



**ASSOCIATION FOR BIOLOGY LABORATORY EDUCATION**

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own key, learn the differences between natural and useful classifications, and gain experience in precisely defining their observations.

### **Adaptation to an Abrupt Environmental Change**

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Spreadsheets can be a fun, cheap and useful way to encourage students to explore evolutionary and ecological topics. Creative students can use spreadsheets as a blank artist's canvas to create simulations for a great variety of natural phenomena. In this workshop, we will explore an example of a spreadsheet model that you or your students might construct. On the spreadsheet, we will manipulate the genetic variation in a simulated population of plants. The genotypes and phenotypes of individuals will be followed over five years. The simulation demonstrates Fisher's Fundamental Theorem of Natural Selection that a population with greater additive genetic variation is more able to adapt to changes than one with less variation. Perhaps even more interesting, the spreadsheet allows you to manipulate how abruptly the environmental change happens. The simulation demonstrates that a population that experiences an abrupt environmental change is more likely to go extinct than one that experiences a gradual change in the environment. The exercise relates well to evolutionary concerns biologists have about global warming.

Instructions to construct the Excel sheets are available in the following:

Puterbaugh, M. N. 2001. Chapter 31 – Adaptation; and Puterbaugh, M. N and L. Lawson. 2001. Chapter 34 – Heritability, *In* C. Welden and T. Donovan (Editors). Volume 1, Spreadsheet Exercises in Ecology and Evolution, Sinauer Associates, Inc.

Puterbaugh, M. N. 2001. Chapter 18 Adaptation, *In* C. Welden and T. Donovan (Editors). Volume 2, Spreadsheet Exercises in Conservation Biology and Landscape Ecology, Sinauer Associates, Inc.

### **The Value of Field Experiences in a Non-Major Marine Biology Course**

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This workshop discusses the costs and benefits of providing real world field experiences for non-science students. We developed and implemented optional field trip experiences for students enrolled in summer term and spring semester marine biology courses that allow students to explore a diversity of marine habitats within 6 hours of the University of Georgia campus. Faculty and students involved with the field trips have contributed to a growing digital photo archive that has been used to develop virtual alternatives for students unable to participate in the field experiences. Cost-sharing and cooperative agreements with the UGA Marine Institute and the Florida State University Marine Lab have helped hold costs to a minimum, while providing the students with experiences that include trawling on a converted commercial fishing vessel, snorkeling offshore in turtle grass beds, canoeing and sea kayaking through coastal estuary areas, seining, and surveying barrier island habitats. Student evaluations suggest the field trip experience is invaluable. It is also a very effective recruiting tool for attracting talented undergraduates early in their academic careers. For graduate students, the opportunity to teach in an informal field setting has proved to be a unique and valuable learning experience. With increased emphasis on study abroad programs at the University of Georgia and other institutions, field teaching experience as a graduate student provides an opportunity for instructional training beyond the classroom.