FIELD TRIP!

Middle Schoolers learn about biodiversity in the fields of Richmond and beyond.

Multiple choice: A Berkeley graduate student conducting a biodiversity survey should be doing their research in: a) Borneo, b) an Ecuadorian rainforest, c) an overgrown field in Richmond surrounded by 37 giddy seventh graders wielding butterfly nets. Thanks to the Exploring California Biodiversity Project, part of the National Science Foundation's GK-12 Program, science graduate students all over the country are stepping out of the lab and into the schoolyard, teaching young students from kindergarten through the 12th grade about science. The UC Berkeley chapter of the project is run through the Berkeley Natural History Museums and sends graduate students to one middle school and three high schools in the Bay Area. Graduate student fellows' tuition, fees, and stipend are provided through the project.

Anyone who asks a question about the world is a scientist.

In addition to visiting the classroom once a week, graduate student fellows take students on three-day field trips to natural reserves around California.

As one of this year's graduate student fellows, I work with Peg Dabel's seventh grade class and John Eby's eighth grade class at Adams Middle School in Richmond. Each week I go into the classroom with another graduate student, Joel Abraham, and two undergraduates, Natalie Valencia and Becky Chong. We've learned to make our lessons interactive and to involve every student. Holding a class discussion is hard because there are always a few kids with all the answers, and a few kids who take this opportunity to tune out. So, we've tried a few creative things this year. The kids learned about California's diverse habitats by building dioramas. They built sea urchins out of toothpicks, made cacti from pipe cleaners, and learned that grizzly bears used to roam in California's mountains. We played "Jeopardy!" to review the differences between birds, reptiles and mammals. And we taught kids about how humans can impact biodiversity through urbanization, pollution and global warming by playing bingo.

But we're not just game show hosts. Our affiliation with the Berkeley Natural History Museums means we can show students the similarities among the bones in a bat wing, a bird wing, and a seal flipper by borrowing specimens from the Museum of Vertebrate Zoology and bringing them into the classroom. Students can get a close look at a diverse collection of reptiles preserved in glass jars, and taxidermied birds and mammals, which they can touch if they are brave enough. We follow up these lessons with trips to the museums on the Berkeley campus so students can see how scientists use museum specimens, often collected many years ago, to answer present-day questions. Later this semester, we plan to bring live reptiles and invertebrates into the classroom for the kids to look at.

Of course, the best place to explore biodiversity is outside. After collecting insects and plants in the yard at Adams Middle School, we took the students to the Hastings Reservation, a

BSR GETS SCHOOLED

Editors talk science writing and reporting with Adams Middle School students

PHOTOS BY WENDY HANSEN

BSR staff (above, Jess Porter, below left, Charlie Koven) and the GK12 mentors (above, Joel Abrahom, below Becky Chong and Jennifer Skene) work with students on their science articles.

This spring several members of the *BSR* staff joined Jennifer, Joel, Natalie, and Becky in their Adams classes for a one-day workshop on science writing and reporting. Our goal was to get the students excited about the idea of reporting on scientific discoveries and to give them a glimpse into how a science magazine is put together.

We began with a brief 'press release' on the science of how geckos climb walls, delivered by *BSR* editor Wendy Hansen. As an undergraduate at Lewis & Clark College in Oregon, Wendy was part of a research project studying the mechanisms of adhesion underlying the gecko's gravity defying climbing prowess.

The students' assignment was to interview Wendy, and then write a 100-word article on the discoveries for a science magazine, like the Berkeley Science Review. While there were some off-topic but predictable questions about how poisonous geckos are, and who would win in a fight between a gecko and a scorpion; many of the questions got right to the science.

One student asked if a gecko's sticky feet get dirty, a question it turns out that Wendy spent much of her time at Lewis & Clark trying to answer (apparently they don't).

After the interview session was completed, the class broke up into small groups to write their articles. Wendy, and fellow *BSR* editors Charlie Koven and Jess Porter worked with the groups, getting the students to think about an exciting lead sentence, helping them decide how to explain the scientific results, and showing them examples of science articles from the *BSR*.

At the end of an hour, each group turned in their final draft, which we pasted into a magazine spread complete with color pictures and captions.

The workshop was fun, and it was also a dry run for the students—they will write a newsletter about their experiences with their GK-12 graduate mentors, which will be published by the *BSR* later this spring.

Jess Porter *is a graduate student in biophysics.*

BbSsRr

(Above) Birdwatching at the Hastings Reservation. (Left) Students catch crickets as part of a biodiversity survey.

Photos by Jennifer Skene

UC Natural Reserve in Carmel Valley. For three days, the students collected plants and insects using the methods they'd learned at Adams. We expose students to science, and to totally new experiences.

On the first night of the field trip, we took the students for a night hike. In a treeless spot along the dirt road, we convinced everyone to turn off the flashlights and look at the sky. These city kids had never seen so many stars. Everyone tried to be quiet, to listen to night noises. "Was that a mountain lion?" No, it was an owl, but good ears. "Was that a mountain lion?" No. It was wind in the trees. "What about that one?" No. Please keep quiet so everyone can hear. "Man, I could've sworn that was a mountain lion." "Yeah, I bet it was!" "We just heard a mountain lion!" We gave up on silence, switched on the flashlights, and kept walking.

The next day, the students were split into teams for a scavenger hunt. First, they learned to use a compass and a transect tape to find a topographic map, hidden in the tall grass. Next, they learned to read the map to discover their next assignment: they had to climb to the lone oak tree on Red Hill, 500 feet above their current elevation. Students were nervous about the ascent—it required hard work, and it was a little scary. But with our encouragement, every student made it to the top, where they could all look down on the oak woodlands and feel proud of their accomplishment.

Anyone who asks a question about the world is a scientist. Through the GK-12 program, the middle and high school students learn that science is not intimidating or scary if you've got a little self-assurance. During the field trips, the students became more confident in their abilities to read maps and climb steep hills, certainly, but they also became more confident about their abilities in the classroom. The students were always curious, but now their curiosity is more evident because they are not afraid to ask questions. Hopefully their confidence and curiosity will persist, and they'll continue to see themselves as scientists long after we leave their classroom.

As for us, as graduate student fellows we learn how to talk to a new audience about science. Communicating with the public is a critical component of the scientific process—as evidenced by the many funding agencies that require grant proposals to comment on how proposed research will impact and involve the public—and middle-school students provide an appropriately challenging audience. Through our weekly trips to the classroom, we learn how to make scientific issues accessible and interesting to everyone.

Jennifer Skene is a graduate student in integrative biology.

Want to know more?

Check out:

The Exploring California Biodiversity project.
`gk12calbio.berkeley.edu`

Through Community Resources for Science, scientists can visit elementary school classrooms in Alameda County and give hands-on presentations about a variety of science topics.
`www.crscience.org`

"It's like being on an African safari looking through a pair of binoculars and seeing some water buffalo wreaking havoc, and then realizing they're coming straight towards you."

-Sir Roger Penrose describing how he felt when some of his ideas were incorporated into string theory, March 5, 2006

"When you get a thick milkshake from McDonald's, you think that's cream you're drinking, but actually it's silica nanoparticles."

-Chancellor Robert Birgeneau, at Advanced Light Source colloquium on liquid crystal gels, March 2, 2006

"No matter what you think to the contrary, I am not a large, furless, white mouse."

-George Whitesides speaking about the applicability of model studies for pharmaceutical development, January 24, 2006