per unilaterally without consulting us at all." In a 24 August letter to *Astronomical Journal* editor Paul Hodge of the University of Washington, Seattle, Mendillo claimed that Dantowitz's paper was based on data belonging to the group and not Dantowitz's exclusive intellectual property. Hodge responded that he would hold up publication until the parties resolved the disagreement themselves.

After negotiations conducted mostly by e-mail—Mendillo and Dantowitz at the end were no longer on speaking terms—the two teams last February agreed to publish separate papers highlighting the newly observed mercurial features, which both appeared in last month's issue of *The Astronomical Journal*. The matter appeared settled, until BU issued a press release touting the technique and the images in advance of a presentation by Mendillo on 2 June at a meeting of the American Geophysical Union in Washington, D.C. Conspicuously absent was reference to the work of Dantowitz and his colleagues. In retrospect, says Baumgardner, "it probably would have been better if we had had a common press release." With the bad blood, however, the teams may have Mercury's once-obscured face in better perspective than each other's point of view.

–GOVERT SCHILLING

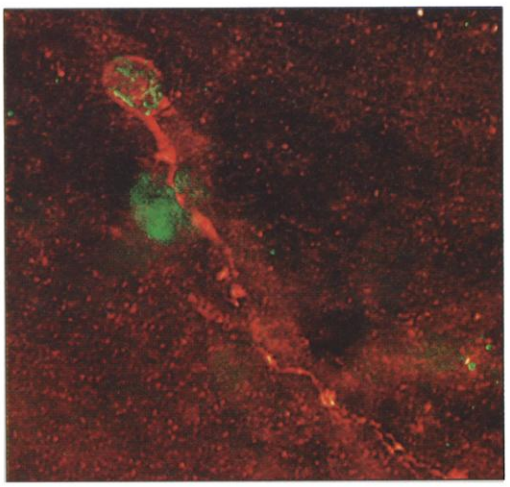
Govert Schilling is an astronomy writer in Utrecht, the Netherlands.

NEUROBIOLOGY

Death Leads to Brain Neuron Birth

Of all the body's organs, the brain seems least able to repair itself if damaged by injury, disease, or stroke. Indeed, throughout most of the 20th century, scientific wisdom held that neurons simply could not regrow after brain development ended. But in the past few years, scientists have provided mounting evidence of neurogenesis, or the production of new neurons, in some areas of the adult brain in organisms ranging from birds to mice and primates. One area that did not seem capable of such regeneration, however, was the neocortex—the region most concerned with such higher brain functions as memory and learning. But new work has now added the neocortex to the list.

In the 22 June issue of *Nature*, neuroscientists Sanjay Magavi, Blair Leavitt, and Jeffrey Macklis of Children's Hospital and Harvard Medical School in Boston report that when they induced certain neurons in the neocortex of adult mice to self-destruct, the loss triggered the formation of replacement neurons by brain stem cells. What's more, the newly formed neurons migrated to the same positions and made the same connections as their deceased predecessors.



Making tracks. A neuron labeled for both BrdU (green) and Doublecortin (red) can be seen making its way into the neocortex.

CREDIT: S. S. MAGAVI, B. R. LEAVITT, J. D. MACKLIS, *NATURE* (22 JUNE 2000)

"This work shows that the adult brain has the capacity to respond to damage by repairing itself," says neuroscientist Elizabeth Gould of Princeton University. If similar regeneration of brain neurons can be triggered in humans, the findings could open the door for treatments that might restore memory in Alzheimer's disease, for example, or undo the damage wreaked by spinal cord injury.

The current research is an outgrowth of previous findings in which Macklis and his colleagues showed that cell death, of all things, could foster a healing environment. Working with neurobiologists Constance Scharff and Fernando Nottebohm of Rockefeller University in New York City, Macklis had selectively induced apoptosis, a form of programmed cell death, in song-related areas of the brains of zebra finches. The result: a burst of neurogenesis. (The research was published in the 24 February issue of *Neuron* and was also described in *Science*, 25 February, p. 1381.) "But this was in a brain area and species where we know neurogenesis takes place," notes Macklis. "The next question was, 'Could we induce it where it does not normally occur?' "

To find out, Macklis and his Harvard colleagues zeroed in on a group of neurons in the mouse neocortex. Although new neurons were not known to grow in the area, it is near a potential source of neurons, because it lies above the subventricular zone, which contains so-called multipotential neural precursor cells, better known as stem cells. The researchers injected a select group of neurons in the neocortex with a light-activated chemical that triggers apoptosis. The resulting neuronal death mustered the underlying precur-

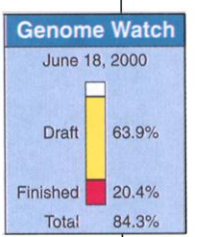
ScienceScope

Reviving the Dead Zone A White House plan to shrink the Gulf of Mexico's "dead zone" calls for major cuts in river-borne nutrients and more funds to create pollution-trapping wetlands and stream-side buffers. But observers say the draft road map, released last week by the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, still lacks some key details—such as a price tag.

The 18,000-square-kilometer dead zone appears each spring at the mouth of the Mississippi. Floods wash excess nitrogen into the gulf, triggering algae blooms and an ecological chain reaction that reduces oxygen levels and suffocates sea life (*Science*, 10 July 1998, p. 190). To reduce the nutrients, the panel calls for restoring 2 million hectares of wetlands and cutting fertilizer runoff by 20% by 2010 in the Mississippi Basin, which holds more than half of the nation's farmland.

Will Congress back the plan? "That depends on the price—and assurances that it won't harm the region's $100 billion farm economy," says a House aide. A final version is due later this year.

Any Day Now In May, the 16 international partners producing a publicly owned sequence of the human genome set a 15 June deadline for submitting 90% of the gene-containing regions to GenBank, a public database. The milestone would signal the end of a frantic race to produce a rough draft of the 3.3-billion-base genome ahead of private competitor Celera Genomics of Rockville, Maryland.



But as of 18 June, the team was short of its goal—stuck at about 84% (right). A weekly tabulation by the National Center for Biotechnology Information (NCBI) revealed one reason why: Although GenBank has almost 3.9 billion bases of human sequence in-house, more than a billion are duplicates. The duplication is a natural outcome of the sequencing process, which starts with small chunks of overlapping DNA that are pieced together into a long, continuous string. As a result, the "redundancy goes up as [the project] approaches completion," explains NCBI's Greg Schuler. His Genome Watch, which charts sequencing progress, has edged up at just 1% per week lately, but the sequencers still hope for a June finish. Tune in to www.ncbi.nlm.nih.gov/genome/seq/HsHome.shtml to see if they make it.

Contributors: Jocelyn Kaiser, Pallava Bagla, David Malakoff, Elizabeth Pennisi

sor cells to form new neocortical cells.

The researchers tracked the development of these neurons by giving the mice a tracer chemical called 5-bromodeoxyuridine (BrdU). BrdU is incorporated into newly synthesized DNA and thus labels cells that are dividing. The team then examined the BrdU-labeled cells in the neocortex for the presence of other markers that would indicate their developmental stage. These analyses revealed that the neocortices of animals given the apoptosis-inducing chemical contained new neurons in all developmental stages, ranging from those that were just born and were migrating up from the subventricular zone (detected by the presence of a protein called Doublecortin) to those that were fully mature (marked by the presence of the NeuN protein).

Other results indicated that the newly born neurons make functional connections. The damaged neocortical neurons originally sent their long axons into the thalamus of the brain. When the team injected the thalamus with a dye that's transported backward from the axon ends up to the nerve cell bodies, they found that the axons of the BrdU-labeled neurons picked up the dye. This finding suggests that the new neurons were making the same connections as those they had replaced. "We have evidence that by inducing apoptosis, we reactivated a program of developmental gene expression that was in place when the mice were embryos," says Macklis.

Next, the researchers would like to identify the genes that control the neurons' development—a task that "will take the field many years," Macklis cautions. But if it can be done, it might be possible to design drugs that reactivate the program in people who have suffered brain damage. Gould adds, "If we could figure out what the obstacles [to neuronal regeneration] are and how to overcome them, we might be able to get the brain to heal itself."

–ELIZABETH NORTON LASLEY

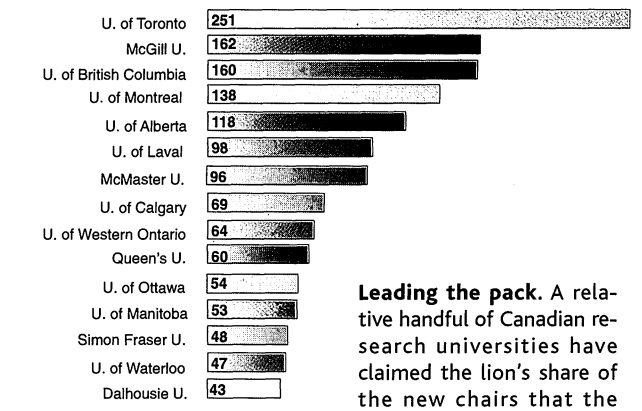
Elizabeth Norton Lasley is a science writer in Woodbury, Connecticut.

CANADIAN UNIVERSITIES

Funding of 2000 Slots Sets Off Musical Chairs

EDMONTON, ALBERTA—Jack Lightstone was thrilled last fall when the government announced a $605 million program to help Canadian universities attract and retain the best scientific talent (*Science*, 22 October 1999, p. 651). As provost and vice president of research at Concordia University in Montreal, Lightstone has spent the past 5 years building up the school's research capacity, and the government's promise to pay for 2000 new faculty positions across Canada over the next 3 years seemed like a godsend.

This month the government fleshed out the details of its Research Chairs Program, awarding slots to 57 universities, including 21 to Concordia. But Lightstone is decidedly cooler these days toward the pending federal help. He's learned that at least six Concordia faculty members have already received "preoffers" of employment from other universities dangling the new chairs as bait. Those offers, say Lightstone and other university administrators, threaten to turn a program intended to stem a supposed brain drain to U.S. institutions into a game of musical chairs, forcing Lightstone and his colleagues to run faster simply to stay in place.



Leading the pack. A relative handful of Canadian research universities have claimed the lion's share of the new chairs that the government is funding.

Four months before it goes into effect, the chairs program has ignited a furor within Canadian academe. Benefiting from an allocation system based on a university's success in obtaining federal grants over the past 3 years, 15 large, research-intensive universities have received 70% of the 2000 slots. Leading the pack is the University of Toronto, whose 251 positions represent 8% of the total (see graph), whereas 28 of the 57 participating schools are getting fewer than 10 chairs, and about two dozen universities have been shut out entirely. The pot is supposed to be divided 45:35:20 among the natural, life, and social and behavioral sciences, although universities are free to decide the balance among individual disciplines and to create multidisciplinary posts.

The chairs come in two sizes: $135,000 a year for established scientists, and $67,000 for rising stars. They are good for 5 years, with the senior awards renewable indefinitely and the junior slots good for a second term. Universities can use the money not just for salaries but also for travel, new equipment, and hiring students and postdoctoral fellows. In addition, the Canadian Foundation for Innovation (*Science*, 28 February 1997, p. 1256) announced last week that it will add $84,000 to the funds for each research chair to cover the institution's overhead costs.

In anticipation of the 1 September kickoff, the research-intensive universities have begun aggressively shopping for prospective candidates. Smaller universities say that has left them fending off talent raids. Short of a gentleman's agreement to eschew such raids, Lightstone says that the government should require all chairs to be advertised and filled through a competitive process. "Then you won't have one institution handing someone a chair on a silver platter, saying: 'Come work for me.'"

Other administrators worry that the game of musical chairs will ratchet up overall costs by giving sought-after faculty members the leverage to push for higher salaries or better working conditions. "[In itself] that may not be bad," says Michael Owen, vice president of research at Ryerson Polytechnic University in Toronto, which has received six chairs. "But some of the more senior and midcareer faculty members may feel somewhat slighted if they aren't seen as promising." Rene Durocher, head of the chairs program, says such fears are unwarranted and that the program actually will give smaller universities the means to retain star researchers. "They are being alarmist," he says. "If they lose some good people, they can now recruit some other people."

Speaking with Durocher last month at a University of Alberta forum here sponsored by the Humanities and Social Sciences Federation of Canada, university administrators fretted that playing musical chairs will simply strengthen research-intensive universities and make it more difficult for have-not institutions to compete for research grants. They also see it fueling a trend toward a handful of megadepartments in certain disciplines.

Again, Durocher dismisses that concern. Although he admits that universities must make "tough decisions in what fields they want to develop, with whom," he says that's preferable to having the government call the shots: "That would be micromanagement of universities." The flexibility universities have to spend the money means that there will be "no losers," he adds. And although established researchers may initially claim most of the positions, he predicts that ultimately the program will meet its intended goal of combating the brain drain by "helping Canada to retain its best researchers and to attract new superresearchers."

–WAYNE KONDRO

Wayne Kondro writes from Ottawa.