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Boosting Biology

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BioScience

Organisms from Molecules to the Environment

American Institute of Biological Sciences

Boosting Biology

When I first studied—if that is the word—biology, in high school in the 1970s, it seemed uncompelling: the lab demonstrations could not compare for spectacle or danger with more vivid offerings in chemistry and physics. Only an encounter with *The Ecologist* magazine persuaded me that biology had gravity.

Today's biology teachers have at hand not only better demonstrations of biology's power but also more convincing arguments for its importance. As Thomas Lovejoy, biodiversity chair of the Heinz Center, remarked recently, humanity has finally come to the point where daunting rates of species loss and the challenges of sustainably meeting energy and food needs are "all one big crunch." Individuals' decisions are important, but national and international policies will govern how our species manages the pressures stemming from its burgeoning numbers. Nobody can doubt that biology, from molecules to the environment, must inform those policies if we are to avoid tragedies.

The tools available are stunning: petaflop computing, nanoscale secondary ion mass spectrometry, and high-energy coherent light sources were just a few highlights described recently during a one-day meeting convened by the National Academy of Sciences, which is conducting a study called "A New Biology for the 21st Century." These and other techniques allow researchers to disentangle life's webs of causation in real time and on molecular scales, bringing unprecedented opportunities and demonstrating the quantum-mechanical effects underlying key processes. At the opposite extreme, satellites have made many people familiar with maps showing processes such as primary productivity regionally and globally.

Popular excitement about science gels around the promise of advances in medicine, as did much of the academy's whistle-stop tour of biological triumphs. Such advances, however, will help only a small fraction of humanity unless larger-scale biological challenges see similar progress. James Collins, head of the National Science Foundation's BIO directorate, aptly sketched the imperative and the promise of comprehending the biosphere in order to manage it.

Indeed, biological approaches to carbon sequestration might offer some of the most plausible ways of taking action against global warming. Yet the challenges of inspiring tomorrow's biologists remain just that, and the notorious fragmentation of biology into enclaves that communicate with one another only with difficulty is widely recognized as an impediment. Somehow, students must learn that life does offer plenty of spectacle and danger, and that familiarity with key concepts and a readiness to learn new techniques can empower them.

The hard part is to convey essential ideas without snuffing out interest with a surfeit of facts and jargon. For students who want to become biologists, academic institutions need to do more to offer early career support for innovative research, another point made strongly at the Academy's show-and-tell day. Fortunately, educators are developing new approaches to teaching biology, and that topic is among those the Academy study will address. With an administration in office that is receptive to input from scientists, the Academy could provide crucial leadership.

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