On the question of how low a limit could be adequately monitored, the study concludes that a treaty limiting explosive yields down to 10 kilotons "can be readily monitored with high confidence" using seismic arrays outside the Soviet Union. "The seismic signals produced by explosions of this magnitude are discernible and no method of evading a seismic monitoring network is credible."

For a limit below 10 kilotons, a seismic network within the Soviet Union would be required to detect explosions and distinguish them with confidence from legitimate chemical blasts and small earthquakes, the study concludes. According to Gregory van der Vink, who directed the study for OTA, there was a strong consensus among the experts who participated in the effort that a treaty banning all nuclear explosions with an explosive force greater than 5 kilotons could be adequately monitored and that cheating would be readily detected.

The Soviet Union has already accepted the principle of seismic monitoring networks within its borders by agreeing to a private exchange agreement between the U.S. Natural Resources Defense Council and the Soviet Academy of Sciences, under which monitoring stations have been established in both countries.

The report notes that "there will always be some threshold below which seismic monitoring cannot be accomplished with high certainty." A complete ban on testing might still be considered desirable "if the advantages of such a treaty would outweigh the significance of any potential clandestine testing below the monitoring threshold," the report notes. The study did not address the military significance of very low-yield tests, however.

Van der Vink notes that CORRTEX would play no role in monitoring a very low-level threshold treaty or a comprehensive test ban. It is only useful for monitoring blasts greater than about 50 kilotons, and because it requires prior notification that a shot will take place, it is useless in detecting clandestine testing. ■ COLIN NORMAN

Cantor to Head LBL Genome Center

Charles Cantor, a leading geneticist at Columbia University, has been named the first director of the new Human Genome Center at Lawrence Berkeley Laboratory (LBL) in California. Cantor's appointment seems certain to give the Department of Energy (DOE) a leg up as it moves into mapping and sequencing in a big way.

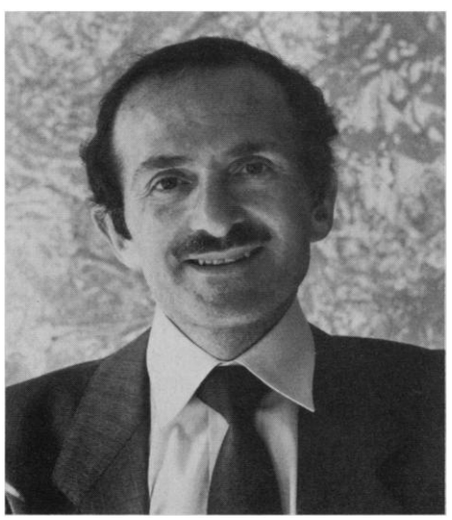
After some initial jockeying for position, both DOE and the National Institutes of Health (NIH) are carving out their respective roles in this massive biological endeavor to map and sequence the human genome—an endeavor that could consume $3 billion over the next 10 or 15 years.

Just a few months ago, after some foot-dragging, NIH requested $28 million for fiscal year 1989 and set up a high-priority Office for Human Genome Research within the director's office. Nobel laureate James Watson has been asked to run it. NIH will channel these funds through investigator-initiated proposals.

And now DOE, with an $18-million request for 1989, is gearing up for a major in-house effort, with centers at LBL and Los Alamos and smaller efforts at other labs, that will span the range of activities in physical mapping, sequencing, technology development, and data-handling.

If Cantor has his way, LBL will become one of the major centers worldwide involved in mapping and sequencing the human genome. But all that depends on whom he can recruit and how much money DOE has to offer.

One of two genome centers created by Energy Secretary John Herrington last fall—the other is at Los Alamos—the LBL center has been operating on a modest budget, about $600,000, and with about 12 people. Cantor hopes to have a staff of 30 in place when he arrives 9 months or a year from now and expects it to grow rapidly to about 100, which translates into a budget of about $10 million a year. And if, several years down the line, LBL becomes one of the few centers in the world trying to complete the entire map and sequence, as he would like it to be, then Cantor envisions a staff of perhaps 500.



Charles Cantor. *Has big plans to turn the center into a major operation.*

"That is a lot of 'if's," says David Smith of DOE's Office of Health and Environmental Research. "Cantor is taking this job with the expectation that he will have the resources to create something substantial. Assuming that the scientific content deserves it, we will do what we can to make it happen." At this stage, say both Cantor and Smith, it is not clear how much of the $18 million DOE has requested for next year will go to LBL.

What LBL offers that a university cannot, says Cantor, is scale. At the size he envisions, it should be possible to have a wide range of activities—physical mapping, sequencing, instrumentation, and data-handling—all under one roof, with the investigators "all talking to one another." Cantor does not share DOE's oft-stated view that the initial focus should be to map and sequence those chromosomes involved in DNA repair or cancer, which fits in with DOE's research on the health effects of radiation and energy-related chemicals. Says Cantor: "All the chromosomes are interesting, but some are easier to map than others. We will start with those."

Scale also affords the luxury of thinking about longer term problems, says Cantor, such as, "What are the fundamental technical obstacles to finishing the map and sequence? Most groups, including ours at Columbia, have been thinking about how to start the project. We want to think about how it will be finished."

The center will work closely with nearby Lawrence Livermore Laboratory, other national laboratories, industry, as well as with the University of California, Berkeley. Much of Cantor's staff at Columbia will move with him, as will Cassandra Smith of Columbia and her lab. Smith will bring her $500,000 a year project to develop a physical map of chromosome 21. Both Cantor and Smith will have joint appointments at UC.

All of this is fluid, says Cantor. "We have to feel our way in this. The project is too big and the technology too likely to change to make predictions with accuracy now."

"Even in a focused center like this one," says Cantor, "what you actually do depends heavily on whom you recruit. Those people will have a tremendous choice in the direction we choose."

Recruiting may be one of the toughest tasks Cantor faces, although the Bay Area location is also an undoubted plus. Notes Maynard Olson of Washington University: "There are not a lot of people with experience in analyzing complex DNA." ■ LESLIE ROBERTS