

universe. Detection of ultrahigh-energy cosmic rays of extragalactic origin.

■ **Applications.** Fission and photovoltaic energy and the prospect of fusion energy. More efficient combustion. X-ray, ultrasonic, and nuclear magnetic resonance medical imaging. Laser surgery. Weapons systems and strategic defense systems. Microelectronics. Laser optical communications and printing. Laser-assisted manufacturing and robotics.

To maintain the pace of progress, the Brinkman committee endorsed several major construction projects that had been previously approved by other study groups. The criterion for approval of these quite expensive, centralized research centers is, "Is this facility necessary to maintain research at the cutting edge?"

However, the committee reserved its strongest words for what it called small-group physics; namely, that physics research done by one or a few investigators. "We hit a resonance on the small science issue," Brinkman said. One reason for the concern is that about 70% of physics Ph.D.'s receive their training in such groups. The universities where the research is done face several problems resulting from inadequate support over the years.

Simply put, there is a significant disparity between the cost of doing research (equipping a modern laboratory can cost \$1 million) and the size of grants. As a result, many laboratories have outdated instrumentation, and support services, such as machine and electrical shops, have deteriorated. Because of the difficulty of doing research under these circumstances, the most talented prospective faculty members are fleeing to industry, a situation that has long-range consequences for the vitality of research universities and for the training of future physicists.

The committee concluded, "to allow a reasonable number of groups to pursue the new scientific opportunities, and to allow some young investigators to enter the field, the level of operating funds must be doubled over a 4-year period. . . . The endeavor surely represents one of the most important ways for the nation to invest in research."

A related problem is a possible shortage of physicists in the 1990's. The committee recommended several measures aimed at making graduate studies and research in the universities more attractive, such as increasing the number of physics predoctoral fellowships, supporting award programs for young faculty, encouraging women and minorities to take up physics careers, and facilitating the entry of U.S.-trained, foreign-born physicists who wish to work in this country. ■ **ARTHUR L. ROBINSON**

Briefing:

New Relatives of AIDS Virus Found

The family of retroviruses that includes the virus that causes AIDS (acquired immune deficiency syndrome) has just gained at least one and possibly two new members. In this issue of *Science* (p. 238), Phyllis Kanki and Max Essex of the Harvard School of Public Health and their colleagues describe the isolation of a virus, which is distantly related to the AIDS virus, from apparently healthy individuals who live in the West African country of Senegal.

In addition, Luc Montagnier of the Pasteur Institute in Paris has just announced the finding of a new virus, also distantly related to the AIDS virus, in two individuals who have the disease. Whether there is any relation between this isolate and that of the Essex group is still unclear.

The current results of Kanki, Essex, and their colleagues are an outgrowth of their previous discovery, with researchers from the New England Primate Center, of simian T-lymphotropic virus type III (STLV-III). This virus, which is similar but definitely not identical to the human AIDS virus, was originally found in captive rhesus macaques that have an AIDS-like disease, but the same virus, or one very much like it, also occurs in about 50% of healthy African Green monkeys living in the wild. Essex postulated that there might be a spectrum of related viruses that could infect different primate hosts and have a range of pathogenic effects ranging from none to full-blown AIDS. The work implied that the human AIDS virus might be derived from one of the monkey viruses.

Subsequent work by the Essex group indicated that human beings also harbor an AIDS virus relative that does not cause any obvious pathology. Healthy prostitutes from Dakar, Senegal, where AIDS occurs rarely if at all, carry antibodies indicating that they had been infected with a virus that is closely related to STLV-III, a finding that is consistent with the idea that a virus might have passed from monkeys to humans. Essex first presented these results at the International Symposium on African AIDS, which was held in Brussels in November 1985.

The investigators have now followed up on this observation by isolating the virus from three individuals. As expected, the viral proteins share some similarities with the proteins of the AIDS virus, but more closely resemble those of STLV-III. In addition, the new virus is T-lymphotropic, which means that it infects T cells, and in particular, T cells of the helper class. The AIDS

virus and STLV-III also share this predilection for infecting helper T cells. That is one reason why Robert Gallo, whose group discovered the AIDS virus in 1984, called it "human T-lymphotropic virus-III (HTLV-III)" as the third member of a class of human viruses with this property. The Essex group calls their new virus HTLV-IV. However, HTLV-IV does not kill the cells it infects, whereas HTLV-III and STLV-III do.

So far HTLV-IV does not appear to be associated with any illness. "It may be important precisely because it fails to cause disease," Essex suggests. Comparative studies of HTLV-III and -IV may help to pin down the lethal effects of the AIDS virus on helper cells and also aid in determining how the immune system responds to these viruses, information that may be of use in designing strategies to prevent or treat AIDS.

Montagnier, whose group achieved the first isolation of the AIDS virus in 1983 and called it "lymphadenopathy-associated virus" or LAV, has given the name "LAV-II" to his group's new virus. This one resembles HTLV-IV in that it, too, is more closely related to STLV-III than to the AIDS virus. However, LAV-II was isolated from AIDS patients and, unlike HTLV-IV, kills the helper cells it infects. "This may be a different virus. We will have to compare them to find out," Montagnier says.

The announcements of the isolation of the new virus or viruses highlighted the competition that has become a characteristic feature of AIDS virus research (and is also illustrated by the different names borne by the virus). Montagnier first presented his group's results at a Lisbon meeting sponsored by the Gulbenkian Foundation on Wednesday, 26 March—just, as it happens, 1 day before Essex was scheduled to report his group's data at the annual meeting of the American Society for Microbiology in Washington, DC. According to Montagnier, he decided to release the information in Lisbon because researchers from the Hospital Egas Moniz in that city collaborated in the work. The group is publishing a preliminary note of the results in a publication of the French Academy of Sciences and also has a paper under consideration at *Science*.

Meanwhile, according to Essex, as word of the French announcement spread, he and his colleagues were deluged with reporters' requests for information about the virus they were studying. This led Essex to release that information on Wednesday, thereby allowing the work of both investigators to appear in news reports on Thursday morning, several hours before the scheduled presentation at the ASM meeting, and of course, 1 week before this issue of *Science* rolled off the presses. ■ **JEAN L. MARX**