Schinder and colleagues at the Fundación Instituto Leloir in Buenos Aires, Argentina. In the 2 November Journal of Neuroscience, the team painted a detailed picture of the maturation of adult-born hippocampal neurons. They monitored the movement and changing shapes of the neurons by labeling them with a fluorescent dye and examined how their electrical activity and responsiveness to different neurotransmitters shifted with time. “The [maturation] sequence is nearly identical” to what happens during embryonic development, Schinder says.

“During early development, there’s a critical period where neurons are capable of a greater degree of plasticity,” says Linda Overstreet Wadiche, a neuroscientist at Oregon Health & Science University in Portland. Much of the new work is converging on the idea that adult-born neurons recapitulate this youthful flexibility, Wadiche says: “It’s not just that [adult] neurogenesis is adding new cells; it’s adding a new type of neuron.”

Kempermann theorizes that new neurons optimize the hippocampus to process novel and complex stimuli. Based on his data, Macklis suspects a similar role for new neurons in the olfactory bulb. Both brain regions are ancient structures that help animals deal with novel and complex features of their surroundings, Macklis notes. New neurons may give these parts of the brain additional plasticity that couldn’t be accomplished by tweaking existing synapses, as happens throughout the brain. “It makes sense evolutionarily that one would want to … allow whole new circuits to form by the integration of a steady stream of new neurons,” Macklis says.

New neurons and disease
A better understanding of the physiology of new neurons in healthy brains should help researchers evaluate the role of adult neurogenesis in the diseased brain as well. An uptick in neurogenesis, perhaps as a compensatory response, has been proposed to accompany several types of brain injury, including stroke and neurodegenerative disorders such as Alzheimer’s and Parkinson’s disease. There’s also evidence that depression reduces neurogenesis and that antidepressant drugs work by promoting it, at least in rodents (Science, 8 August 2003, p. 757). Yet little is known about whether newborn neurons in diseased brains successfully integrate into existing circuitry, let alone whether they could be exploited to restore the function of damaged circuits.

In some cases, they may even compound the problem. At the Society for Neuroscience meeting, Wadiche reported that epileptic seizures speed up the maturation of new neurons in adult mice, prompting the cells to form synapses more quickly than usual, and in some cases, to form inappropriate contacts with other neurons. It’s a nice demonstration of how pathology can affect new neuron integration, says Song.

Figuring out what new neurons have to do to integrate into the adult brain could have important implications for researchers trying to maximize the brain’s limited innate capacity to heal itself or design stem cell therapies for brain injury and disease. Based on what’s known so far, however, it may be naïve to expect that just plowing some neural stem cells down will do the trick, says Macklis: “If we’re going to repair neural circuits, we’re going to have to very carefully activate new neurons so that they’re incorporating into the existing circuits.”

—GREG MILLER

Scientists’ Suicides Prompt Soul-Searching in China

A spate of deaths has raised questions about whether China’s scientific community is piling too much stress on young researchers

BEIJING—Mao Guangjun seemed destined for scientific stardom. In September 2001, the 32-year-old theoretical physicist, just home after a postdoc stint in Japan, signed a 3-year contract as a full professor with the Institute of High Energy Physics (IHEP) of the Chinese Academy of Sciences (CAS) in Beijing. However, his personal and professional life soon soured, and in 2004, IHEP declined to renew his contract. He landed a position at another university but would never report for duty: On 14 September 2005, Mao, 36, jumped to his death from the fourth floor of his apartment complex.

Although academic stresses weighed on Mao, family members and colleagues told Science, no one can say for certain whether those pressures caused him to take his own life; he did not leave a suicide note. But Mao’s death and those of a handful of other young researchers in recent months have lifted the lid on simmering discontent among young scientists in China. Their concern is that some institutions, in pressing to gain on the West, are making life intolerable for vulnerable researchers. That’s a hot topic these days on Web sites frequented by Chinese academics, including www.sohu.com, a Beijing-based information clearinghouse, www.xys.org, a U.S.-based site aiming to expose fraudulent academic behavior in China, and www.chinahexie.org, an information site run out of China’s Guangdong Province. In the words of one anonymous researcher on China Hexie, “Mao Guangjun’s death reflects the flaws of the current management system for Chinese intellectuals.”

The wave of introspection has prompted some academics to question China’s newfound obsession with a sacred cow of Western science, publish-or-perish. And the suicides have
focused attention on a clutch of programs launched in the last decade to entice young Chinese scientists working abroad to come home. The most competitive, the One Hundred Talent Project, provides young stars with generous lab-start-up funds, housing allowances, and salaries higher than those of some senior scientists. Although the program has no formal requirements for awardees to demonstrate their value, there is plenty of informal pressure on them to prove their mettle.

The stresses at elite institutes like IHEP are now nearly on a par with those felt in the West, scientists say. It is no longer the age of the “Big Rice Bowl,” says Zhang Zongye, a CAS academician at IHEP. “Competition has become increasingly intense and unavoidable,” she says.

Disqualification

Returnees like Mao tend to get preferential treatment, whether or not they receive One-Hundred-Talent status. After earning a Ph.D. from the China Institute of Atomic Energy in 1995, Mao spent 2 years in Germany as a Humboldt Research Fellow, then 18 months in Japan on a fellowship. “Mao was a good young scientist, very focused and did not have any big flaws,” says Zhao Enguang, Mao’s postdoctoral supervisor at the CAS Institute of Theoretical Physics in Beijing.

When Mao returned to China at the end of 2000, his Ph.D. adviser, Zhuo Yizhong, recommended him to IHEP. At the time, the institute had few scientists in their early 30s, says Zhang. A committee of IHEP and outside experts endorsed hiring him as a full professor. In hindsight, Zhang says, it would have been better to have started him off as an associate professor, with fewer expectations. People returning from abroad usually need time to settle down and readjust to China’s work environment, adds Wu Ke, a mathematician at Capital Normal University in Beijing.

Several factors conspired to make Mao’s transition difficult. For starters, once at IHEP he had to move from nuclear physics into an unfamiliar but trendy field, nuclear astrophysics. After such a change, says Zhuo, “it would have been difficult for him to produce any significant results within 3 to 5 years.” And Mao was having problems at home. Both Zhuo and Mao’s mother say his marriage failed, he slept poorly, and read- ing gave him headaches. Nevertheless, Zhuo says, Mao recovered and was able to concentrate again on his work.

In October 2004, a 14-member expert committee met to review Mao’s work. His output in three Chinese journals—and a monograph of his pre-IHEP research. According to a statement issued by IHEP after Mao’s death, 11 panel members voted to “disqualify” him from his position. The statement notes that the panel considered Mao’s academic achievements, research program, future plans, and academic ability.

Zhuo contends that IHEP’s evaluation system, which puts a premium on short-term achievement, is “heavily flawed.” Zhao agrees and points to what he views as a growing problem in China. “It is not appropriate to judge a scientist’s work merely by the number of papers he has published, nor is it convincing to attach too much importance to overseas publications,” he argues. “It is more important to look at the quality of papers instead of quantity.” Zhang, who was on the committee, responds that the panel did not base its judgment solely on Mao’s publications. “We also looked at his ideas guiding his current work and found them not so promising,” she says. The panel’s decision could not be appealed.

With help from Wu Ke, in July 2005 Mao landed a job as an instructor at Beihang University, also known as Beijing Aeronautics University. But before the start of the autumn term, Mao ended his life.

Frustration

Another cautionary tale is that of Wu Jianyi, a 39-year-old specialist in plant breeding at the Hunan Academy of Agricultural Sciences. Shortly after joining the academy in 1999, Wu’s department was spun off as a company called Xiangyuan Guaguo (Melon and Fruit) Seedling Co. Ltd. His wife, Feng Zhihui, recalls that Wu complained repeatedly that his skills lay in research, not marketing. Nevertheless, Wu’s research budget was pegged to earnings derived from seed sales.

At a company meeting in late March 2004, Wu was berated for not bringing in enough revenue to cover his own salary, says Feng. A week later, he leaped to his death from the top of their five-story apartment building. In the 2 months before Wu’s suicide, two other academy researchers, aged 39 and 41, also killed themselves. Academy officials deny that the deaths were work-related.

Others see a disturbing pattern. The tragedies at the Agricultural Academy and IHEP suggest that some young scholars are too brittle to cope with today’s academic pressure cooker, says Li Daguang, a professor of science communication at CAS’s graduate school in Beijing. Young stars who have worked abroad claim they are especially vulnerable. In comments posted to www.lqqm.org, one young scientist described the difficulties he encountered after returning to China when he was 29 years old to take up a professorship, sponsored by the One Hundred Talent Project, at the Institute of Modern Physics in Beijing. Soon after his return, he wrote, he often thought of jumping from his office window. His solution to his despair was to take a job abroad. “The research environment in China is still not as good as in Western countries,” he wrote. “People coming back from abroad have to deal with guanxi [personal relations] if they want to get research funding and other things needed for their experiments.”

The bottom line is that more care must be taken to safeguard the physical and mental well-being of young scientists, says Li. Zhang agrees that counseling should be available for young scientists who struggle to maintain their mental equilibrium in intense work environments. And younger scientists should shoulder lighter burdens, argues Zhao. Young people are more likely to be creative, but they often lack management experience, he says. Asking young scientists to run a project before they are mature is a recipe for disaster, Zhao says. For Mao, that lesson has come too late.

—DING YIMIN

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