CHEMISTRY

Julie Ann Miller reports from Miami Beach at the meeting of the American Chemical Society

After the burn, before the graft

Severe burn treatment requires removal of irreparably damaged skin before grafts of healthy skin can be applied. Surgical excision of the burned tissue requires skilled attention to the depth of the burn and use of anesthesia, which can be dangerous to an already traumatized patient. Researchers have investigated use of enzymes to remove dead skin, but they find that the enzymes tend to irritate surrounding healthy tissue. Now Eli Seifter and colleagues at Albert Einstein College of Medicine in New York report the first rapid burn treatment with defined chemicals that permits immediate skin grafting.

Rats with third degree burns over 15 to 20 percent of body surface were treated with the mercaptan *N*-acetyl cysteine in a vanishing cream or antibiotic salve. The chemical removed dead skin within six hours. Two other mercaptans were slightly less effective. Seifter suggests that the mercaptans depolymerize heat-denatured extracellular mucoproteins but are inactivated by healthy tissue. "The unburned skin seems undamaged," Seifter says, "and there is no evidence of systemic toxicity." Seifter's colleague Stanley M. Levenson says the researchers are currently applying for Food and Drug Administration approval for clinical tests.

Toward clean drinking water

Is activated-carbon filtration the reasonable way to remove organic pollutants from drinking water? Last February the Environmental Protection Agency proposed a requirement for such filtration in water systems serving more than 75,000 people, but the White House Council on Wage and Price Stability recently charged that the $700 million estimated price tag of the plan is not justifiable. Among the 49 papers in a symposium on activated-carbon adsorption were evaluations of the technology: reports of successful pilot plant studies in Kansas City, Philadelphia and Miami, announcement of new synthetic adsorbents and discussions of methods for regenerating activated carbon for reuse. However, John T. Cookson Jr. of JTC Environmental Consultants, Inc., in Bethesda, Md., expressed reservations based on concern for health, rather than cost. He pointed out that activated carbon can behave as a catalyst, forming new compounds in the water. Industry routinely uses activated carbon for its catalytic properties, but few drinking water studies, Cookson says, look for catalysis either by the carbon, by adsorbed compounds or by the carbon surface as it is modified by use and regeneration. "This catalytic behavior may result in the formation of compounds of more insidious characteristics than the parent species," Cookson says. He sees a need for more information about carbon surface chemistry and its interactions with organic components.

New plant function for an old compound

Sixteen thousand pea plants, harvested just after germination, produced only 250 micrograms of hormone. It wasn't much, but it was enough to establish the chemical identity of a potentially important regulator — the first hormone isolated from cells that effects the mitotic cycle. Koji Nakanashi of Columbia University reports that the hormone, previously known as G-2 factor, is not a novel compound at all. It is just *N*-methylnicotinic acid (or trigonelline), which was identified in the fenugreek plant more than 80 years ago. But until now there was no reason for botanists to consider it a hormone. The G-2 factor, discovered several years ago, lets cells replicate their DNA but stops the cells before they divide. Nakanashi now hopes to discover how the simple nicotine compound controls the signals for cell division.

SPACE SCIENCES

More on Martian organics

There certainly have been reasons to expect organic materials to exist on the surface of Mars, rained down by carbon-rich meteorites or created by photochemical synthesis, so it was a major surprise of the Viking mission that no organics were detected by the two landers. One suggested reason for their apparent absence has been the possible presence of peroxides, superoxides and ozonides — active molecules capable of readily oxidizing many organics out of existence. Another proposal has been that the organics would be "scavenged" by glow discharges built up among particles in the Martian dust storms.

Yet even with Viking's help, much remains unknown. The superoxides and glow discharges, for example, are only inferences from other data. Now, however, a group of California researchers has suggested another way of making organics disappear. "Our proposal," according to Sandy F. S. Chun, Kevin D. Pang and James A. Cutts of the Planetary Science Institute and Joseph M. Ajello of Jet Propulsion Laboratory in Pasadena, "differs from previous ones in that all conditions required ... have been found to be present in the Martian environment."

The lack of organics, the group reports in the Aug. 31 NATURE, could be due to their oxidation by mere gaseous oxygen, stimulated by solar ultraviolet radiation in the presence of a catalyst of titanium dioxide. The TiO_2 has been detected by the Mariner 9 spacecraft in UV spectroscopy of Martian dust storms (titanium has also been directly measured by the Viking landers), solar UV of the proper wavelengths (below 3,600 angstroms) has been recorded from the surface by both Mariner 9 and Viking and Viking also revealed gaseous oxygen.

A laboratory test on a piece of the Murchison meteorite (a carbonaceous chondrite) has confirmed that the process works, although studies suggest that extremely low temperatures could appreciably slow down the reaction rate. Pang and other scientists have said, in fact, that the polar regions of Mars might be better places to seek organics than are the warmer low and middle latitudes where the Viking landers lie.

Laser communications by satellite

A two-year series of earthbound and air-to-ground laser communications tests was begun this month by the U.S. Air Force's Space and Missile Systems Organization, leading up to a proposed global satellite system in the mid-1980s. It is not only the high data rates possible with lasers that pique military interest, but the security enabled by the extremely narrow beam (5 microradians, or less than 0.0003°).

Ground-to-ground tests are the first phase of the series, with the laser beams reflected from a 24-inch steerable mirror placed one to six miles away. Air-to-ground tests will follow, with laser transmitters and receivers both on the ground and in an EC-135 aircraft flying at 30,000 feet. The laser path will be varied over a range of angles, in part to test the accuracy of the pointing and acquisition equipment, with the result that the laser path will sometimes be as much as 30 miles long. The tests will be run under a variety of weather conditions, although the proposed satellite version is considered to be "primarily a clear-weather system," carrying radio-frequency transmitter/receivers as backup. The present tests are using a 550-watt Nd:YAG (neodymium: yttrium-aluminum-garnet) laser.

The envisioned satellite system would embody four satellites, all at geosynchronous altitude, for global coverage, connecting land, sea, air and spaceborne users. As many as 1,500 simultaneous calls could be handled at each spacecraft's low data rate of 100 bits per second, or a high-priority call could automatically switch the system's data rate, giving the single message an available one billion bits per second.