

## Smart Young Minds

A SUMMER TRAINING PROGRAM, INITIATED BY A HANDFUL OF MOTIVATED UNDERGRADUATES, IS MAKING A HOME AT JANELIA FARM.

NINETEEN-YEAR-OLD JONATHAN YOKE, SURROUNDED BY PLIERS, resistors, and small vials teeming with flies, proudly showed off the machine he was building to determine how flies respond to gravity. The device encloses them in a tube mounted on a wheel that will turn—effectively changing which way is “up”—according to a computer’s instructions. A camera will spin with the wheel to record the flies’ reactions.

Yoke’s creation is the brainchild of Janelia Farm fellow Michael Reiser, who studies how fruit flies gather multisensory information and make choices as they interpret the world. Yoke is one of four undergraduates who conducted research at HHMI’s northern Virginia research campus during summer 2007, finding their way to Janelia Farm on their own initiative. Each contacted Janelia’s associate director for science and training to inquire about opportunities.

Reiser says he appreciates the contributions of undergraduates like Yoke because, “many of them possess impressive courage—a certain fearlessness—that allows them to tackle a challenging project.” A computer-engineering major at the University of Virginia, Yoke has more experience in building robots than in biology. But his technical skills combined with his interest in neuroscience make him a good fit for Janelia, where interdisciplinary approaches are especially valued in addressing difficult questions about the brain.

Yoke became interested in signals in the brain as a Boy Scout participating in an annual wheelchair walk with paralyzed veterans. “Their brains worked fine, but they couldn’t control their limbs,” he recalls. “It seemed like there should be some way to fix that.”

On the same floor as Yoke and his machine-in-progress, University of Toronto student Arjun Bharioke worked in the lab of Janelia group leader Karel Svoboda. Though only 20 years old, Bharioke speaks about neuroscience like an old pro. His project aimed to understand how the brain gets rewired during learning. He used a new technique for activating specific neurons: injecting a light-sensitive protein into the brains of mice, followed by a pulse of light. First, he trained the mice to push a lever in response to a puff of air on their whiskers in exchange for a drink of water. Then, he aimed the light pulse at neurons believed to be involved in whisker movement. If the mice went for the water—even though the whiskers were not

actually deflected by a puff of air—that would confirm an important role for the targeted neural circuitry.

Bharioke says one of the best aspects of working at Janelia was access to the scientists. Livia Zarnescu, a math major at the University of Arizona, agrees. “Everybody is so smart and enthusiastic about what they do. Most hours of the day, you’ll find someone here working. You can go in and ask someone about their work and they’ll be happy to show you.” She worked with group leaders Julie Simpson and Eugene Myers, who have taken on the ambitious task of mapping the fruit fly’s neural circuitry for motor activity.



*University of Colorado student Chelsea Trengrove worked with Loren Looger to improve imaging of neural activity in the brain.*

Zarnescu’s work covered a wide scope—from dissection and staining with fluorescent antibodies to programming the computer algorithm needed to overlay images from thousands of samples. Simpson was glad to have Zarnescu there for the summer. “She could speak computer [with the programmers] and then come back and speak English to us.”

Chelsea Trengrove switched majors several times in her first year at University of Colorado at Boulder, yet her pull toward neuroscience remains strong. “When I was five years old, I would read about the brain. All I want to do is research the brain,” she says. “Since being at Janelia, I’ve thought that maybe I should get my Ph.D.”

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She plowed through textbooks to prepare for her work with group leader Loren Looger, a mathematician and chemist by training who has devoted himself to building better tools to study the brain. Trengrove's project focused on improving imaging of glutamate, the brain's primary excitatory neurotransmitter and a chemical that is useful for tracing neural activity.

The four undergrads stayed in a four-bedroom townhouse on campus, just a short walk from the laboratory building. The proximity helped them integrate into the larger community—including pick-up games of soccer and ultimate Frisbee after work. Trengrove was impressed by the sense of community. At lunchtime, for instance, there were empty tables in the cafeteria, but if people were sitting at any given table, every chair was taken.

The place was often abuzz with new hypotheses, setbacks, and results. "Everybody was talking about what they were doing," she says. "I just tried to listen and understand."

Based on the success of this fledgling effort, HHMI has formalized the Janelia Undergraduate Scholars program for 2008 and will be accepting online applications from students.

Simpson says that providing a positive research experience for young people at the college level is a good way to inspire future scientists. After all, Simpson's summer research while enrolled at Princeton University is what sold *her* on science. She believes the summer undergraduate training program at Janelia will help to "convert smart young minds to neuroscience." ■ -LINDSEY PUJANAUSKI

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FOR MORE INFORMATION on applying for the 2008 Undergraduate Scholars program, visit [www.hhmi.org/janelia/undergrad](http://www.hhmi.org/janelia/undergrad).

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## HHMI Expands Support of New Physician-Scientists

INSTITUTE INCREASES NUMBER, SIZE, AND DURATION OF PHYSICIAN-SCIENTIST EARLY CAREER AWARD PROGRAM.

ONLY A SMALL FRACTION OF THE PHYSICIANS who graduate from U.S. medical schools each year pursue a career in academic research. The reasons vary, but graduates often cite two in particular: insufficient time for research and lack of financial support.

To minimize those hurdles for a small cadre of physicians, HHMI has named 20 new recipients of its Physician-Scientist Early Career Award. Now entering its second year, the awards program is part of the Institute's commitment to help promising physician-scientists launch their careers in academic research.

"It's not easy to go back and do science once you've started down the clinical path, so it's really important to get a good solid footing early in your career,"

says William Galey, program director for HHMI's graduate education and medical research training programs.

When the awards were created last year, 13 grantees received \$150,000 over a three-year period. This year, the 20 awardees will receive \$375,000 over five years.

Each year, HHMI invites alumni of the HHMI-National Institutes of Health Research Scholars Program and the HHMI Research Training Fellowships for Medical Students who are starting up their labs with full-time, tenure-track positions to apply. The funding must be used for direct research expenses, and the awardees' institutions must allow them to spend at least 70 percent of their time conducting research. ■



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WILLIAM GALEY