SCIENCE NEWS of the week

Controlling Access to Supercomputers

When the National Science Foundation (NSF) last March established four national supercomputer centers (SN: 3/2/85, p. 135), few people suspected that access to these computers would become a national security concern. The stated aim of the NSF program was to make supercomputers available to as many researchers as possible.

As a result, when the time came for representatives from the institutions hosting the centers to negotiate contracts with NSF, they were surprised to find a clause that called for keeping visiting Soviet-bloc and Chinese scientists away from the machines. Officials from the Departments of State and Defense had insisted that this requirement be inserted.

"We felt it was an unreasonable clause, as did the other centers," says Allen Sinisgalli, acting chief financial officer of the Princeton, N.J.-based Consortium for Scientific Computing, which will operate one of the four centers. "Therefore, we said we could not accept it."

This led to a round of negotiations involving NSF, university and federal officials. The result was new language leaving the question of restrictions on supercomputer access to be settled later, after a high-level government review of the whole problem is completed and perhaps a national policy formulated. In June, two of the centers, one at Princeton and one at San Diego, signed the modified contract.

Says Sinisgalli, "If a national policy came about that restricted access to supercomputers, then we would comply, as we would comply with any other national policy."

However, the centers at the University of Illinois at Urbana-Champaign and at Cornell University in Ithaca, N.Y., have refused to sign the agreement because it leaves a number of questions unresolved. "This particular issue is a delicate one," says Cornell's Kenneth G. Wilson. "On the one hand, there's the issue of the openness of universities. On the other hand, there is the concern of not losing the very considerable lead we have over the Russians in the whole computing area."

"Nothing has been settled yet," says John W. D. Connolly, director of NSF's Office of Advanced Scientific Computing. "But we're pretty optimistic that we can get something that we can live with."

Physicist Michael J. Levine of Carnegie-Mellon University (CMU) in Pittsburgh is one of many university researchers worried about the outcome. As co-director of a recently announced fifth center for advanced computing, involving CMU, the University of Pittsburgh and Westinghouse Electric Corp., he, in particular, has to grapple with this issue.

"There are very serious questions of academic freedom involved here," Levine says. "I do not understand how we can satisfy the security-conscious folk and still encourage use of these machines in the scientific community."

Moreover, there isn't anything particularly special about a supercomputer except its speed, he argues. Almost any problem that can be done on a supercomputer can also be done on a slower machine. It's also relatively easy to build an efficient special-purpose computer, using easily obtainable electronic parts, to solve a specific problem.

"You'd have to restrict everything right down to the microchips," says Levine. "I don't believe that's practical , sensible, feasible or anything else."

The State Department contends that its present focus on supercomputer access is part of a routine national-security review. "We are concerned about Soviet-bloc access to supercomputers for a variety of reasons," says Michael Marks, special assistant to Under Secretary of State William Schneider Jr. Schneider is responsible for technology transfer issues and will ultimately review any policies that are developed concerning supercomputer access.

"We don't want people to go into some sort of a panic that we're about ready to clamp down on all access to supercomputers," says Marks. "It's really not our intent to impede legitimate access to supercomputers by the academic community or the business community or anyone else. It can be handled in a variety of ways, and that's what we're looking at now. I don't see that there are going to be any problems here."

Some observers wonder why attention has focused on the four NSF-funded supercomputer centers. About 17 supercomputers are available to university researchers already, and anyone with enough money can rent time on several privately owned machines. None are off limits to foreigners.

One fear is that any kind of restriction would undercut officially sanctioned exchanges or collaborations with scientists from the Soviet Union, China and other countries. A few federal officials have, at various times, advocated an end to these exchanges. Such controls would also affect many graduate school programs involving foreign students.

The supercomputer access issue comes up at a time when the federal government is also seeking tighter controls on the flow of biotechnology products and manufacturing processes to the Soviet bloc (SN: 6/9/84, p. 360). The Department of Commerce is drafting new export regulations that govern genetic engineering techniques, fermentation processes and other methods that could be used to create new biological weapons.

Despite some signs of an improved working relationship between the national security community and university scientists, these new national-security initiatives threaten the progress that has been made (SN: 9/22/84, p. 183; 12/8/84, p. 358).

One person still concerned about these issues is Robert M. Rosenzweig, president of the Association of American Universities in Washington, D.C. Because most of the significant pieces of paper, including new export control regulations and a statement of national policy on scientific communication, are still in draft form, says Rosenzweig, the academic community has every reason to continue to be concerned and to remain vigilant. —*I. Peterson*

Between the cells: Control by glue

The meshwork of protein and sugar molecules that holds together different layers of cells in the body also influences their structure, metabolism, behavior and development. To examine just how this extracellular matrix affects the cells attached to it, biologists are growing cells on laboratory plates, where the cell's semi-solid support and surrounding solution can be manipulated directly. Now Lola Reid of Albert Einstein College of Medicine in New York City reports that by varying the semi-solid support, scientists can manipulate liver cells in tissue culture to mimic a liver's several physiological states. She and her colleagues are beginning to describe the mechanisms behind this control.

Coaxing liver cells to maintain their normal characteristics while growing in tissue culture was a challenge that Reid found "laborious, but straightforward," she said in a seminar last week at the National Institutes of Health in Bethesda, Md. She and her co-workers spent four years working out the mixtures of nutrients and hormones that would sustain these cells. In contrast, most tissue culture experiments employ cells derived from tumors, because normal cells generally lose their specialized characteristics or die in laboratory culture.

To better mimic a cell's natural environment, Reid began growing the liver cells, called hepatocytes, not directly on plastic plates, but on a gel of collagen, a class of fibrous proteins that make up the biological glue. Reid finds that the type of collagen put on the laboratory plate determines the cells' "differentiation profile."

Cells placed on type III collagen resemble a normal "quiescent" adult liver — the cells maintain their adult characteristics and do not reproduce. Cells placed on type