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RESEARCH NEWS

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Two Undergraduate Researchers Help Reveal Chernobyl's Impact

Amanda Wright was 10 years old when Unit 4 of the Lenin Nuclear Power Plant in Chernobyl blew apart, creating the worst nuclear accident in history. At the time, Wright was living with her family on a U.S. Air Force base in England. "I remember there was a little more concern about the milk being contaminated there but I forgot about it after a while," recalled Wright, who began her senior year as a cell and molecular biology major at Texas Tech University in 1996. "Then, I go to college in Texas and Chernobyl becomes a big part of my life."

Big, indeed. Wright and Texas Tech junior Lara Wiggins are co-authors of a widely publicized study in *Nature* that reports a high rate of genetic change in rodents (voles) living near Chernobyl's reactor 4 after the accident. The study accompanied a related article on Chernobyl's impact on human mutation rates. Wright and Wiggins carried out their research through funding from HHMI's Undergraduate Biological Sciences Education Program.

How did two young students in Lubbock, Texas, wind up making significant contributions to a study of Chernobyl's long-term impact? The story illustrates how investing in the careers of aspiring scientists can pay off. Within days of graduating from high school, both Wright and Wiggins were working full-time in the molecular biology laboratory of Texas Tech mammal specialist Robert J. Baker. With support from HHMI, they have continued to work in his lab, full-time during summers and half-time during the school year. Wright started sequencing genes in bats in Baker's lab in 1993, but switched to the Chernobyl vole study in 1994. That year, Wiggins entered Baker's lab and joined the cytogenetic studies of the Chernobyl voles.

Baker and the lead investigator on the project, Ron Chesser of the University of Georgia, collected voles from around the Chernobyl reactor and from a less contaminated site about 20 miles to the south (the control group). Using liver and heart samples, Wright sequenced the voles' DNA. Wiggins searched photomicrographs of the chromosomes for breaks in the DNA.

Baker's analysis showed that the rate of genetic change in the Chernobyl voles was hundreds of times greater than in the controls. When embryos from a Chernobyl female vole were analyzed, the high nucleotide substitution rates were confirmed in their mitochondria. The analysis also showed a continuing high rate of mutations in the voles's rapidly reproducing population, though

background levels of radiation are receding.

Based on the vole study, Baker and others conclude that Chernobyl's biological consequences cannot be predicted according to previous lab studies or data from Hiroshima and Nagasaki. The results suggest that contamination from radiation, heavy metals and other mutagenic chemicals may have a greater impact than expected.

"The historical relevance is a big draw for me," Wiggins said. "It has far-reaching implications into issues regarding nuclear energy and the cleanup of radioactive sites."

The undergraduates learned about "real science" not only from their lab studies but also from their publication efforts. The journal *Science* rejected their team's paper after some reviewers said the mutation rates were so incredible that the tests should be duplicated by an independent source. Another reviewer said the data were accurate but too surprising to be believed.

Nature, however, published it. The paper has won substantial international attention. The undergraduates said they found this lesson in scientific publication educational and frustrating. "It was baptism by fire," Wiggins said. "Being a novice, it seems as though if you have surprising results, that's why you publish."

Texas Tech researchers who run the undergraduate biological sciences education program say the experience shows what aspiring scientists can accomplish with outside support. Program director Richard Blanton said Wright and Wiggins both want to become research scientists. "Amanda and Lara turned down some amazing places to come here, because they could start working in a lab here the day they walked through the door."