

The road to magnetic fusion?

Controlled thermonuclear fusion promises to supply a significant portion of the world's electricity by the middle of the 21st century, according to *Starpower*, a report issued last week by the Office of Technology Assessment (OTA), which advises Congress on scientific and technical matters.

However, to maintain progress toward that goal, the report concludes, the magnetic fusion program that the United States has pursued for the last 40 years as mainly a national project will have to be internationalized.

The U.S. Department of Energy, which administers the fusion program, agrees. According to John F. Clarke, associate director of the agency's Office of Fusion Energy, the United States concluded an agreement in Vienna, Oct. 18 and 19, with the world's three other major pursuers of fusion research — the European Community, Japan and the Soviet Union, for the construction of the next large step on the way to a practical fusion reactor.

This project will be called ITER, for International Thermonuclear Experimental Reactor, Clarke testified at a hearing by the Subcommittee on Energy Research and Development and the Subcommittee on International Scientific Cooperation of the House Committee on Science, Space and Technology. "My friends who know Latin tell me that *iteris* is the Latin word for road," Clarke told the representatives. "This seems to be the road for magnetic fusion."

Also testifying at the hearing, Gerald L. Epstein, project director of OTA's Energy and Materials Program, said OTA had identified three possible future roads for the magnetic fusion program: a continued national effort, which would require substantial increases in its budget; internationalization; or cancellation. Budget problems, particularly the deficit, make the first option unlikely, he said. The third is undesirable. That leaves internationalization.

The committee members seemed to accept the idea of internationalization, but they expressed concerns about such things as technology transfer, secrecy and the touchy politics of managing a joint project among such disparate partners.

There are two main approaches to fusion. Inertial-confinement fusion uses pellets of solid fuel that receive blasts of laser light or accelerated particles to induce fusions in them. It is closely related to weapons research and is not part of the contemplated international program. The other approach, magnetic fusion, tries to induce fusions in a hot plasma, an ionized gas, contained and compressed by a magnetic field. How-

ever, magnetic fusion, too, has military connections.

Rep. Ralph M. Hall (D-Tex.) queried the willingness of the Soviets to collaborate. Epstein replied that the "Soviets are very interested in collaborating" and added that much of the initiative for the agreement came from Mikhail Gorbachev himself.

Rep. Marilyn Lloyd (D-Tenn.) suggested that we "might be giving more than we intend to give," pointing out that up to now the main goal of the Soviet fusion program has not been the production of electrical power, but fuel for their fission reactors. Clarke replied that in recent months, since Chernobyl, the Soviets are starting to look at fusion as an electricity source. "They realize they've got a real problem with their fission reactors."

The next step for ITER is for the four research agencies that negotiated the agreement to get the legislative approval of their governments. If approved, ITER will have a four-person council representing each of the partners, of which Clarke will be chairman. Somewhat unusually, it will operate on the basis of unanimous decisions.

Commenting on this, Hall said: "I think what you propose is ideal. I'm not sure it will work. You've got a tremendous job on your hands. Don't give away the store."

— D.E. Thomsen

Saving Mt. Wilson

The Mt. Wilson Observatory, one of the oldest in the southwestern United States, has been mothballed since 1985. The Carnegie Institution of Washington, which owns Mt. Wilson Observatory, had decided to concentrate its resources on its observatory at Las Campanas, Chile. Now Mt. Wilson may observe again, according to a joint announcement by the Carnegie Institution and a new organization, the Mount Wilson Institute.

A nonprofit corporation formed by members of the scientific, educational and business communities with representatives of the Los Angeles County Department of Parks and Recreation, the Mount Wilson Institute will take over operation of the observatory and possibly title to the property if it can raise sufficient funds. Located 5,800 feet above Pasadena, the observatory is near the top of the inversion layer that causes the famous Los Angeles smog; the observatory is affected little by the basin's light-pollution.

The atmosphere above Mt. Wilson is very stable and so particularly good for certain kinds of stellar observations. The observatory's 100-inch (2.5-meter) Hooker telescope remains one of the world's largest. □

Enzyme blockers slay AIDS 'giants'

Drugs that block a "sugar-trimming" enzyme important in the progression of AIDS can reduce the virus's ability to infect human blood cells and may provide a nontoxic therapy for the disease, scientists said this week. By inhibiting an enzyme called glucosidase, the drugs apparently reduce the cell-to-cell spread of the AIDS virus (HIV), as well as inhibit the formation of "giant" cells made when uninfected blood cells attach to an HIV-infected cell.

Researchers from the University of Amsterdam and The Netherlands Cancer Institute report in the Nov. 5 *NATURE* that the drugs castanospermine and 1-deoxy-ynojirimycin (dNM) hinder HIV's ability to infect monocytes and lymphocytes in cell cultures by at least 100-fold. The drugs are known to block glucosidase, which trims sugars from the HIV component gp120 during virus production in host cells. A study last year at Stanford University had shown that gp120 joins with receptors on cell surfaces, leading to infection of the cell by the virus. Subsequent research indicated that at least some of the gp120 sugars influence this receptor binding.

Receptor binding by gp120 is also thought to be important in the formation of large cells that develop when uninfected cells are mixed *in vitro* with HIV-infected cells and their membranes fuse together. Although researchers have not detected these fragile giant cells in fresh tissues from AIDS patients, they suspect they may be important in the spread of the virus. The cells could explain, for example, how HIV — which is found in lower-than-expected numbers in AIDS patients — may maximize its effect by infecting a cluster of cells at the same time.

In the latest research, castanospermine and dNM "completely inhibited" giant-cell formation for 6 hours after the drugs were mixed with cells, and then greatly decreased it for several days after the mixing, say the scientists. The drugs, however, did not stop virus production inside already infected cells.

The latter observation is of interest because it indicates that the virus needs the proper arrangement of gp120's sugars to bind to cells, but not to replicate, says Thomas M. Folks of the Bethesda, Md.-based National Institute of Allergy and Infectious Diseases.

Folks, who does similar experiments with other enzyme-blocking agents, told *SCIENCE NEWS* that the low toxicity of dNM and castanospermine also is important. The Dutch researchers note that the two agents have been used in Europe to control blood glucose levels in humans.

— D.D. Edwards