SCIENCE NEWS of the week

Monitoring the Movements of Nerves

When electricians wire a house, they follow a blueprint indicating what connects where, sometimes buying color-coded wires to help them keep the different circuits straight.

But no such blueprint exists to tell developing nerve cells where to go. And embryonic neural cells, far from being color-coded, seem to differentiate on their own, sometimes forming nerve cells and sometimes forming glial cells that surround and support the nerve cells.

Two new studies, one conducted in the nematode *Caenorhabditis elegans* and one involving newborn rats, shed light on the wiring of nervous systems.

At birth, rats have deep in their brains a group of cells that manage to migrate several millimeters to their proper places, says Marla B. Luskin, a neuroscientist at Emory University School of Medicine in Atlanta.

Her report in the July 23 NEURON shows that at least some nerve cells that descend from a common ancestor stay together as they find their final destinations.

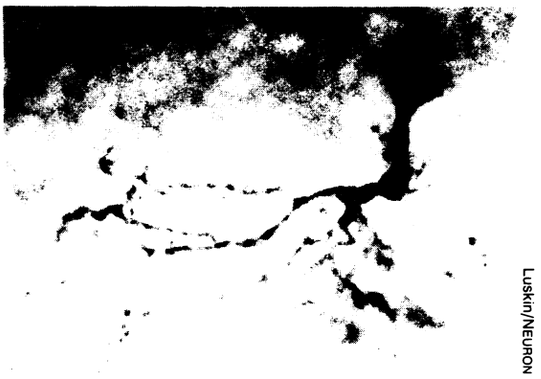
As an embryo develops, the cells that form the nervous system start off as a mishmash of "progenitor" cells. These cells turn into glial cells or either of two types of nerve cells, or neurons. But Luskin has discovered an unusually large, pure patch of neuron progenitor cells in a region of the brain thought to yield primarily glial cells. To her surprise, she has observed that all these young nerve cells journey from this region, called the subventricular zone, to the olfactory bulb, the part of the brain that receives input from the nose, she says.

"What [the discovery] helps do is bring the concept of long-distance migration of cells as a method of patterning in the nervous system into greater prominence, particularly in the later stages of development," comments Arthur D. Lander, a neurobiologist at the Massachusetts Institute of Technology. "I'm sure more and more [examples] will be found."

For her study, Luskin infected progenitor cells in 43 rat embryos with a retrovirus modified so that it would not harm the cells. Instead, the retrovirus transferred a bacterial gene to the genetic material of these cells, which in turn passed the gene on to their descendants. That gene leads to the production of an enzyme that causes cells to turn blue when stained, Luskin explains. Cells containing the enzyme will also take up an antibody tag that allows Luskin to monitor the cells as the brain develops.

Some investigators think that cells spread out as they migrate from their origins, following "tracks" established by glial cells. But these results "really show that you need not have dispersion with long-distance migration," says Luskin.

The finding may prove a boon for investigators seeking to grow nerve cells in the laboratory because the subventricular zone of the brain may provide a pure source of neurons, says Luskin. In addition, because these cells travel such a long way without the aid of tracks, "it now presents a very nice system for trying to reveal whether there are [signal] molecules along the pathway," she adds.



Luskin/NEURON

This nerve cell moved several millimeters before settling down in the brain.

In a different study, researchers showed that molecules specified by the genetic makeup of cells play a role in the connections made by nerve cells. Unlike Luskin, who studied the movement of cells, these neurobiologists examined how axons, long tendrils that extend out of nerve cells, find their targets.

The tips, or growth cones, of axons process cues from their surroundings and select the axon's pathway, explains Joseph G. Culotti of Mount Sinai Hospital in Toronto. Using genetic engineering, he and his colleagues created nematodes whose "touch" neurons make a special receptor protein on their growth cone surfaces.

That protein causes the axons to grow dorsally, toward the top of the nematode, instead of taking their usual route along the side of the animal or down toward the ventral nerve cord, the Canadian team reports in the July 22 NATURE.

"It's a very clear proof that these proteins are playing an instructive role in giving a direction to the growth cones," Culotti says. "And there's not a big difference between an axon and a moving cell. If we could find human or vertebrate [equivalents], we might be able to do something useful to reorganize the circuitry in a desirable way." — *E. Pennisi*

Charting the spread of AIDS

For the first time, the number of U.S. AIDS cases among women infected through heterosexual contact has outstripped the number of cases among women who got their infection through intravenous drug use.

That's one conclusion reached by researchers at the Centers for Disease Control and Prevention (CDC) in Atlanta. Their update, published in the July 23 MORBIDITY AND MORTALITY WEEKLY REPORT, provides a snapshot of the U.S. AIDS epidemic in 1992.

"The trends are all in the direction of a heterosexually transmitted disease," comments June E. Osborn, dean of the School of Public Health at the University of Michigan in Ann Arbor. Osborn and David E. Rogers of Cornell University Medical College in New York City, who together head the National Commission on AIDS, wrote a related commentary in the July 28 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

The CDC logged 47,095 cases of AIDS last year, an increase of 3.5 percent over 1991. The absolute number of men with AIDS remains much higher than the number of women with AIDS. Yet last year the number of AIDS cases increased four times faster among women than among men.

In 1992, 50 percent of the diagnosed female AIDS cases could be traced to heterosexual sex with an infected partner, while just 44 percent were attributed to a woman's own use of intravenous drugs, the report states.

Drugs still play a major role in HIV infection, even when a woman gets the virus through heterosexual activity, notes Pascale Wortley at the AIDS Surveillance Branch of the CDC. The CDC report notes that 57 percent of women who acquired HIV through heterosexual sex were sleeping with men who are drug abusers.

The CDC report notes that 10 metropolitan areas, including New York City and Washington, D.C., account for more than half the cases among women.

Nonetheless, Osborn and Rogers argue that the AIDS epidemic isn't simply a problem localized to certain drug-using communities in urban areas. "Infection with HIV is spreading slowly, but relentlessly, into all sectors of our society," they warn in their commentary. □