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Summer Research Experiences for High School Teachers

SUSAN MUSANTE

Though others might be concerned about adding to their already long list of responsibilities, David Carr says that spending a summer mentoring a local high school teacher through a research project was completely worthwhile. Carr, acting director of the University of Virginia's Blandy Experimental Farm in Boyce, was looking for an innovative way to interact with local teachers. He applied for a supplement to his National Science Foundation (NSF) research grant through the Research Experiences for Teachers (RET) program, and as a result Carla Gorman, from nearby Sherando High School in Stephens City, joined Carr's research team during the summer of 2003.

Anyone with an NSF grant in the biological sciences can apply for a supplement (www.nsf.gov/bio/supp.jsp) and invite students or teachers to be involved in his or her research project. The RET supplements provide a unique professional development opportunity for a K-12 educator to participate in what NSF describes as a "research experience at the emerging frontiers of science in order to bring new knowledge into the classroom." Most of the supplemental funds go directly to the teacher as a stipend, and the rest can help offset expenses for materials and supplies.

"You can get a real payback from teachers' involvement," says Carr, who also regularly mentors undergraduates during the summer. He found Gorman highly capable and motivated. Her research results were excellent and will be included in Carr's next NSF proposal. Carr encourages his colleagues to apply for an RET supplement to their NSF research, and suggests using existing connections to local school districts to find the right teacher. "Working with an adult can definitely lead to something creative and significant," he adds.

For Gorman, the summer started off as quite a challenge. She finished up the school year and immediately plunged

into Carr's world of plants: mating mechanisms, inbreeding, and interactions with natural enemies. "It was almost overwhelming," she recalls, "but doing new research was an incredible learning experience." Although she received some guidance from Carr and often worked alongside one of his undergraduate students, Gorman had to find many answers on her own. Figuring out the protocol for the lab work required much trial and error, and the experiments took a significant amount of time and effort. She drew on skills developed years ago during her college independent research project, and was reminded of how much she really enjoys field biology.

The experience also clearly reinforced the importance of giving biology students actual problems to solve. "Far too often teachers use prepared labs that go straight to the solution," says Gorman, and "then we wonder why students don't enjoy the thrill of science. If there wasn't a problem to solve in the first place, where is the thrill of discovery?"

The excitement of doing science is exactly what inspired Lisa Weise to accept Richard Triemer's RET-sponsored invitation to work in his Michigan State University (MSU) lab for the summer. "Discovering new organisms, learning about all of the types of euglenoids, and sequencing DNA while sitting side by side with a busy research scientist who took the time to work with me was terrific," says Weise, a biology teacher at Holt High School in Holt, Michigan.

Triemer, chair of the plant biology department at MSU, sees the RET work as an investment in the future. He believes that students who are given the opportunity to participate in scientific research before college will be better prepared for college-level biology courses and more likely to pursue science degrees. But teachers

need to have the skills and tools to facilitate scientific research. "Although they are asked to teach biology," says Triemer, "many high school teachers are not trained or offered the opportunity to do scientific research."

The teachers who join Triemer's lab become part of a supportive research community, discussing challenges, solving problems collaboratively, and gaining essential scientific skills and knowledge. Triemer and his colleagues also benefit from the interactions, learning teaching tips and techniques from the high school teachers. "We can sit down and talk about why something might be boring," he says, "and ask how we might be able to make things more exciting."

Weise has incorporated the research experience into her biology curriculum. She now supplements her cell biology and evolution units with organism-collecting field trips to local ponds. Her students identify the organisms and match them with genetic sequences in GenBank, the National Institutes of Health's genetic sequence database. They use software to visualize phylogenetic trees showing the relationships between the organisms. Weise is currently writing up the lessons she developed and posting them on the Internet for the benefit of other teachers.

Sharing the research experience with her students was an essential outcome of RET for Weise, who says that her students now see her as a scientist as well as a teacher. Gorman agrees that this is a huge benefit to participating in the RET program. "It's really important for teachers to gain credibility with students," she says, "so that they see their teacher as a biologist who can bring real examples into the classroom."

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