A novel vaccine approach that could possibly be used to block binding sites of either the HIV or T4 cells uses "anti-idiotypes" (SN: 4/12/86, p.231). As discussed at the NIH workshop by Ronald C. Kennedy of the Southwest Foundation for Biomedical Research in San Antonio, Tex., an anti-idiotype is made in two steps. First the virus is injected into an animal and the resultant antibodies produced by the animal are collected. These antibodies are then injected into a second animal, which produces anti-idiotypes, or antibodies to the antibodies. The idea is to use anti-idiotypes, which mimic the antigenic structure of the virus but not its genes or other dangerous components, as a vaccine.

In the same way, anti-idiotypes could be made that mimic the structure of CD4 receptor sites; these anti-idiotypes would then tie up the binding site on HIV. Kennedy says he and his colleagues have demonstrated in chimps that anti-idiotypes have potential as a vaccine for hepatitis B. As for AIDS, he says that work by his laboratory and, independently, by a group in England suggests that anti-idiotypes can neutralize different virus variants.

But June Osborn of the University of Michigan in Ann Arbor worries about "going the receptor route" in general, because the CD4 receptor is found not only on T4 cells but on many other cells as well, especially in the central nervous system. In trying to interrupt HIV attachment to the CD4 site, she says, researchers may be adversely affecting other important processes.

Another way of dealing with the variability problem is to focus on internal proteins, which seem to be more stable than those on the virus's outer coat. Most researchers have avoided the core proteins because they are thought to lie too deep within the virus to be seen and attacked by antibodies. However, Allan L. Goldstein of George Washington University in Washington, D.C., told the NIH workshop that research by others has shown that one internal protein called P17 lies closer to the outer envelope than once supposed, and it may be exposed enough to make an effective vaccine.

Using yet another technique, Goldstein's group has made a vaccine by directly synthesizing P17 proteins. He says they have been encouraged enough by animal studies to have applied in February to the Food and Drug Administration to begin human tests.

If experience with the hepatitis B and influenza viruses is any gauge, says Hilleman, there may be some hope for solving the variability and infected-cell problems of AIDS. For influenza, a highly variable virus, he says "there appear to be some constant regions in the surface-membrane antigens that have something to do with immunity." And from hepatitis B research, he adds, "we learned that the internal coded antigens can appear on the surface membranes [of cells] and provide a basis for recognition of infected cells."

In spite of all the scientific barriers that must be surpassed, the NIH workshop was infused with optimism. Some scientists think this optimism is misplaced. Some believe that by instilling people with what may turn out to be false hopes, this confidence is even dangerous. But whether or not a vaccine is indeed developed, all scientists have been duly impressed at the speed with which the HIV's workings are being unraveled.

"Even though [the study of AIDS] is just a few years old," remarks Hilleman, "it's just miraculous how much is known now about its molecular virology and viral replication." And even if scientists fail in their attempts to make a vaccine, he says, the work will have tremendous importance to the biological sciences in general: "AIDS may be to virology what space exploration has been to the development of new products such as electronics and computers." □

Coming later this month: Ethical and legal issues of a possible AIDS vaccine

Books

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City of Trees: The Complete Field Guide to the Trees of Washington, D.C. — Melanie Choukas-Bradley and Polly Alexander. This beautiful book about trees in the nation's capital portrays Washington's evolution from tidal marsh to world capital. More than 300 species of trees from all over the world grace the streets and gardens of Washington. The authors describe the trees on the White House and Capitol grounds, at many of the memorials and tourist haunts. Part two is a well-illustrated botanical guide to Washington's native and exotic trees. Originally published in hardback in 1981, this paperback edition has been revised and updated. Johns Hopkins, 1987, 354 p., color/b&w illus., paper, $12.95.

The Language of Nuclear War: An Intelligent Citizen's Dictionary — Eric Semler, James Benjamin and Adam Gross. Focuses on those terms applicable to nuclear war that the public is likely to encounter. Contains words describing weapons, strategies, treaties, science, effects, organizations, slang terms and history. An extensive bibliography is included. Har-Row, 1987, 325 p., $22, paper, $9.95.

Mind Tools: The Five Levels of Mathematical Reality — Rudy Rucker. Explains how and why mathematics has evolved five modes — number, space, logic, infinity and information — and then relates these five modes to what Rucker considers the five basic psychological activities: perception, emotion, thought, intuition and communication. Goes on to use information theory to discuss in separate chapters number, space, logic and infinity. HM, 1987, 328 p., illus., $19.95.

The Particle Explosion — Frank Close, Michael Marten and Christine Sutton. For the general reader, a beautifully illustrated tour of the subatomic world — the science of particle physics — and a look at the scientists who attempt to understand the nature of matter and energy. Starts out with an introduction to the fundamental particles, which include quarks, leptons and bosons, and tells of the methods used to create and study them. Chapters telling the story of the developments in particle physics and the physicists involved — from the discovery of the particles to today's experiments seeking confirmation of a grand unified theory — alternate with chapters that describe in detail the major particles and groups of particles. Oxford U Pr, 1987, 239 p., color/b&w illus., $35.