



CALIFORNIA THE LIVING EARTH

# Biology

Miller & Levine

partners with



hhmi

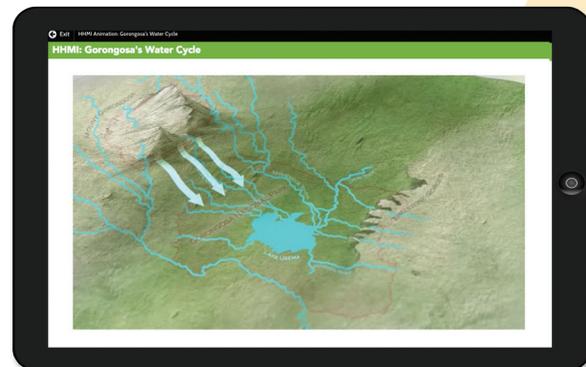
# BioInteractive

## Multimedia brings stunning clarity to life

Add brilliant, movie-quality films and interactives to your biology lessons! Savvas partners with **HHMI BioInteractive** to integrate the free, award-winning resources you know and love from [BioInteractive.org](http://BioInteractive.org) into the *California Miller & Levine Biology: The Living Earth* program. Let students experience natural phenomena and the scientific process in ways never before possible.

### Animations

Engaging animations, integrated at point of use in the student program, combine scientific rigor with best practices of visual storytelling to cover a broad range of topics from the molecular machinery of a cell to the dynamics of life on our planet.



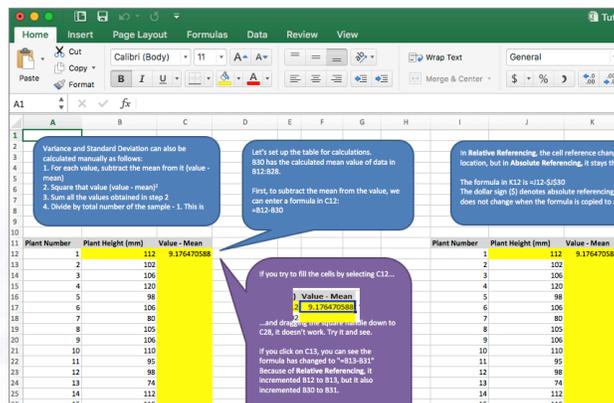
### Scientists at Work Career Videos

Experience authentic scientific research with the *Scientists at Work Career* videos. Watch scientists describe how they apply the scientific process to understanding a range of phenomena, from dying coral reefs to the distribution of elephants across the African continent.



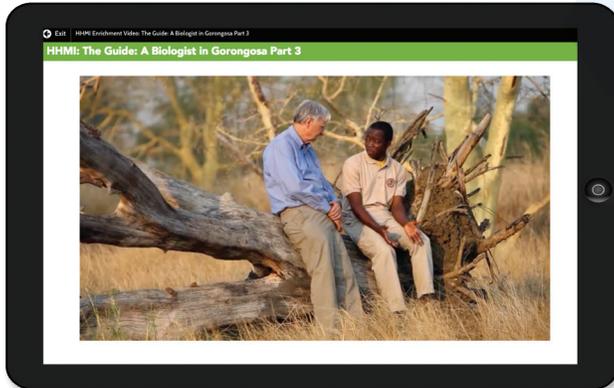
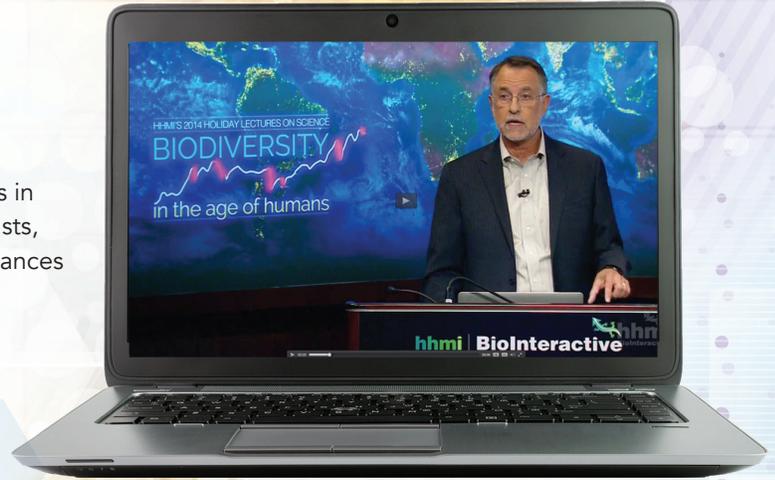
### Spreadsheet Data Analysis Tutorials

Students learn essential quantitative skills applied to biology research, such as organizing data, calculating statistical values, 95% confidence intervals, and plot graphs with error bars. Working with spreadsheet programs builds student confidence with critical science and engineering practices.



## Lectures on Science

Enrich the student experience with the latest scientific findings in the *Holiday Lectures on Science*. Lectures from leading scientists, working at the cutting edge of their scientific fields, cover advances in cancer research, earth science, virology, and ecology.



## Short Films

These memorable stories of scientific discovery, in fields ranging from evolutionary biology and genetics to earth science, provide concrete examples of how science works and how scientists ask questions, test hypotheses, and analyze evidence to draw conclusions.

## Hands-on Activities

Short films and lectures are accompanied by collections of supporting materials, including film guides, quizzes, hands-on activities, and lesson plans to enhance and extend their use in the classroom.

**Food Chains and Webs** Student Worksheet

**Part 2. Quantifying energy flow and the rule of 10 percent**

Three hundred trout are needed to support one man for a year. The trout, in turn, must consume 90,000 frogs, that must consume 27 million grasshoppers that live off of 1,000 tons of grass.

— G. Tyler Miller, Jr., *American Chemist* (1971)

Only a small fraction of energy available at any trophic level is transferred to the next trophic level. That fraction is estimated to be about 10 percent of the available energy. The other 90 percent of the energy is needed by organisms at that trophic level for living, growing, and reproducing.

This relationship is shown in the energy pyramid above. It suggests that for any food chain, the primary producer trophic level has the most energy and the top trophic level has the least.

8. Why is a pyramid an effective model for quantifying energy flow?

**Energy Pyramid Data:**

Trophic Level	Relative Amount of Available Energy
Tertiary Consumers	0.1%
Secondary Consumers	1%
Primary Consumers	10%
Producers	100%

Sign up for a demo account at:  
[SavvasRealize.com](https://www.savvasrealize.com)



# Savvas.com/MillerLevine

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