# Biology

*From Los Angeles at the annual meeting of the Society for Neuroscience*

## A first look at the eye's stem cells

Neither the mammalian eye nor the brain can repair itself. Still, the brain retains stem cells, precursors capable of proliferating into any of the organ's various cell types (SN: 11/7/98, p. 293). Researchers now find that the eyes of mice also harbor a population of stem cells, raising hope of treating blinding illnesses such as retinitis pigmentosa.

In animals whose eyes can regenerate, such as fish and frogs, stem cells reside in the ciliary margin, an area on the outer edge of the retina near the iris. Brenda K.L. Coles of the University of Toronto and her colleagues have now isolated candidate stem cells from a similar region in adult mice.

Like the cells that make up the retina's back layer, the putative stem cells are black. When grown in the laboratory, however, the cells give rise to both pigmented and unpigmented cells. The latter resemble the nerve cells that make up the retina's light-sensitive layer. These cells even make proteins characteristic of developing nerve cells.

To determine why mammalian eyes don't regenerate, Coles and her colleagues plan to study what inhibits growth of the newfound cells. They also will inject the cells into mouse eyes damaged by injury or disease to see if the transplants can perform repairs. —*J.T.*

## A shocking case of depression

Physicians attempting to treat a woman with Parkinson's disease may have stumbled upon a nerve circuit crucial to making people feel depressed. This surprising turn of events occurred when Merle Ruberg of Salpêtrière Hospital in Paris and her colleagues placed electrodes deep within the brain of a 65-year-old woman whose Parkinson's illness was worsening.

"We were testing sites to see which would best cure her," says Ruberg. Constant stimulation through carefully placed electrodes can sometimes relieve the symptoms of the neurodegenerative illness.

When Ruberg and her colleagues activated an electrode in a brain region called the substantia nigra, where Parkinson's disease usually causes cells to die, they were startled to see their patient start to cry and become incredibly depressed. She made comments such as "I no longer wish to live" and "I'm hopeless, why am I bothering you?" The depression lifted once the electrode was turned off, and the physicians found that they could repeat the transformation at will. If researchers can isolate the nerve cells that ignite depression, they might develop treatments targeted at them, suggests Ruberg. —*J.T.*

## Just for the fizz of it

With their characteristic fizzy sensation, soda water and other carbonated beverages make quite an impression on the mouth. Researchers have long assumed that the tingling results from the bubbles created by the carbon dioxide dissolved in the liquids. The bursting of the bubbles presumably stimulates pressure-sensitive receptors on the tongue.

Think again. Jean-Marc Dessirier of the University of California, Davis suggests that the fizz actually stems from taste receptors responding to products of a chemical reaction. In the mouth, an enzyme converts carbon dioxide into carbonic acid, which is broken down further into substances that bind to the receptors.

When Dessirier and his colleagues coated one-half of the tongues of 20 people with an inhibitor of the enzyme, 17 of them felt less fizz on the treated side when they tasted carbonated water. Treatment with capsaicin, a pepper-derived substance that inactivates taste receptors by overstimulation, also reduced the sensation. Dessirier notes that other researchers have found that people in a hyperbaric chamber, where oxygen pressure is too high for the carbon dioxide to bubble, still sensed the fizz in their carbonated beverages. —*J.T.*

# Environment

## DNA fingerprints of pollution's touch

DNA fingerprinting has gained renown for its pivotal role in highly publicized legal proceedings—such as Kenneth Starr's investigation of a notorious stain on Monica Lewinsky's dress. This forensic technique now appears also to hold promise in probing for evidence of ecological mayhem.

Steven H. Rogstad of the University of Cincinnati and his coworkers collected leaves from wild raspberries on a Michigan Air Force base. The 16 patches they studied grew at roughly equidistant intervals across 350 meters of scrubland. Half were fed by seeps tainted with low to moderate concentrations of pollutants—including six toxic organic solvents—that had leached from an upstream aircraft-waste landfill.

Though the plants didn't appear to differ, DNA fingerprinting of their leaves showed that those watered by the toxic seeps had dramatically less genetic diversity than plants growing at the adjacent clean sites.

The scientists compared more than a dozen sequences of DNA within the same stretch of each plant's genome. Among raspberries growing in the clean zone, each examined sequence—or allele—tended to vary widely from plant to plant, Rogstad's team reports in the October ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY. In contrast, the corresponding alleles of plants fed by the toxic seeps showed great similarity from one raspberry patch to the next.

The simplest explanation for the reduced genetic variation, Rogstad says, is that the polluted seeps may be killing off all raspberries but those with alleles conferring resistance to the chemicals. However, he cautions, pollution's effects on biodiversity can vary with plant type and chemical. Among cattails in the same scrubland, he notes, his team found the highest genetic diversity at the most polluted sites. —*J.R.*

## Pesticides—the newest 'dioxins'

Chemists characterize dioxins as any of a family of 75 structurally similar, double-ringed chemicals. Toxicologists, however, tend to define dioxins functionally. They argue that something is a dioxin only if it can turn on a cell's dioxin receptor, also called an aryl hydrocarbon (Ah) receptor. Just seven true dioxins meet this test, as do another 10 structurally similar chemicals called furans and 11 polychlorinated biphenyls.

Now, toxicologists at the University of California, Davis report that carbaryl, one of the most widely used insecticides, turns on the Ah receptor in liver cells despite having a shape remarkably unlike dioxins. In the October TOXICOLOGY AND APPLIED PHARMACOLOGY, Michael S. Denison and his colleagues argue that "carbaryl is [a] relatively potent" functional dioxin. They note, however, that carbaryl is just one three-hundred-thousandths as strong as TCDD, a true dioxin and the most potent functional one.

Because it does not accumulate in the body the way most dioxinlike chemicals do, carbaryl is unlikely to reach active concentrations in most people. Denison's team cautions, however, that agricultural workers who apply the chemical might experience "a transient activation of the Ah receptor."

Breast-fed babies may ingest biologically active concentrations of yet another previously unrecognized functional dioxin—hexachlorobenzene (HCB), a once-popular fungicide—according to Angélique P.J.M. van Birgelen of the National Institute of Environmental Health Sciences in Research Triangle Park, N.C. Though phased out of use in many countries 20 years ago, owing to its toxicity, the persistent compound still pollutes the environment and accumulates in fatty tissues of the body, including the breast. In the November ENVIRONMENTAL HEALTH PERSPECTIVES, van Birgelen calculates that even though HCB is only one ten-thousandth as potent as TCDD, in most countries it still can constitute 10 to 60 percent of the dioxinlike activity in breast milk. —*J.R.*