Laskers highlight addiction, RNA work

A physician, a molecular biologist and a biochemist received the 43rd annual Albert Lasker Medical Research Awards, announced this week by the Albert and Mary Lasker Foundation in New York City.

For his pioneering work in the medical treatment of opiate addiction, Vincent P. Dole of Rockefeller University in New York City won the clinical research category. Molecular biologist Phillip A. Sharp of the Massachusetts Institute of Technology and biochemist Thomas R. Cech of the University of Colorado in Boulder shared the award in basic medicine for discovering unexpected roles of RNA.

One day in the early 1960s, Dole recalls, he looked out at drug-devastated Harlem and thought, "Someone should do something scientific about it." He soon abandoned other research and established with his wife, the late psychiatrist Marie Nyswander, the first successful medical treatment program for opiate addicts in the United States.

Dole and Nyswander tested various narcotics and found, to their surprise, that "on methadone, [the addicts] became totally different people," recalls Dole, now 75. He postulated that methadone, a known opiate painkiller, acted on the same receptor molecules in the brain as did heroin and other opiates. He then mathematically determined the number of these receptors.

Methadone is still the main treatment for opiate addicts in the United States. This long-acting drug helps prevent withdrawal symptoms by lingering in opiate-responsive tissues, blocking the normal opiate action sites. Dole emphasizes that his wife contributed as much as he to these achievements. "The only reason I'm standing alone is that she's not here to stand with me," he says.

Sharp is honored for "his series of revelations regarding the ability of RNA processing to convert DNA's massive store of genetic data to biological use." Sharp, now 44, discovered that DNA's genetic information is interrupted by apparently meaningless DNA sequences called "introns," which are removed after the RNA copy is made from the DNA. Before Sharp's finding, scientists had assumed the messenger RNA's genetic sequence would correspond one-for-one with that of its parent DNA strand.

Sharp's work is crucial to understanding how cells and viruses regulate their genes, a fundamental process in cell specialization, carcinogenesis, growth, healing, aging and viral diseases such as AIDS. Sharp also found a splicing role for some small nuclear-RNA particles.

Cech is cited "for his revolutionary research revealing the enzymatic role of RNA and opening a new universe of research in molecular biology." Comments biologist Larry Gold of the University of Colorado, "He discovered something that changed everybody's understanding of enzymology as a protein-based system."

In the early 1980s, Cech was trying to purify the enzyme supposedly at work in a splicing reaction. Instead, he "eventually found that it was RNA itself," says Cech, now 40. Cech's discovery also led to the idea that the evolution of life may have begun when the first RNA molecule appeared. In addition, Cech says, "it now appears that there are some very important human pathogens that use RNA catalysis to do their dirty deeds. So it is possible that inhibitors of this process will have important clinical application."

— I. Wickelgren

Discriminating neurons pick the right face

For most of us, a glance is enough to recognize a familiar face. And except in a poker game — when important protective mechanisms come into play — a person's facial expression tells us a lot about that person's mood.

Neuroscientists know that two parts of the brain — the inferotemporal gyrus (ITG) and the superior temporal sulcus (STS) — are important in recognizing faces and their expressions. Now they've begun pinpointing the brain neurons involved. By identifying and mapping the key neurons responsible for recognition of these complex patterns, researchers hope to "teach" similar recognition skills to computerized neural networks. Scientists from California and Japan described their findings this week at the Society for Neuroscience annual meeting in Toronto.

Michael E. Hasselmo of California Institute of Technology in Pasadena and Gordon C. Baylis of the University of California, San Diego, monitored the activity of 45 individual neurons in the brains of two macaque monkeys while the monkeys were shown photographs of other monkeys' faces. One photo at a time, the researchers showed nine pictures of three different monkeys, including three different expressions for each monkey: calm, slightly threatening and strongly threatening. They identified nine neurons significantly associated with recognition of facial expression only, and 15 with recognition of facial identity only. The former were mostly located in the STS and the latter mostly in the ITG, strongly suggesting the two functions are encoded independently in the brain.

These findings may help elucidate the specific mechanisms behind two types of brain disease in humans: prosopagnosia — in which the affected individual can identify emotions expressed on faces but cannot identify individuals by their faces — and cerebral organic brain syndrome, where the opposite is true.

Kenji Kawano and his colleagues at the Electrotechnical Laboratory in Ibaraki, Japan, monitored 446 neurons in the brains of monkeys trained to recognize three human faces in photos. The researchers measured 21 different indices for each face — such as distances between nose, eyes and hairline — then compared neuronal firing when the monkeys tried to recognize composite faces made from parts of three different faces. They found five neurons specifically attuned to particular facial indices.

Despite such neuronal specificities, Baylis and Kawano say, face recognition ultimately must be the result of a complex and still-unexplained integration process.

— R. Weiss

First Soviet shuttle flight

Americans have watched U.S. space shuttle astronauts float weightlessly during days-long flights covering dozens of Earth orbits. The first Soviet shuttle, launched Nov. 15, carried no cosmonauts and flew for only 3 hours, 25 minutes, orbiting Earth twice. But the Soviets see its maiden voyage as a major success.

The flight of Buran (Russian for "snowstorm") came two weeks after its first launch attempt was halted 51 seconds before liftoff when a platform failed to pivot out of the craft's path. Redesigned since the Oct. 29 aborted launch, the platform swung away smoothly during the second attempt. Soviet officials say all intended onboard tests were completed, adding they will not schedule a manned shuttle mission until every one of the craft's systems has passed tests during unmanned flight.

Buran's apparently flawless launch also demonstrates the versatility of the Energia booster, a multirocket system around which the Soviets plan a variety of missions. This liquid-fuel booster could launch nonshuttle payloads, including space-station segments for Earth-orbit assembly and parts of spacecraft for lunar or Martian exploration. Providing more than three times the carrying power of the U.S. shuttles used to transport satellites, Energia also could orbit satellites much larger than any yet built.

Minutes after liftoff from the Baikonur cosmodrome in Soviet Central Asia, Buran separated from Energia. About 45 minutes later and 100 miles above Earth, the shuttle maneuvered toward its 155-mile orbit using small onboard engines. Buran made a remote-controlled landing 8 miles from its launch pad, as planned. □