RUI IMPACT STATEMENT
ETHAN D. CLOTFELTER

Impacts on Amherst College and our students. Amherst College is a small (ca. 1600 students), co-educational, liberal-arts college devoted to educating outstanding undergraduate students. There are no graduate programs at Amherst College. Faculty members are expected to teach two courses every semester and conduct high-quality research with extensive involvement from their students. The close relationships students have with their research mentors are essential parts of the Amherst educational experience. Amherst College is a leader in recruiting and retaining those students traditionally underrepresented in higher education in the United States, with 30 percent of the student body self-identifying as people of color. A 2003 study by *The Journal of Blacks in Higher Education* awarded Amherst the highest average diversity rating of any leading liberal arts college in the nation. Amherst ranked first among peer institutions in several categories, including the highest percentage of blacks in any student body (10.3% in 2003), the highest black graduation rate (93%), and the largest six-year gain in black first-year enrollments (12% of the Class of 2007). One of the cornerstones of Amherst's success in achieving diversity is its need-blind admission policy; roughly 50% of students receive financial aid following their admission to the college.

Acutely sensitive to the "leaky" educational pipeline for women and minorities interested in science careers, and cognizant of its responsibility to help produce a diverse pool of highly skilled scientists, Amherst College has developed several initiatives designed to help these groups succeed and move into leadership roles at the College and beyond. These include a Quantitative Skills Center and numerous research fellowships for first- and second-year students. These efforts have produced good results: 48% of all natural science majors in 2004 were women – up from 38% just a decade ago – and the College saw a doubling of non-Asian minority science majors in the decade spanning 1994-2004. Moreover, a recent study that determined post-commencement outcomes for more than 180 summer research fellowship recipients on our campus between 1988 and 1998 found that 91% of the women, and 94% of the students of color, continued on to graduate and/or medical schools. Amherst has also made progress toward increasing the representation of female faculty in the sciences. This past year, women comprised 23 percent of tenured or tenure-track faculty in the sciences, up from 15 percent five years ago.

Amherst College has long been at the forefront of efforts to improve undergraduate science education, in part through interdisciplinary curricula. In 1973, Amherst was the first institution in the country to offer an undergraduate major in Neuroscience, and for more than 20 years our Biology and Chemistry departments have collaborated to teach Biochemistry. More recently, the College has renovated its Merrill Science Center and has constructed an adjoining 37,500 square foot McGuire Life Sciences Building. The new facility provides expanded, state-of-the-art research facilities for our science faculty as well as greater opportunities for cross-departmental collaborations. For students who want to experience interdisciplinary research first-hand, Amherst College has established several Collaborative Research Groups comprised of 3-4 science faculty from different departments whose research is related to a central theme. These Collaborative Groups work on intensive summer research projects with groups of students each

year. I am a member of both the Neuroscience and Behavior group and the Environmental Science group.

Faculty members in the Department of Biology conduct high caliber research that creates numerous opportunities for students. In the past five years, the nine Amherst Biology faculty members have published more than 80 peer-reviewed publications with 30 undergraduate co-authors. In their freshman or sophomore years, many Amherst Biology majors join research labs as laboratory assistants. As seniors, students have the option of conducting honors thesis research, a commitment that approximately half of our ca. 30 majors undertake each year. Prospective honors students frequently spend the summer before their senior year conducting preliminary research; some of the funds requested here are to support summer research by honors thesis students. During the academic year, honors students present their research plans, attend weekly departmental seminars, prepare manuscripts for publication, and engage in public defenses of their theses. This rigorous process produces students able to tackle any challenge in science. Distinguished Amherst alumni in the sciences include Nobel laureates Harold Varmus '61 (Medicine 1989) and Henry Kendall '50 (Physics 1990), and Leeuwenhoek Medal winner Carl Woese '50 (1992).

The work described in this proposal has much to offer the students of Amherst College. There are opportunities for beginning students to get basic laboratory experience, as well as more challenging research for advanced students. Students working on this project will learn how to study behavior, how to conduct toxicological research, how to assay steroid hormones and serotonin and, most importantly, how to design and execute effective experiments. Honors thesis students will be expected to submit manuscripts from their research to peer-reviewed journals. My research on the endocrine disruption of behavior is of broad interest to students in the Department of Biology and the Program in Neuroscience. In addition, my laboratory will provide numerous research opportunities to students in the nascent Environmental Studies program currently being developed at Amherst College.

Impacts on the principal investigator. The successes of the Department of Biology's faculty and student research projects depend largely on financial support secured by the faculty. On average, my colleagues have attracted more than $500,000 apiece in extramural funding over the past 10 years from a variety of public and private sources. The college provides competitive research awards (up to $30,000) and an array of support staff (machinists, dishwashers, and greenhouse staff). This internal support is enough to sustain a research lab between successful grants, but not enough to maintain an active research program. Thus, in order to support quality student research it is essential to secure extramural funding.

For junior faculty like me, the pressures on our time are considerable. In my first three years at Amherst College, I have supervised eight honors students (six women, three students of color), eight research assistants (four women, three students of color), and supervised two courses of independent study (four students, of which three were women). I am also developing new courses, learning how to be an effective academic advisor, and continuing to establish myself as an independent scientist. In the implementation of my research program at Amherst, I have encountered a set of challenges that are common to liberal arts colleges, including the absence of graduate students and the inevitable turnover and re-training of undergraduate assistants. For

these reasons, it is essential for me to have a laboratory technician. Such a person will provide continuity in the laboratory, help foster connections between student projects, and act as an invaluable resource for research students when I am in the classroom.

In addition to a laboratory technician, this grant provides summer support for two student researchers per summer, as well as the equipment and supplies they need for their work. It also provides summer salary for me so I can devote myself to this project and the students working on it. Summers offer periods of intensive side-by-side research with students that are both professionally and personally rewarding; they are opportunities for me to interact with some of the most engaging and talented young people in the country. The grant also includes funds to support my travel to scientific meetings, where my students and I can present the results of our work (student travel is supported by Amherst College).

Like many of my colleagues at undergraduate institutions, I believe that the dichotomy between teaching and research is a false one. At Amherst College, 'experiential learning' is not just a buzzword – it is how we work every day. Our students are involved in all stages of our research, from conceiving an experiment to publishing the manuscript. Since 2003, for example, I have co-authored 10 papers with undergraduates, and three more manuscripts are in review or in preparation. These experiences are the cornerstones of the Amherst College experience and contribute greatly to our students' future successes. Having an active research program enhances my classroom teaching in many ways. By conducting, publishing, and presenting my research, I stay abreast of the latest trends in animal behavior, behavioral neuroendocrinology, and environmental toxicology. By attending conferences and reading professional publications, I am better able to advise my students about their career plans in biology. Most of all, however, I am able to convey to my students my passion for the subjects I study and teach.