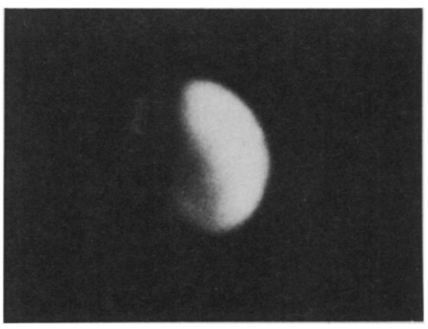
Viking nears Mars; special issue planned



Viking's first view of Mars, taken April 12 with 9.5 million miles left to travel.

With nearly a decade of development, a billion dollars and a 10-month space trek behind it, the first of the two Viking spacecraft will go into orbit around the planet Mars on Saturday, June 19, carrying a landing craft due to touch down on the Martian surface on the Fourth of July. The next issue of SCIENCE NEWS will be a special, 32-page edition, combining the issues of June 5 and 12, devoted to Mars and the Viking mission. Besides a detailed chronology and description of Viking's complex scientific plans, the issue will include a discussion (with tabular data) of Mars itself, a brief history of Martian observations, a centerfold map of the planet and a scientific analysis of the possibilities of extraterrestrial life. It all goes to press on June 10 and in the mail the following day, a compact guide to the most exciting interplanetary mission ever flown. □

A new approach to designing drugs

Visualize a drug that when swallowed or injected homes in on the desired tissue, thus sparing other tissues and avoiding undesirable side effects. Visualize a drug that zaps the target tissue in the right concentration, then switches off after the proper amount has been delivered.

Biomedical fantasy? A team of San Diego scientists believes that such drugs may eventually become a reality.

The reason is that they are working on a radical new approach to drug design. The plan is to attach drugs, which are generally small molecules, to larger carrier molecules that can be more easily manipulated. The research group has been gathering increasing evidence that the approach is feasible, the most recent of which is reported in the April PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

The investigators are Michael S. Verlander, J. Craig Venter, Murray Goodman, Nathan O. Kaplan and Bernie Saks of the departments of chemistry and medicine at the University of California.

Designing drugs for systemic use is currently limited at best. Chemists can alter chemical components of a drug and thereby increase or decrease its pharmacological effect. But chemists have no way of making sure that a drug reaches the desired tissue of the body, nor of keeping it from adversely affecting other tissues. Nor can they control the precise amount of drug released at the target site over a period of time. The San Diego team realized, in the early 1970s, that a more effective, safer approach to drug design was needed and set out to find it.

Other researchers had reported that some enzymes and small molecules retained activity when immobilized covalently on the surface of insoluble chemical materials. The San Diego scientists theorized that drugs, generally being small molecules, might be attached to larger chemical matrices, say, polypeptides or polymers. The larger chemical carriers would be easier to manipulate than the smaller drugs would be. It would thus be easier to get drugs to the right tissues in the right amounts at the right times if they were attached to such carriers.

They performed experiments showing that their hypothesis had validity. For instance, they found that the drugs epinephrine, norepinephrine, isoproterenol and propranolol remained active in tissues and animals while covalently bound to glass particles. They have found that luteinizing hormone-releasing factor, a hypothalamic hormone that stimulates ovulation, can be covalently bound to water-soluble, synthetic polymers. In these and other experiments, however, they weren't sure that the immobilized drugs were really producing the pharmacological activity observed. There was a chance that some drug might have leaked off the chemical carrier and have produced the activity instead. They wanted to make sure that the drugs were truly able to act while covalently attached to their chemical carriers. They now believe that they finally have the "rigorous proof" that the drugs act in this manner, and these are the findings just reported. The experiments concern the drug isoproterenol covalently coupled to soluble polypeptides.

Verlander and his colleagues are now ready to see how they can alter drugs' chemical carriers—say polypeptides or polymers—in order to deliver drugs to specific tissues. For instance, a chemical carrier might be chosen for a particular drug because it has a strong affinity for the body site where one wants the drug to act. If the drug can be made to act in a specific site, then it drastically reduces the chances of the drug producing undesirable effects in other parts of the body. Or the chemical carriers might be altered in such a way that only a specific amount of drug is delivered at the target site and over only a specific time schedule. □

Snake blood to fight snake bites

Venom for commercial anti-venom.

Three Utah researchers who amassed the world's largest supply of rattlesnake blood have extracted some potentially life-saving information from that arcane collection. Rattlesnake blood, they now report, contains an antivenom factor that protects venom-injected laboratory animals better and with fewer side effects than commercial antivenoms made from venom and horse serum.

Herpetologists have known since the late 1800s that the blood of vipers and pit vipers (such as rattlesnakes) contains antivenom factors. This is not terribly surprising since the snakes store highly poisonous venoms in their own fang glands. But this knowledge has remained little more than curiosity following the discovery, about the same time, that fang venom injected into horses causes the production of antibodies that can be used clinically to treat snake bite.

These antibody-horse serum preparations were used quite successfully for decades, but have slowly lost some effectiveness for emergency treatment. So many vaccines are produced in horse serum that by now, many persons have developed antibodies to *it*. Many, as a result, experience allergic reactions—sometimes fatal—when treated with antivenom based on horse serum. A doctor treating a rattlesnake bite, therefore, is faced with a difficult decision: Should he administer a commercial antivenom and risk a potentially severe allergic reaction in order to stop the possible bleeding, tissue destruction and scarring that can follow snake bite? Or should he use precious time to test the patient's blood for allergic reaction first while the venom courses through the victim's bloodstream?

This dilemma led the three Utah researchers to reexamine rattlesnake blood as a potential source of antivenom. Richard C. Straight and J. L. Glenn of the Veterans Administration Hospital in Salt Lake City and C. C. Snyder of the University of Utah report encouraging re-