Introducing Microarray Technology into the Undergraduate Laboratory

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Because transcriptome analysis is important in providing information about gene regulation, undergraduate students should have some knowledge of microarray technology. I have taken advantage of the Genome Consortium of Active Teaching (www.bio.davidson.edu/GCAT), which provides expertise for undergraduate teachers to introduce this technology into their laboratories and materials at a reduced cost. They will also scan the microarrays for the class. Students in the Biotechnology/Molecular Biology course, a second level course, are first introduced to microarrays using a model from Genesifter (www.genesifter.net/web/dataCenter.html) investigating the transition from primary tumor growth to metastasis. Following this step, students read and discuss key papers using yeast (*Saccharomyces cereviseae*) as a model system for microarrays and examine representative data. They then plan an original experiment and partially complete their experiment modeling their experiment after these key papers. An essential component of planning is to support their hypothesis using journal articles. After approval from the instructor, all students must carry out the experiment through extracting the yeast RNA and analyzing it. Subsequent steps, from converting the mRNA to DNA to analyzing the microarray data from their experiment, are completed in the second semester.

Splitting the project into two semesters reduces costs since only a few projects continue into the second semester when the most expensive steps, converting the mRNA to labeled cDNA and using the microarrays, are completed. This two-semester approach is successful in that all students are introduced to the microarray technology and understand how experiments are designed. Those who complete their experiment are encouraged to present it at a regional Biology conference.