

DNA: Secret of Photo 51 (DVD, 56 minutes, \$17.99; written, produced, and directed by Garry Glassman; <http://www.pbs.org/wgbh/nova/photo51/>)

Photograph 51, originally a NOVA episode, is available as a DVD for classroom viewing. I highly recommend it to high school and college biology, women's studies, and science history students, as a testament to the sexual discrimination once pervasive in science and still evident in some male-dominated professions. A lesson on DNA would benefit from a showing of this compelling DVD. Students already familiar with the names Franklin, Crick, Watson, and Wilkins who have read Watson's bestseller *The Double Helix* may know that Rosalind Franklin, the noir heroine of DNA structure, died at 37. Our textbooks tell us how her discoveries inspired the Watson-Crick model of the structure of DNA, which was awarded the Nobel Prize in 1962. The fact that Franklin's *sine qua non* research was not mentioned in Stockholm was not surprising, considering the time in which she lived. The scientists and friends interviewed on the DVD recount with outrage the purloining of her data, vilification of her character, and misrepresentation of her knowledge, the specific details of which may shock viewers whom we teach that science is fair, gender-neutral, and objective, none of which (editorial opinion) it is.

Franklin's intelligence and mastery of subjects is described by two of her public school classmates; says one, "If she understood something she expected to be running it." As a result of her early research on coal, better gas masks were developed, aiding the war effort. J. T. Randall of King's College offered her a position in his lab examining the structure of nucleic acids by x-ray crystallography. At that time it wasn't clear what DNA looked like or how it worked. Her pictures, *Photograph 51* among them, were obtained by bombarding DNA crystals with x-rays and collecting with a detector the x-rays diffracted (scattered) by the crystals. These diffraction patterns allow scientists to calculate the three-dimensional forms of complex molecules. Nowadays a computer can analyze diffraction patterns in seconds, but Franklin would have taken an entire year

to analyze patterns from a single image, doing a thousand calculations by hand.

Franklin's photos of the "B" form of DNA showed the molecular signature of a helix: the "x" in the center revealed DNA to be a helix with 10 base pairs measuring 34 angstroms per turn; her symmetry data using the "A" form of DNA helped nail down the antiparallel nature of the two strands (the strands run in opposite directions), enabling Crick and Watson to figure out how the bases nestle on the inside of the helix.

Franklin's last work was on the viral structure and infectivity of tobacco mosaic virus and poliovirus. She died of ovarian cancer, having achieved her stated goal of "the improvement of the lot of mankind" in a multiplicity of ways.

Science enthusiasts will enjoy the technical details, but our historians and gender-studies students can skip the science-geek bits using the scene selections menu. The DVD can springboard a group or individual activity uncovering other unsung (or sung) heroines of science, past and present. The website (<http://www.pbs.org/wgbh/nova/photo51/>) produced by WGBH contains inviting animations, photos, and interviews.

Roberta Batorsky

The Day the Mesozoic Died (DVD, 33 min; <http://www.hhmi.org/biointeractive>)

Although an image of *Tyrannosaurus rex* adorns the cover of this fantastic new video produced by the prolific Science Education Department at Howard Hughes Medical Institute (HHMI), the surprise is that tiny fossilized protists are the real stars of the show. Intended for "all students in all science classes," this beautiful and well-produced video offers a glimpse into how scientists constructed an understanding of how and why a mass extinction occurred on Earth 66 million years ago.

Instead of focusing on dinosaurs, the story asks why there are size and diversity differences between tiny fossilized microorganisms called *foraminifera* (or "forams" for short), between sedimentary rocks found near the boundary of Cretaceous and Tertiary (K-T) periods. The video, available free on DVD or online, is divided into

three acts, moving seamlessly between locations, people, and "deep time," reconstructing scientists' interdisciplinary approach to solving this mystery. The result was a revolutionary theory explaining how a large asteroid impact caused the mass extinction of most of the dinosaurs. The well-paced DVD includes closed-captioning in both English and Spanish, and is engaging for students from middle through high school.

Accompanying the video are teacher resources: a film guide for teachers, a student quiz, and six activities. The six lessons, three of which carry a heavy dose of physical science, are appropriate for more than just life-science classes. Each lesson is also available in both student and teacher formats, which outline the objectives, appropriate levels, and prior knowledge required. And as with many HHMI materials, all can be found online linked to common texts and curriculum.

While the video is suitable for a wide variety of students and science classes, many of the readers and lesson prompts are written at a college level. Students with below-grade-level reading skills and English language learners may find the text difficult to comprehend. Moreover, some of the lessons require math skills and confidence commonly found only in AP or advanced courses, but with a bit of effort from the teacher, each activity can be reworked to meet individual classroom needs, from middle school through AP.

The Day the Mesozoic Died is another vital resource created by HHMI. The DVD and accompanying materials underscore the importance of all science disciplines in understanding the natural world.

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