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Holiday Lectures on Science Can Be a Year-round Resource for Teachers

The news is hot and live from the front: the latest word on biological clocks, sex and gender, the microbe menace, hearts and hypertension. Each year in early December, during HHMI's Holiday Lectures on Science, high school and college students and teachers join two pioneers of biomedical science for a guided tour of a scientific frontier.

In 2002, Stuart L. Schreiber, an HHMI investigator at Harvard University, and Eric S. Lander, director of the Center for Genome Research at MIT's Whitehead Institute, are exploring the promise of genomics and bioinformatics.

HHMI produces free videotapes and DVDs of the lectures for teachers. The DVDs are indexed by topic, with easily accessed animations and related activities.

But many teachers do not yet have DVD players in their classrooms. So, during the summer, when winter holidays are the last thing on most people's minds, a husband-and-wife teacher team in upstate New York closet themselves with their computers to turn the Holiday Lectures videotapes into a teacher-friendly, year-round classroom resource.

"The Holiday Lectures are four hours of high-level science," explains Anthony J. "Bud" Bertino. "But teachers don't have to use it all. They can use video clips and animations or go directly to a section that addresses the topic they're teaching."

Bertino, a retired Advanced Placement Biology teacher who now works in teacher education, and his wife, Patricia Nolan Bertino, a high school biology teacher at Scotia-Glenville High School, annotate the Holiday Lectures videotapes by minutes and even seconds on a CD that they make available free to teachers who attend their workshops. With timed scripts, searchable lecture summaries, a topic index and a PowerPoint presentation, they guide teachers to topics, key concepts, discussion questions, video clips, animations and project ideas in each lecture.

In the 2001 Holiday Lectures on the genetics of sex and gender, for example, HHMI investigator David C. Page of the Massachusetts Institute of Technology Whitehead Institute for Biomedical Research discussed a

question likely to arise in high school biology: What determines the sex of a child? Following Bud and Patricia Bertinos' script, a teacher can fast-forward the videotape to Lecture One, minute 09:42, and share Page's answer to that question with students. Or, in a lesson on X and Y chromosomes, a teacher can go straight to Lecture Four, minute 18:56, for Page's discussion of the evolution of the sex-determining chromosomes, and to minute 21:21 for an animation of the evolution of the Y chromosome from an ordinary autosomal or non-sex chromosome.

The videotape indexing developed by the Bertinos helped shape HHMI's approach to indexing its Holiday Lectures DVDs.

Bud and Patricia Bertino also help teachers find and use related animations and virtual labs on HHMI's Web site (www.biointeractive.org). "No matter what level of biology you are teaching, there is something in the Holiday Lectures that you can use in your classroom," says Patricia. Take a virtual lab for the 1999 lectures on hearts and hypertension, for example. "Students can see a human heart in action and, using case studies provided by HHMI, determine what kind of heart disorder a person has through an analysis of heart sounds, EKGs, magnetic resonance imaging and genetic pedigrees," she says. With respect to fetal heart circulation, Patricia adds, "It's awfully hard to explain to students in words how it works. This animation shows them."

The Bertinos devote countless volunteer hours to their teachers' guide to using the Holiday Lectures. They spread the word by presenting a workshop underwritten by HHMI at the National Association of Biology Teachers (NABT) national conference each year. To them, it's a labor of love—love of making science comprehensible and exciting to teachers and students.

Suzanne Black teaches biology and International Baccalaureate biology at Inglemoor High School in Kenmore, Washington, a suburb of Seattle. She is a teacher-advisor who is helping develop DNAinteractive, a joint educational project of the DNA Learning Center at Cold Spring Harbor Laboratory, HHMI and PBS.

After the 2002 Holiday Lectures, she designed a jigsaw teaching tool she calls "Xs and Os: the Tic-Tac-Toe of Sex Determination." Using "critter cards," teams of students study and analyze the sex-determination mechanisms of different organisms, then teach what they have learned to students from other teams.

Black and her colleague, Nancy Monson, presented the sex-determination activity to a "Biology Best Bets" workshop at the 2002 NABT meeting. Monson and other teachers field-tested the activity, which also was reviewed by scientists.

"It's an exercise in making observations, synthesizing and testing hypotheses," Black explains.

Critter cards, karyotype cards and other pieces of the biological jigsaw puzzle will be downloadable from the HHMI Web site by the end of 2002.