

Identifying cells' chemical personalities

These days, sophisticated tools often become the inspiration for experiments that earlier researchers might never have dreamed of doing. Two chemists have developed such a tool for taking chemical inventories of individual cells and other liquid samples so small that millions of them could fill a thimble.

"The idea is to be able to look on a cell-by-cell basis at the chemical contents of cells," says James W. Jorgenson, who developed the technique with Robert T. Kennedy at the University of North Carolina at Chapel Hill. In the March 1 ANALYTICAL CHEMISTRY, they report using the technique—open tubular liquid chromatography (OTLC)—to distinguish among individual neurons by their chemical makeup. They say OTLC also could help biologists demystify the chemistry underlying cellular behaviors such as responding to drugs, manufacturing neurotransmitters and differentiating into muscle, blood or brain cells.

In less time than it takes to watch a movie, the researchers can determine the chemical personality of an individual cell, in this case from the escargot's cousin—the land snail. After isolating and homogenizing a specific neuron, the researchers inject tiny samples of the cell's watery chemical brew into a specially coated glass capillary tube to separate the sample's components. As the mixture travels down the thinner-than-hair tube, the coating hinders each component's motion to a different degree. At the tube's other end, an electrode detects many of the now separated neurotrans-

mitters, amino acids and even unknown chemicals by measuring how much voltage it takes to oxidize each one as it exits.

A plot of the resulting data looks like a range of steep, pointy mountains. Each peak corresponds to a different cellular chemical; peak heights indicate amounts of the chemicals. In two of three types of cells the researchers analyzed, dopamine and serotonin (neurotransmitters), tyrosine and tryptophan (amino acids) and other chemicals showed up as identifiable peaks. In the third type, the neurotransmitter peaks were absent. One cell type consistently produced a promi-

nent peak that the researchers are still trying to identify.

At this week's Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, held in Atlanta, Jorgenson plans to report data from even newer OTLC experiments in which he measured the cellular amounts of 18 amino acids that he chemically modified to be more easily oxidized by the detector electrode. At the same conference, Andrew G. Ewing, a chemist at Pennsylvania State University at University Park, and his co-workers, who have developed another technique for studying neuronal chemistry, will present data on the distribution of dopamine in different regions of single neurons.

— I. Amato

Panel frets over cash-short climate studies

Warning that the United States and other nations have severely underfunded research into global warming and related issues, a committee of nongovernment experts this week asked Congress to almost triple the current funding for studies of global change.

The panel recommends approval of the President's 1990 global-change budget request of \$190 million and calls for spending an additional \$170 million on climate studies. This type of research received \$134 million in fiscal year 1989.

Convened by the Washington, D.C.-based Climate Institute and led by Gordon J. MacDonald, vice president and chief scientist at the MITRE Corp. in McLean, Va., the 16-member panel offers specific recommendations on improving climate research. Many suggested fund-

ing increases would go toward developing a comprehensive global monitoring system, designed to detect any changes in climate.

The committee proposes spending more to study how climate warming might affect sea level, shorelines, agriculture, forests, wildlife and human health. Noting that worldwide efforts are required, the panel recommends funds to strengthen international negotiations and research on this issue. It also suggests an additional \$14 million for programs to accelerate the phaseout of substances that destroy the ozone layer.

Panel member Courtland Perkins, former president of the National Academy of Engineering, says Congress needs such specific recommendations to identify holes in current global-change research.

In its report, the committee expresses concern that one important global-studies project, the Earth Observing System (Eos), might not receive sufficient support in coming years because NASA has linked this satellite system to the costly and controversial Space Station program. "The Eos mission could be accomplished just as effectively through much less expensive satellites," the panel says.

Sen. Patrick Leahy (D-Vt.), on the Senate Appropriations Committee, says the report "zeroes in on the most important areas which need beefing up as we try to assess what global warming and ozone depletion will do to our world."

Recognizing the limitations on the federal budget, MacDonald's panel suggests Congress provide the increased funds for global-change studies through a "very modest reallocation" of money planned for the manned space program. But NASA spokesman Charles Redmond in Washington, D.C., says this move seems unlikely. "The chances of pulling a dollar out of the shuttle budget are like trying to pull a tooth out of a large tiger. You can argue that it's a great place to get the money, but it's never been done, and it's not likely to be done."

— R. Monastersky

Task force says circumcision has benefits

Marking a subtle but significant change of view, the American Academy of Pediatrics this week concluded there are "medical benefits and advantages" to circumcision. The nation's largest pediatric organization stopped short of recommending the procedure, which involves the surgical removal of foreskin from the penis. But the new statement, the first from the academy in five years of heated debate on the topic, represents a departure from past statements declaring circumcision has "no absolute medical indications." The percentage of boys circumcised as newborns has fallen from about 95 percent in the 1960s to about 60 percent in 1978, in part because of a growing movement among parents and some physicians emphasizing the shortage of documented medical benefits.

The academy's Task Force on Circumcision based its revised report on new studies suggesting the incidence of urinary tract infection during the first year

of life in uncircumcised boys may be 10 times that of their circumcised counterparts. New studies also indicate circumcised men have lower rates of penile cancer. Previous studies have found in uncircumcised men a higher rate of infection with human papillomavirus—a virus associated with penile and cervical cancers—as well as higher rates of other sexually transmitted infections. But methodological problems render many of these latter reports "inconclusive," the academy maintains.

The academy concludes that parents should make any decision about circumcision based on a full consideration of medical benefits and risks, as well as aesthetic, religious and cultural factors. While noting that infants undergoing circumcision "demonstrate physiological responses suggesting they are experiencing pain," the report fails to resolve an ongoing controversy over the relative risks and benefits of anesthesia during circumcision. □