

CLASSROOM MEDIA REVIEWS

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Biomimicry – Innovation Inspired by Nature
(2 DVDs, 2002, Bullfrog Films, 88 min)

Necessity may be invention's mom, but the producers of *Biomimicry* argue that "nature" is, in fact, a much better "mother." The film warns students of the ways our vaunted technologies may be damaging our planet, and encourages them to look natureward when designing new problem-solving technologies. This unconventional film can both inspire and initiate discussion in its intended audience of grades 7–12. Based on the book by Janine Benyus, the two-part DVD introduces various novel technologies, the scientist(s) behind them, and their inspirations in nature. Examples of the technologies include synthetic compounds that mimic the process of photosynthesis in order to harvest energy, environmentally friendly rugs with patterns inspired by nature, adhesives that incorporate the compounds found in mussel glue, and even microprocessors made more effective by mimicking the abalone.

The kiln of evolution has forged the internal processes of Earth's organisms for millions of years. For this reason Wes Jackson of the Land Institute, Devens Just and the Moores at Arizona State University, among the other scientists featured, are encouraging students to seek solutions to our problems by imitating nature rather than merely consuming nature's limited resources.

One caveat: The film does not appear to have been made for youthful audiences in its pacing and music. The dialogue is stagey, the soundtrack old fashioned. But these minor flaws are trumped by the science, which is complex, top notch, relevant, and well explained. It doesn't require further flash and panache to be absorbing. For the teacher choosing to share clips that enrich lessons on Biotechnology, chemistry, or natural resources, the film is very effective; it is also appropriate for older audiences.

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Bones, Stones, and Genes: The Origin of Modern Humans (DVD, 2012, Howard Hughes Medical Institute)

The Howard Hughes Medical Institute (HHMI) has a well-deserved reputation among biology teachers for providing outstanding teaching tools free of charge through their BioInteractive website. The annual HHMI Holiday Lectures are one such resource. The lectures are organized around a specific topic (for example, biological clocks or neuroscience) and feature engaging, media-rich presentations by prominent scientists in the field. HHMI makes the lectures available as a live stream, via on-demand streaming, and on DVD. The DVDs and the BioInteractive website are well organized, and it is easy for the teacher to select portions of the lecture that are as long or as short as desired for classroom viewing, or to play only specific animations to illustrate particular concepts.

The 2011 lectures, *Bones, Stones, and Genes: The Origin of Modern Humans*, was released on DVD in April 2012 and features Drs. John Shea, Sara Tishkoff, and Tim White. The lecture series has four parts: Lecture 1 serves as an overview, Lecture 2 covers the genetics of human origins and adaptation (genes), Lecture 3 addresses the archaeological evidence of human prehistory (stones), and Lecture 4 discusses physical paleoanthropology (bones). All are engaging and informative; Lectures 2 and 4 are probably the most useful to instructors teaching general biology courses at the high school or college level.

Lecture 2 includes discussions of human genetic variation, single-nucleotide polymorphisms (SNPs), the tree of life, primate phylogeny, mitochondrial DNA, and the dispersal of *Homo sapiens*. Especially compelling is a segment on lactase persistence, in which Dr. Tishkoff outlines the origin and spread of the mutation conferring lactose tolerance in adulthood. This 10-minute segment, brief enough to work into any class, is a powerful

case study that makes connections among several topics:

- *Natural selection*: lactase persistence may have been selected for in some human populations after the advent of animal husbandry;
- *The Central Dogma*: the gene → protein → trait link is made manifest here;
- *Regulation of gene expression*: the lactase persistence mutation occurs in a regulatory sequence;
- *Enzyme activity*: lactase catalyzes the hydrolysis of the disaccharide lactose, yielding glucose and galactose;
- *Convergent evolution*: European and African populations have different mutations that result in the same phenotype;
- *Chromosomal linkage*: SNPs near the lactase persistence mutation are inherited together with it, giving geneticists evidence of selection; and
- *Data collection*: volunteers in various African populations are shown being tested for the lactase persistence phenotype (ingestion of lactose followed by periodic finger pricks and blood glucose monitoring)

This latest installment in the Holiday Lectures series is a welcome addition to a valuable collection.

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