

## *THOMAS J. DEVRIES*

Vashon Island High School  
Vashon School District #402  
20120 Vashon Highway SW  
Vashon, WA 98070  
tdevries@vashonsd.wednet.edu

Following stints as a post-doc in oceanography (Oregon State University) and research professor in geology (The University of South Carolina), I came to Vashon to teach high school science in 1992.

I teach a freshman Physical Science course and electives in Environmental Science, Marine Science, and Molecular Evolution. The latter course focuses on the sometimes contradictory paleontological and molecular evidence concerning the evolution of cetaceans.

I participated in the SEP program in 1995 and followed up in 1996 and 1997 with a Research Corporation/M. J. Murdock grant to work in Scott Edwards' molecular evolution lab at the University of Washington.

In a life parallel to that in the classroom, I conduct research in Cenozoic invertebrate paleontology and stratigraphy in Peru, which recently involved a five-month field season in Peru as a Fulbright Senior Research Scholar.

**VASHON ISLAND HIGH SCHOOL  
VASHON SCHOOL DISTRICT  
THOMAS J. DEVRIES  
JASON TANGUAY**

- 3 sections sophomore Biology (2 General, 1 Basic), repeated for 2 trimesters (2001-2002)
- 70 minute class periods
- 20-30 students per class
- 8 lab groups of 3 or 4 students

Also

- 1 section junior/senior elective in Environmental Science (2001)
- 70minute class periods
- 24 students
- 6 lab groups of 3 or 4 students

In both the biology and environmental courses, the Elephant Project was incorporated as part of a larger unit on conservation biology.

Biology students had a wide range of backgrounds and abilities. Some had no prior instruction about DNA other than a one-period overview. Students with previous knowledge of DNA had a more enriching experience.

Students in all classes had learned how to use micropipets and gel electrophoresis boxes in their freshman Physical Science course. Nonetheless, it was necessary to spend a day re-acquainting them with the equipment.

#### HOW I CUSTOMIZE THE ELEPHANT PROJECT FOR MY CLASSES

Time constraints dictated that we proceeded rapidly with the Elephant Project. We employed few of the kit resources other than those directly related to the essential elements of the project.

**DAY 1:** Review of micropipetting and electrophoresis; “Wildlife Warrior” (clipped version); passing of ‘the tooth.’

Need brief overview to establish rationale for biotech review. Need to follow movie with hook to scenario – “It’s the ivory, stupid!”

**DAY 2:** Scenario and discussion; elaborate on biotech solutions; biographies of Comstock and Wasser and pictures of African lab; overview of project; posting of Africa maps.

Grampa scenario worked fine; need to exaggerate drama; emphasize that investigators are real people (current news articles might be available). If time permits, review basic geography of Africa. Consider geography homework assignment.

**DAY 3:** RFLP Paper Activity; distribution of Internet assignments

We used both options – elephant paragraphs work best. Small differences in lengths are due to spaces between words. Internet assignments parceled out by groups rather than individually. Need to keep track of progress throughout project.

**DAY 4:** Make gels and store; mix enzyme with unknown ivory sample and incubate.

Groups mixed agarose with buffer; boiled on hot plates; cooled; poured gels. Enzyme work started by one or two members of group and joined by others while gels cooled. Teacher often moved gels to storage. Recommend teacher make an extra 10-20% gels to replace those that break.

**DAY 5:** Load and run gels; Concept Questions Part 1. 70-minute period gave enough time to complete run. Gels stained overnight by teacher.

**DAY 6:** Analyze gels – estimate band lengths; record data. No semi-log plots done.

Most students unfamiliar with semi-log plots – needed at least 1.5 days to cover plots and standard line.

**DAY 7:** Concept Questions – Part 2, Vocab. Renew student interest with movie, “Animal’s World.” Students’ emotional buy-in was flagging; movie rekindled interest.

**DAY 8:** Analyze Comstock data; compare students’ and Comstock gels; determine outcome of ivory analysis.

Clarity of outcome depends greatly on quality of gel visualization with Carolina Blu™ dye. Be prepared for ambiguous data and uncertain similarities!

**DAY 9:** Review of Internet information; stakeholders’ debate or directed discussion.

Be prepared to provide information that students did not find. Setting up a debate situation can add half a day to schedule. Directed discussion with non-judgmental questions that challenge students’ positions can be equally effective.

**HOMEWORK:** Whale Assessment with sample handouts of whale meat articles. Can be followed up in class or simply evaluated as final project.