



Student Research at Phillips Andover Academy

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While many departments and programs at Phillips Academy feature faculty members and students who are deeply engaged in research projects, the Division of Natural Sciences has enjoyed an especially robust research program in recent years. Within the last decade, several instructors have joined the science faculty following careers in research, bringing their own special interests and expertise to the courses offered in the Division. As a consequence, Phillips Academy's Division of Natural Sciences has seen an increase in active research, even beyond the strong existing research programs already in place. The signature course for research in the Division is Biology 600, a dedicated laboratory course normally reserved for seniors (or accelerated 11th graders) who have completed most of the available advanced classroom coursework in biology. Beginning with instruction on model systems and techniques widely used in professional laboratories, students enrolled in Biology 600 embark on independent research projects of their own choosing. In past years, students have explored a wide range of topics, from the roles that specific genes play in the growth of brain cancer cells, to the genetic controls promoting successful regeneration of motor neurons in nematodes, to novel gene targeting strategies for the production of "humanized" proteins in bacteria.

One recent study from our lab, an investigation into potential role(s) for the protein Survivin in glioma cell proliferation and migration (Montana), is presented in this issue. Generally speaking, Biology 600 students spend two to three trimesters working on their projects. Along the way, they become active participants in the broader scientific community, communicating with professional laboratories and companies and learning the refined art of collaboration. Each year, students present their findings before a collection of peers, faculty, staff, alumni and administrators, at a special event that celebrates their efforts and achievements.

The Abbott Independent Scholar Program offers additional support for independent research (in place of standard coursework) here at Andover, and many opportunities to execute experiments on a smaller scale are also presented to students within the framework of existing courses. For example, the focus of the Biology 580 course—the final term of a three-term advanced sequence that builds from cellular and molecular biology to ecology and evolution—is an experimental research project into an ecological topic of the students' choosing that is conducted over the course of most of the spring term. The current issue of the Journal of Experimental Secondary Science features an article (Howard et al.) that was the product of one such project: an investigation into the effects of soil conditions on thigmotropism (rapid snap-trap closure) in Venus flytrap plants. As testament to the creativity of students involved in these projects, the flytrap experiments were conceived, designed, and executed completely by the students themselves.

Even as future sections of the Biology 580 course will work on student-driven ideas for ecology projects, and Biology 600 still presents opportunities for long-term, in-depth research, students continue to express interest in model systems and experimental work that will push the boundaries of the research offerings at Phillips Academy. Indeed, a trio of students who have taken Biology 570—the human anatomy and physiology course—are currently writing proposals for an upcoming Independent Project that will focus on recording muscle potentials from genetically-modified fruitfly larvae whose motor neurons contain photo-activatable ion channels to allow for remote muscle stimulation.

We expect that, as long as Phillips Academy students remain curious and motivated by the promise of discovery, and faculty members of the Division of Natural Sciences remain committed to their own professional development, as well as to mentorship and the teaching of practical science, we will continue to see expanded opportunities for students to conduct even more diverse projects in various biological disciplines in coming years.

*More information about Independent Research at Phillips Academy is available online:

<http://www.andover.edu/Academics/NaturalSciences/IndependentResearch/Pages/default.aspx>