Neither cardiologist Bernadine Healy nor psychologist Judith Rodin made the top five, although physician-astronaut Mae Jamison was a runner-up. Prominent winners included Hillary Clinton and Elizabeth Dole.

and later declared bankruptcy, Pianelli says. If the suit is successful, though, it could cost Baylor even more. Angelides has accused the university and its staff of slander and breach of contract, arguing that it ended his tenured professorship without due process.

University officials also declined to comment. But in court filings, Baylor's attorneys maintain that the university simply acted as an agent of the federal government, which requires that allegations of scientific misconduct be fully investigated. Soon, that interpretation of the handling of the charges against Angelides will be vindicated or rejected by 12 citizens of Texas and an appeals board in Washington, D.C.

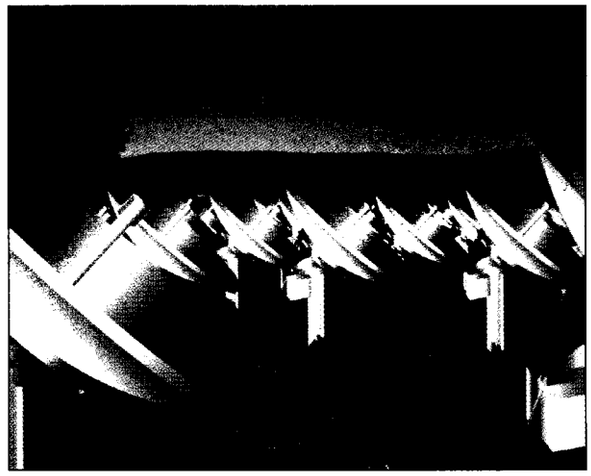
Whatever the outcome, cell biologist Jeffrey Rosen of Baylor, who acted as Angelides's volunteer faculty adviser during the investigation, argues that the 7-year process leading up to these pending verdicts didn't serve the scientists or the university very well. "I question whether it might not be better to conduct [such inquiries] from the start as legal proceedings," Rosen says, because that would give the accused a better chance to confront the accusers. Instead, the investigation involved a baroque academic process in which all of Angelides's questions to his accusers had to be directed through the chair of the investigative panel, who often rephrased them. Rosen is also unhappy about the amount of time, energy, and money it has taken to referee this quarrel, saying he would "never again" offer to get involved. **–ELIOT MARSHALL**

ASTRONOMY

New Telescope Will Turn a Keen Ear on E.T.

BERKELEY, CALIFORNIA—Astronomers listening for radio signals from other intelligent life may soon get their own ear on the cosmos. SETI, the Search for Extraterrestrial Intelligence, has subsisted for decades on small amounts of observing time at radio telescopes built for other purposes. Last Monday, however, the SETI Institute of Mountain View, California, a private advocacy group that supports and carries out SETI studies, and the Radio Astronomy Laboratory at the University of California, Berkeley, announced that they are teaming up to build the first major telescope largely dedicated to searching for other civilizations.

The privately funded telescope, called the One Hectare Telescope or 1HT because it will measure 100 meters on a side, has a design as ambitious as the search it will conduct. To be built in the next 5 years or so, probably at Berkeley's Hat Creek Observatory in northern California, it will match the sensitivity of a single giant dish by combining the signals from 500 or more dishes just 3.5 to 5 meters across—essentially off-the-shelf satellite TV antennas. The design will allow the telescope to be expanded as additional funds become available. And it will cost a fraction as much as a comparable single-dish telescope: about $25 million, which the SETI Institute is now raising from private sources. "We're planning to put as little money as possible into the antennas and instead to keep making [the system] better at the back end," says Jill Tarter, the science team leader at the SETI Institute.



Talk to me. An artist's conception shows some of the 500 or so dishes that will make up the new radio telescope.

SETI researchers have long dreamed of having a telescope of their own, able to devote large amounts of time listening for potentially meaningful signals from other sunlike stars in the Milky Way galaxy. And Berkeley was a natural collaborator. William "Jack" Welch, the former head of the radio astronomy laboratory, has just been named to the newly created SETI chair in the astronomy department and is also the vice president of the SETI Institute. Berkeley will design the instrument and pay operating costs; in return Berkeley astronomers will get telescope time for more conventional studies.

The 1HT should let both sets of observers collaborate seamlessly, because its design will allow "multibeaming." By interweaving the signals from its individual dishes in sophisticated ways, the array will make high-resolution observations simultaneously in 100 directions or more to monitor an array of stars for signals from an extraterrestrial civilization while also studying pulsars, the intergalactic medium, and the cosmic background radiation. And to cast the broadest possible net for meaningful signals, the telescope will monitor each source across a wide range of radio frequencies, from 300 MHz up to 10 gigahertz.

The biggest design challenge, says Welch, is the sophisticated signal-processing circuitry and software needed to combine and analyze hundreds of wide-band signals at once. "We couldn't [build] this before now," says Welch, "but we have every reason to believe that it can be done in the next year or two," when 1HT designers hope to install a prototype array of a dozen or so dishes at Hat Creek. Other radio astronomers say it won't be easy. But "if anyone can do it, Jack Welch is the one to pull it off," says Woodruff Sullivan, a radio astronomer at the University of Washington, Seattle.

If the funds can be raised and the design challenges overcome, 1HT will allow SETI researchers to search the sky 100 times more efficiently than with the 100-meter radio telescope now nearing completion near Green Bank, West Virginia. The 1HT will also sharpen radio astronomers' dreams of constructing a square-kilometer arrangement of radio antennas, two orders of magnitude larger than the 1HT, capable of detecting signals—from alien cultures or the inanimate cosmos—fainter than any other telescope on Earth. But even more visionary designs will be needed: With current technology, the cost of a square-kilometer array would rise into the billions of dollars. "The challenge is to build a complete array for less than the square-meter cost of an expensive carpet," says Tarter. **–DONALD GOLDSMITH**

Donald Goldsmith's most recent book, *Voyage to the Milky Way*, will appear in May to accompany the two PBS television programs with the same title.

SCIENCE IN SOCIETY

Plan for Divulging Raw Data Eases Fears

Congress dropped a bombshell on the scientific community last fall, when it quietly passed a law that appeared to open up to public scrutiny the data of all federally funded researchers. Now the Administration has drawn up a blueprint for implementing this law that would limit its reach to "published" data used to develop policy. Although relieved, agency officials and scientific groups say the Administration must still clarify gray areas in a rule that threatens to undermine scientists' sovereignty over one of their most precious resources: raw data.

Slipped into the 1999 omnibus spending bill by Senator Richard Shelby (R–AL), the directive requires that the White House Office of Management and Budget (OMB) amend

CREDIT: SETI INSTITUTE