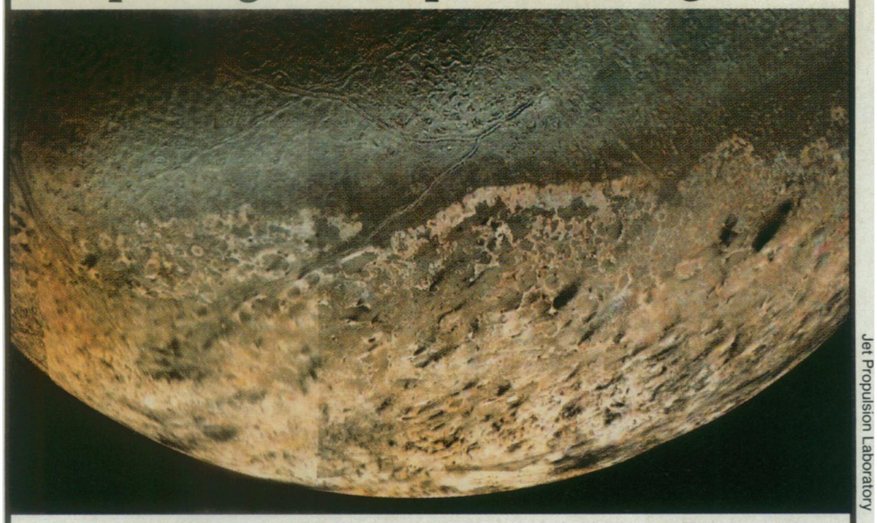
Deciphering Triton's pastel shadings



Jet Propulsion Laboratory

This image of the Neptune-facing hemisphere of the planet's moon Triton combines about a dozen individual photos taken by the Voyager 2 spacecraft as it flew past on Aug. 25. Across the bottom of the picture stretches Triton's bright south polar cap. Scientists think the cap may consist of nitrogen ice, released as a gas at the opposite pole when that pole was in sunlight, then frozen out at the south, where it is now evaporating again to make the return trip north. The darker color of the terrain north of the cap may reflect the darkening of methane on Triton's surface and in its thin atmosphere, a process triggered by cosmic rays, solar ultraviolet light and radiation from particles trapped by Neptune's magnetic field. The poles change from their largest to smallest extent in half of Neptune's 165-year trip around the sun.

Gout drug might cut AZT dosage by half

A drug developed in the 1940s to keep penicillin in the blood longer may do the same for zidovudine (AZT), the only drug approved to treat AIDS. Researchers report that probenecid reduces zidovudine inactivation and excretion — boosting blood levels between doses an average of 80 percent compared with zidovudine alone.

Though the trial included only eight patients, it indicates probenecid, now used to treat gout, could halve the daily dose of zidovudine without changing overall effectiveness, says study director David M. Kornhauser of the Johns Hopkins University School of Medicine in Baltimore. If so, such a change could essentially halve the cost of treatment, he says.

The total cost nationally of zidovudine therapy — estimated at $8,000 annually per patient — might skyrocket if each of the estimated 1.5 million Americans infected with HIV, the AIDS-causing virus, received zidovudine. Two recent studies indicate the drug delays the onset of AIDS (SN: 8/26/89, p.135).

Kornhauser and his co-workers gave probenecid and zidovudine to eight AIDS or AIDS-related-complex patients. Fearing probenecid might work too well — increasing zidovudine's toxic effects as well as its anti-HIV activity — they first reduced each patient's zidovudine dose. Zidovudine levels rose in every patient, but in varying amounts — from 14 percent to 192 percent, the team reports in the Aug. 26 LANCET. The researchers saw no increase in side effects or adverse changes in symptoms.

Kornhauser says no researcher would recommend changes in clinical practice after studying only eight patients, but "a large-scale trial looking at the combination of AZT and probenecid would be reasonable if you think of the health costs to the nation as a whole."

AIDS patients often require several medications. Because probenecid is known to increase levels of many drugs, Kornhauser suggests testing it early in the HIV infection, before patients require medications other than zidovudine.

Margaret Lynn Smiley, medical adviser for the department of antimicrobial therapy at Burroughs Wellcome Co. of Research Triangle Park, N.C. — maker of zidovudine — remains concerned about probenecid's effects on other drugs. She says even asymptomatic patients in the near future won't get zidovudine alone. "This [probenecid] is just a way of maximizing one antiviral, but now we're looking at combination therapies," she says. "In future AIDS anti-viral therapy there are going to be drugs targeted toward different enzymes or different parts of the viral replication cycle." — *S. Hart*

Asbestos fiber shape may trigger radicals

Researchers have discovered how one type of asbestos stimulates cells to release oxygen radicals, highly reactive molecules that seem to play a key role in asbestos-related lung diseases.

The finding, described in the August TOXICOLOGY AND APPLIED PHARMACOLOGY, may help researchers develop treatments for a debilitating respiratory condition called asbestosis, says study coauthor Andrij Holian, a molecular toxicologist at the University of Texas Medical School at Houston.

Asbestos can trigger excessive collagen production in the lung that causes asbestosis, explains coauthor Paul L. Roney, now with Versar Inc., an environmental consulting firm in Springfield, Va. Researchers suspect the interaction of asbestos fibers and alveolar macrophages, white blood cells in the lung, triggers the release of superoxide anion, a highly reactive free radical that stimulates production of collagen fibers.

The two major types of asbestos fibers, serpentine and amphibole, have chemical and structural differences that may influence their interactions with cells. In their study, Roney and Holian screened both forms of asbestos for their ability to stimulate alveolar macrophages from guinea pigs to produce superoxide anions. They found that chrysotile fibers, a form of serpentine asbestos, adhered to the surface of guinea pig macrophages. This binding sets off a chain of events, activating an enzyme that cleaves a fat molecule in the cell membrane, which generates two chemical messengers. One elevates calcium levels in the cell; the other sets in motion a chain of enzymatic events that ultimately converts molecular oxygen into oxygen radicals.

"What our research has shown is that chrysotile asbestos is capable of directly activating one of the most important cell signaling pathways," Roney says.

Amphibole forms of asbestos didn't stimulate those pathways in guinea pig cells, the researchers say. But in cells extracted from human volunteers, Holian says, "both fibers stimulate the human alveolar macrophage to produce superoxide anion." Holian isn't sure how serpentine asbestos stimulates free radical production, but he's confident structural differences between the two fibers influence their reactions with cells.

Holian says research he described in an abstract in the April AMERICAN REVIEW OF RESPIRATORY DISEASE shows that extracellular calcium prolongs the asbestos stimulation of the superoxide anion production. He speculates that calcium channel blocker drugs, already used to treat heart disease, might be used to treat asbestosis patients. — *D.E. Loupe*