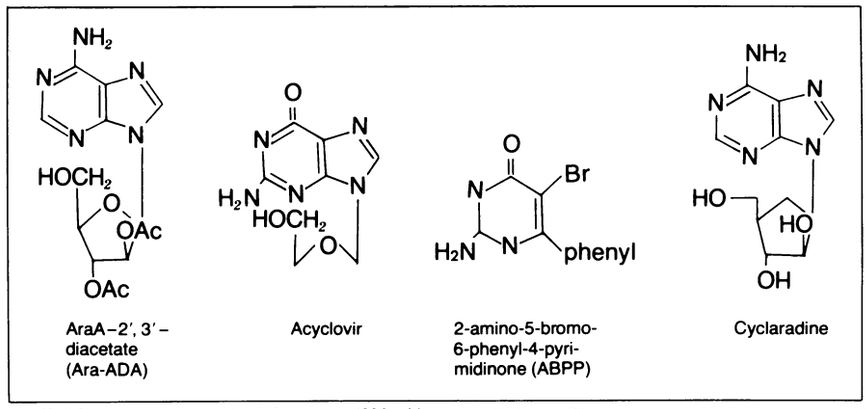
Advances reported in the design of drugs to battle herpes

Progress in the search for preventatives of and more effective treatments for genital herpes virus infection—now one of the fastest-spreading diseases in the world—was reported last week at the American Chemical Society meeting in Seattle. The spotlight shone on three new chemicals whose abilities to combat herpes may be tested in humans within the next several years.

Genital herpes, spread predominantly by intimate body contact, is usually caused by the organism herpes simplex virus (HSV) type 2. (HSV type 1 also can cause genital herpes infections.) After its initial infection, this virus can cause recurrent episodes of the incurable disease — which is characterized by painful lesions or blisters on the genitalia. About 20 million people in the United States — nearly one out of every 10 persons — now are victims of genital herpes; an additional one-half million new cases are expected within the next year.

Currently, acyclovir is the only drug available to treat genital herpes (SN: 4/10/82, p. 247). Acyclovir has been shown to decrease the duration of virus release from lesions and the duration of pain in primary infections. However, it has not been effective in inhibiting recurrent episodes. Moreover, in laboratory tests of acyclovir, herpes strains have mutated to forms resistant to the drug.



William Shannon and colleagues of Southern Research Institute in Birmingham, Ala., are just one of several groups searching for a drug not hampered by such limitations. A modified version of the antiviral drug ara-A is one chemical this group believes shows promise. Ara-A now is used to treat nongenital herpes infections such as herpes keratitis, an eye infection that can be caused by type 1 or type 2. But ara-A fails to combat genital herpes, and scientists believe this is due to its inability to penetrate the skin. Shannon and colleagues have designed a "prodrug" of ara-A, called ara-ADA, that can successfully penetrate into the site of infection where it is then converted back into the parent, antiviral compound. In tests on guinea pigs, ara-ADA "appeared to be just as effective as acyclovir" in treating primary infection lesions. Beyond that, it works by a mechanism different from acyclovir's, so it is expected to be able to fight herpes strains that become resistant to acyclovir. Furthermore, there are preliminary indications that ara-ADA might be effective in fighting recurrent episodes of the viral infection; a study to test this possibility will start soon.

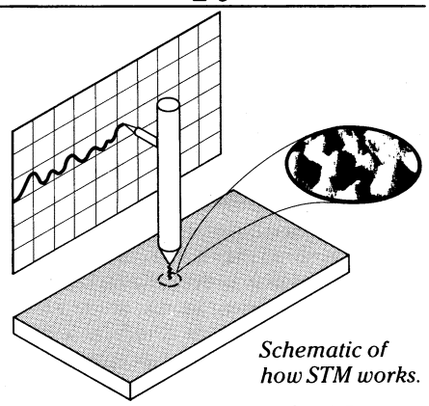
Shannon and colleagues, working with Robert Vince and cohorts at the University of Minnesota at Minneapolis, also will be testing the ability of a second chemical, cyclaradine, to inhibit recurrent episodes of genital herpes. Schering-Plough Corp., a pharmaceutical company, already has shown interest in cyclaradine, which also is a chemical cousin of ara-A.

Finally, Harold E. Renis and colleagues of the Upjohn Co. in Kalamazoo, Mich., are continuing their studies of ABPP — a chemical that has been shown in animal tests not only to clear genital herpes infections but also to prevent transmission of the disease. In tests on female guinea pigs and mice, an ABPP-containing cream was applied vaginally twice daily for three days. ABPP protected 80 to 90 percent of these animals from herpes type 2 virus placed in the vagina on the fourth day. Renis said it is too early to tell whether ABPP would similarly prevent herpes transmission in humans. —*L. Garmon*

Tunneling electrons for microscopy

Tunneling is one of the oddest phenomena of quantum mechanics. Electrons, moving along as an electric current, will appear on the other side of a layer of insulation. The insulator is not damaged nor is there any other evidence that the electrons have passed through it, but they nevertheless appear on the opposite side of it from where they were before. Tunneling goes to show that electrons are waves as well as particles. Wave equations predict a probability of finding electrons on the "wrong" side of the insulation (provided it is thin enough).

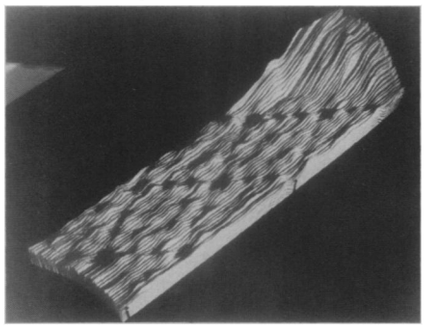
The insulation may be a material substance or a good vacuum. Tunneling through materials was demonstrated a long time ago and is now a feature of a number of practical devices. Tunneling through vacuum, technically more difficult as an experiment, was demonstrated only in the last year. Now Gerd Binning, Heinrich Rohrer, Christoph Gerber and Edmund Weibel, at the IBM Research Laboratory in Zurich, Switzerland, have used it in designing a microscope to study surfaces. It produces "unprecedented" detail, according to an IBM announcement. The procedure was described at last week's meeting of the American Physical Society in Los Angeles by Rohrer.



Schematic of how STM works.

In the device, the surface to be studied forms one electrode; a probe that scans above it forms the other. The amount of current that will tunnel through the vacuum between them depends on the distance of the probe from each point on the surface and so a trace of the surface can be obtained. In practice the probe is moved up and down to maintain the current constant, and the probe's motions are recorded as a trace of the surface. This Scanning Tunneling Microscope can resolve vertical differences as small as 0.1 angstrom and horizontal ones as small as 6 angstroms. —*D. E. Thomsen*

Illustrations: IBM



Three-dimensional model of a silicon surface made from two-dimensional scans by the STM. It shows two rhomboid-shaped unit cells. Hills and valleys within the cells, "never before observed" according to IBM, are less than 2.8 angstroms deep.

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