on screening out high-risk donors.

A very different view is held by immunologist Jacques Leibowitch at the Raymond Poincaré Hospital near Paris, one of the founders of the original AIDS group. In late 1984, months before the Abbott test was even approved in the United States, Leibowitch, working with colleagues at the blood bank of the Cochin Hospital in Paris, tested 2000 blood donors with an early, relatively nonspecific antibody test he had developed. Ten donors, or 0.5%, tested positive. Leibowitch says these findings were immediately communicated to blood bank and health authorities but were not made public until he and his co-workers leaked them to the French press months later. "As soon as this test was available, for moral and ethical reasons it should have been used," says Leibowitch. But others, including Rozenbaum and Montagnier, are not so sure. "Some people were skeptical about these test results," says Montagnier, "because the laboratory technique used … had not been validated at the time and its specificity was put into question."

Whether or not these differing points of view will help clarify the issues before the court, they are sure to add some fireworks to the proceedings. "Even if this testimony is at odds, it will shed light on the information available to the political leaders of the time," says Kahn, a geneticist at the Cochin Institute, which is associated with the Cochin Hospital. Although Kahn is not an AIDS researcher, he told *Science* he believes that he has been called to testify both because of his experience in biomedical research and also because of a decision he made during a harrowing personal experience in 1985: Admitted to Cochin Hospital for a sudden hemorrhage, he refused a blood transfusion.

–MICHAEL BALTER

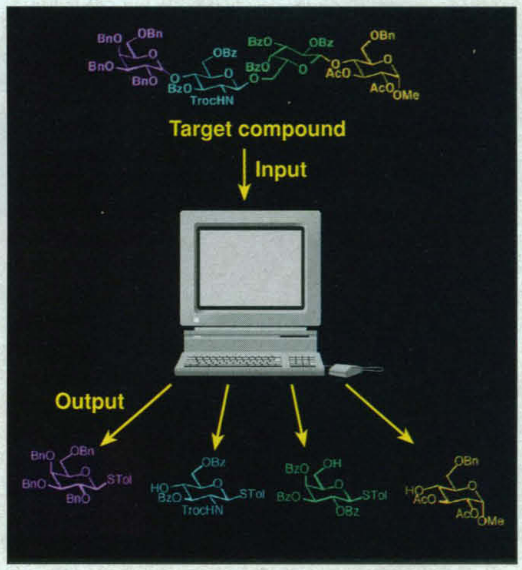
ORGANIC CHEMISTRY

Cooking Up Sugar Chains in a Hurry

Knitting together short chains of DNA or protein takes about as much work as cooking a microwave dinner. Just pop the molecular building blocks into an automated synthesizer, tell a computer what you want, and presto—out come tailor-made molecules, ready for testing as potential drugs and DNA probes, among other uses. But producing a third class of biomolecules—chains of sugar groups known as oligosaccharides—is more like cooking lobster thermidor without a recipe book. Now Chi-Huey Wong and his colleagues at The Scripps Research Institute in La Jolla, California, have come up with an easy-to-follow, one-pot recipe.

In a paper in last week's issue of the *Journal of the American Chemical Society*, Wong's team reports creating a set of sugar-based building blocks and a computer program for creating a range of oligosaccharides in one simple reaction. "It is very important work," says Samuel Danishefsky, an organic chemist and oligosaccharide expert at the Sloan-Kettering Institute for Cancer Research and Columbia University in New York City. By speeding the synthesis of these sugar chains, which are essential for everything from the ability of immune cells to recognize their targets to the spread of cancer around the body, the new scheme could help biologists pin down their precise roles. "We spend 95% of our time making the compounds," says Carolyn Bertozzi, a glycoprotein chemist at the University of California, Berkeley, who is working to parse out how oligosaccharides work inside cells. This new work "could help us turn that around" and spend 95% of the time on the biology, she says.

Creating biomolecules like peptides—short protein chains—is simple. Their amino acid building blocks are all linked with the same bond, making it straightforward to link several together like boxcars in a train. Oligosaccharides, by contrast, are more like a child's Lego bricks: They can snap together in many different arrangements and thus can form a myriad of three-dimensional shapes. The simple sugar glucose, for example, has four nearly identical points at which it can link with other sugars. And the bond that forms each link can itself take on two different shapes. The result is that glucose alone can react with a single partner in eight different ways—to say nothing of the configurations taken on by the partner. Try to string a few sugars together and "the problem becomes factorial," says Danishefsky.



Master chef. When the structure of a desired oligosaccharide is fed into a computer program, it generates a list of standard building blocks to make the compound.

The conventional approach to making a specific oligosaccharide is to bandage sugar molecules with "protecting" groups at all but one reaction site to block unwanted reactions. But that requires chemistry so complex, says Bertozzi, that Ph.D. students can spend a year just learning how to link two or three sugars together.

In the hope of speeding up the process, Wong and his colleagues picked up on a theme outlined over the last few years by Steven Ley and his colleagues at the University of Cambridge. The Cambridge team constructed a set of sugar-based building blocks, each preloaded with different protecting groups. They reacted the building blocks one at a time with a common sugar to find out how fast each reaction occurred. That allowed them to rank the reaction rates from fast to slow. They then selected different combinations of the building blocks and put them together in a single pot. The building blocks with the fastest reaction rate fused together first, while the next fastest reaction added a third component to the chain, and so on.

Wong's group expanded this strategy, adorning six different sugars with various combinations of protecting groups to alter the speed at which each sugar reacted. They ended up with a total of 50 different building blocks, which they ranked by reactivity. They then designed a computer program that allows users to type in the sequence of an oligosaccharide they want to make. The computer determines exactly which building blocks (with the protecting groups at the right places) must be added to the reaction stew so that the sequence of reactions, from fastest to slowest, produces the desired compound. The result is that making a two- to three-member

CREDITS: C.-H. WONG, SCRIPPS

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.

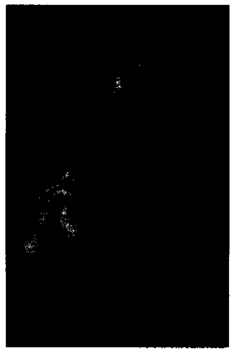
The case has its roots in experiments Angelides and his colleagues did in the 1980s on the biochemistry of nerve impulses, specifically in how signals are passed through sodium channels of rat brain cells. Their work seemed to surge ahead in a series of successful grants and papers in 1990 and 1991. 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

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.



CREDIT: RICK KOZAK

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.