



THINKING EVOLUTIONARILY: EVOLUTION EDUCATION ACROSS THE LIFE SCIENCES
A National Convocation Organized by
The National Research Council and the National Academy of Sciences
October 25-26, 2011, Washington, DC

Nothing in biology makes sense except in the light of evolution.
T. Dobzhansky

The life sciences community accepts the centrality of evolutionary processes and concepts for understanding the processes of life. Yet, the study of evolution has been a source of contention in public schools in many parts of the United States. That is partly because many people do not understand the principles of evolution or the nature, processes, and limits of science more generally. Another problem is the way that evolution is typically taught. Often it is presented as one discrete topic among many in the biology curriculum leading to the false impression that it can be isolated or even removed from biology. A more appropriate and effective way to teach evolution is as a fundamental and integrating principle of modern life science. In response to these issues the National Science Education Standards call for teaching about evolutionary principles throughout the K-12 curriculum with concepts that are grade-appropriate and that build upon earlier concepts. Further, members of the science education community have stated the importance of weaving evolutionary principles into life sciences curricula at all levels, both pre- and postsecondary.

The growing recognition of the central role of evolution in biology is reflected in several recent initiatives, revisions, and assessments by a spectrum of organizations including the American Association for the Advancement of Science, the College Board (through Advanced Placement Biology), Howard Hughes Medical Institute, National Academies, National Evolutionary Synthesis Center, National Science Foundation, and a number of disciplinary and professional societies. A strategic plan is needed to incorporate evolution as a central theme in biology teaching effectively, sustainably and across institutions and levels. As noted below, many components of a comprehensive strategy are already under way, but they need to be integrated and expanded to include:

- guidance for secondary and postsecondary science faculty about how and where to introduce evolutionary concepts most effectively into biology courses, particularly pre-service curricula (for preparation of future teachers), professional development programs for current teachers, and introductory biology programs.
- guidance for authors and publishers of biology textbooks, curricula, and other teaching resources about ways to integrate evolutionary principles into their products.
- development of assessments of evolutionary concepts stressing the integrative nature of evolution in the life sciences.
- buy-in from disciplinary and professional societies in the life sciences and related disciplines so that they can help generate educational resources based on their disciplinary emphases

as well as educate their members about the importance of integrating evolution more deeply and cohesively across the life sciences curriculum.

- ongoing coordination among the various stakeholders about the issues, and new developments.

Several meetings hosted by the National Evolutionary Synthesis Center have generated a consensus on the beginnings of a strategic plan for coordination and action over the next 2-3 years:

- **Collation of existing and development of new online teaching/learning resources** that will enable faculty who teach survey courses in the life sciences to help their students employ and apply “evolutionary thinking and analysis” to all topics that are discussed during the course.
- **Workshops** for biology faculty at both the secondary and postsecondary levels during meetings of disciplinary societies in the life sciences and professional organizations to introduce their members to these resources and to assist them in their adoption.
- **A National Convocation** to be organized and hosted under the auspices of the NRC’s Board on Life Sciences and the NAS that would bring together stakeholders who are critical to the success of this effort but who too rarely communicate, and collaborate with each other. The convocation would articulate issues, showcase resources that are currently available or under development, and begin to develop a “roadmap” and strategic plan for engaging professional societies and their members in future work.

The National Convocation, scheduled for October 25 and 26, 2011 in Washington, DC. This event will actively engage all participants with a mix of plenary, panel, and breakout session that will result in a report summarizing the outcomes and outlining future plans. At this time the committee expects that the convocation will focus on the following issues and questions:

Why ‘thinking evolutionarily’ is a useful way to teach biology:

- How students benefit
- How faculty benefit
- How science benefits

Resources:

- What is currently available?
- What additional resources are needed?
- Who would produce them?

How to encourage and facilitate change:

- Professional Development for high school and college faculty
- Communications strategies
- Engaging diverse communities in the life sciences

Outcomes and Next Steps

- Possible sources for funding further activities
- Agenda items for future meetings

Following the Convocation the National Academies will produce a summary of the convocation that will be made freely available for distribution and discussion by the life sciences community. Links to resources for implementation of the changes, including those available online and best practices will be included in this report.