

The Eyes Have It: Ideas for Undergraduate Student Research

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The above students (Splayer, Gottlieb, and Azizian) registered for an independent study course I (Nolan) gave in 1993 that involved learning techniques in molecular biology to solve a problem in neuroscience. Because Yeshiva University is a small undergraduate college with minimal research facilities, I have been doing post-doctoral work at the nearby City College of New York, which has a graduate program and well-equipped research labs.

The project I chose to bring from City back to the students at Yeshiva required verifying an experiment that I had already attempted, so I knew how much time the project would take, the types and amounts of materials needed, and some of the pitfalls the students would encounter.

I had isolated a positive cDNA clone with Melania Mercado in Dr. Sally Hoskins' laboratory at City College. Dr. Hoskins is studying eye development from egg to adult in *Xenopus* frogs, and is especially interested in isolating molecules that are responsible for regulating "axon pathfinding." She believes she has isolated some novel proteins that are involved in regulating axon pathfinding, and has injected retinal extracts into mice in order to make antibodies to these proteins. These antibodies can then react positively when they come into contact with a retinal cDNA library contained in a lambda phage vector, and we observed one positive reaction.

The initial isolation of a positive from a cDNA library would be too time-consuming and tedious for most undergraduates, but the Yeshiva students did some follow-up work. "Phagemids" were isolated from the plaques, bacteria were transformed with these, plasmid DNA was isolated, and mini-gels were run to determine if inserts were present. They should be in the case of a positive antibody reaction. We did see inserts, and the Yeshiva students were able to help by verifying the sizes of the inserts.

The students learned some common techniques used in microbiology and molecular biology, but they went beyond what might be offered in a typical lab course in that they were working on an actual research problem.

The above is a synopsis of what we put on a poster that we made as a result of this work and that is currently hanging on poster boards in the student library. The students also submitted abstracts for a glossy student brochure published by the Yeshiva Sigma Delta Rho Honor Society, as well as papers to me to be graded.

I can't emphasize enough the value this course has had both to the students and to me. Two of the students now have landed research technician jobs (partly because of the experience they gained in this course) and they plan to go on to graduate school in a year or two. And I, of course, had three extra sets of hands to aid me in my research!

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