Biology

Julie Ann Miller reports from the meeting in Boston of the Society for Neuroscience

Prosthetics in key with patients

The melody of "Sweet Georgia Brown" swelled in the lecture hall. Richard B. Stein of the University of Alberta, Canada, was showing a film in which a professional saxophone player who had lost one hand used a prosthetic device. According to the musician's associates, he was playing as well as he had before losing his hand. Stein gives this achievement as an example of how prostheses can be designed to meet special needs.

While the sophistication of artificial limbs is steadily increasing, none have individual fingers that can move independently. Therefore, Stein and colleagues fashioned for the saxophone player a cuff that fits loosely around the arm stump and contains a set of contact points. Each of the contact points connects to the saxophone via relay switches. When the patient taps the cuff in different places with his stump, a specific combination of saxophone keys depress.

"We were surprised at the speed with which the patient could adapt to playing sax with a different set of muscles," Stein says. "Within an hour he was picking out tunes and he was playing effectively within a week." A second saxophone-playing amputee has also been fitted with the device.

"There will be increasing opportunities for linking people not only to saxophones, but also to computers," Stein says. With such linking devices and also more sophisticated artificial arms, he expects prosthetics to become less a matter of clumsy devices and more a satisfactory rehabilitation appropriate to the interests and daily requirements of a patient.

Sticky issue between nerve and muscle

When a nerve cell releases a chemical signal, many packets containing the chemical fuse with the cell membrane and dump their contents outside the cell. Now Regis B. Kelly proposes that these contents include not only the signal chemical but also a dose of special glue. This glue may anchor the nerve cell ending to a muscle and may be the signal that guides disrupted nerves and muscles to form new connections at the appropriate sites.

The evidence for this special glue comes from work with an antibody that binds a component of the inner surface of the signal chemical packets, which are called synaptic vesicles. The antibody also binds the material, called proteoglycan, in the cleft between nerve cell and muscle in the electric organ of electric fish, report Kelly and his colleagues at the University of California at San Francisco. They do not find the proteoglycan in the fish brain or spinal cord. "This is a very pathway-specific glue," Kelly says. The scientists have also identified a calcium-binding protein in the vesicles that might be responsible for the rapidity with which the vesicles respond to calcium and fuse with cell membranes to release their contents.

Venom of snail at work in the lab

Natural venoms in some cases do their deadly work by disrupting critical processes of the nervous system. Snake and pufferfish toxins have provided invaluable tools to scientists locating and analyzing receptors for signal chemicals and channels through which ions cross nerve membranes. Doju Yoshikami and colleagues at the University of Utah in Salt Lake City now describe the action of a marine snail toxin that promises to be another useful tool. The Indo-Pacific snail, *Conus geographus,* named for its cone-shaped shell, produces a venom that paralyzes animals. The toxin, a short chain of amino acids, was discovered and purified by B. M. Olivera and W. R. Gray, also of the University of Utah. Yoshikami reports the toxin, called omega-toxin, blocks entry of calcium ions into nerve cell endings. "Its precise mode of action is still not clear," Yoshikami says. But the toxin should help scientists characterize the calcium influx that initiates release of a nerve cell's signal chemical.

Science & Society

EPA looking at formaldehyde

The Environmental Protection Agency (EPA) says a lawsuit filed in July by the Natural Resources Defense Council and the American Public Health Association prompted it into reversing its decision of February 1982 not to expedite study of whether formaldehyde exposures need regulating. Under the Toxic Substances Control Act, if EPA gets information indicating any chemical may present a widespread or significant risk to health — from cancer, gene mutations or birth defects — it must initiate statutory action to reduce such risks (or explain why such risks are not unreasonable). By reversing its stand on formaldehyde, EPA has committed itself to deciding within 270 days whether or how to regulate the chemical.

Lilly blamed for Oraflex-related death

An initial decision has been reached in the first of more than 100 suits filed in the United States against Eli Lilly and Co. of Indianapolis over its anti-arthritic drug, Oraflex. On Nov. 21 a federal jury awarded $6 million in damages to the son of a woman who died in July 1982 after using the drug. Lilly plans to appeal this ruling.

The suit charged Lilly was irresponsible in not reporting to federal authorities, before the drug was marketed here, that deaths had been linked to Oraflex use overseas. However, the Justice Department has not established whether Lilly violated federal reporting procedures. U.S. sales and distribution of Oraflex were suspended in August 1982 — three months after its U.S. market entry — when U.S. officials learned 61 deaths in Britain had been linked to the drug's use (SN: 8/14/82, p. 104).

The nuclear boomerang

An effective first strike on the strategic nuclear forces of either the United States or the U.S.S.R. could prove suicidal to the attacker. "It's called the boomerang effect," notes Stanford University biologist Paul Ehrlich: "Shoot at me and you'll drop dead even if I don't shoot back." According to the researcher, this is one of the most important conclusions of recent studies linking climate changes to nuclear war (SN: 11/12/83, p. 314).

Even an accurate 3,000-megaton salvo limited to intercontinental ballistic-missile silos could loft enough dirt and smoke into the atmosphere to initiate a nuclear winter that would halt grain production throughout the Northern Hemisphere for at least a year, Ehrlich explained in a speech Nov. 16. "We are pushing a dangerous and paranoid enemy into a corner by threatening a first strike," he said. "Though we know that is not our intention, [the Soviets] must assume the worst." And if they take a launch-on-warning posture, he warned, the future of *Homo sapiens* could "then depend on Soviet computers not malfunctioning." He added, "Our defense computers, which are infinitely better than theirs, give false alarms all the time."

Warnings of workplace chemical hazards

Manufacturing workers must be informed of health hazards associated with workplace chemicals to which they are exposed — unless doing so would disclose trade secrets, according to a new law issued Nov. 21. Even with trade secrets, however, manufacturers must reveal chemical identities upon the request of health-care professionals treating emergencies involving affected materials. The law takes effect Nov. 25, 1985.

The new Occupational Safety and Health Administration standard requires labeling hazards on a chemical's container, making accessible data sheets that give more detailed information, and establishing programs to inform employees of hazardous chemicals and their safe use whenever workers are assigned to new areas or encounter new chemicals.