

# Botany Department Program Review Team Report

Site Visit February 29, 2008

## *Introduction*

The review team was highly impressed by the Department of Botany's Self-Assessment document prepared as part of the program review. It reflects a deep desire to use the program review process to improve the department and not just as an administrative exercise. In addition, it was "a good read."

The self-study document focused on learning outcomes of students, detailed the requirements for student portfolios, and documented the efforts of the Botany Department to help students secure internships and develop meaningful careers. The section on support staff, facilities, equipment and library was detailed and extremely useful.

Particularly interesting were the responses of the Botany Department to previous input from the 2002 self-study. The careful consideration of the department to the six challenges presented evidences that the department takes the self-study process very seriously, and does not simply engage in "window dressing", as sometimes occurs at other institutions. The challenges addressed in November 2002, and which should be considered benchmarks for the current study include 1) involving more students in faculty research, 2) increasing visibility of the Botany program on campus, 3) remedying inadequate laboratory space, 4) expanding efforts to improve learning assessment, 5) increasing alumni involvement in the department, and 6) increasing the role of adjunct faculty.

Based on these 2002 benchmarks, the department articulates in the current self-study nine additional goals to be accomplished in the next 3-5 years. These goals include 1) improving student portfolios, 2) compensating faculty who serve as student research mentors, 3) increasing recruitment of students into botany, 4) maintaining botany as a distinct discipline at the university, 5) conducting ongoing evaluation of goals and objectives, 6) fostering inclusivity in the program, 7) achieving full departmental status for botany, 8) linking botany with new technology, and 9) strengthening the herbarium collection. The visiting committee members concur with the department in the validity and importance of these departmental goals.

## *The Role of Botany in the Academy*

The success of Weber State University's Botany Department in forwarding botany as a distinct academic discipline is laudatory. Like philosophy, classics, music theory, fine arts, and rhetoric, the popularity of botany within academia waxes and wanes, but no institution can truly be considered a rigorous university in the absence of any of these disciplines. Botany plays a key role in the history of Herodotus. Later, Plato's student Theophrastus wrote the seminal two-volume work *De Causis Plantarum* which became

the foundation of botanical studies. Aristotle and Dioscorides wrote important works on plants, with Dioscorides study of medicinal plants influencing the trajectory of medicine.

Botanical gardens, once known as physic gardens, were the cornerstones of all medical schools, with Gerard's 1597 *The Herball, or General Historie of Plants*, being used as the equivalent of *Physician's Desk Reference* for three centuries. Indeed, other than the Bible, no single published work has remained continuously in print for over 400 years, other than Gerard's *Herball*. The publication on May 1, 1753 of *Species Plantarum* by the Swedish botanist Carl Linnaeus revolutionized all biological systematics, and set in place the framework for the great natural history expeditions beginning with Captain Cook's voyage of discovery in 1768 (accompanied by Linnaeus' student Daniel Solander) and culminating in the voyage of the *Beagle* in 1831. On this trip, a young botanist Charles Darwin made a discovery that changed the entire world.

Thirty-four years later, a young monk named Gregor Mendel read his paper, "Experiments on Plant Hybridization," to the Natural History Association of Brno, laying the foundation for genetics. The reconciliation between Mendel's work and that of later botanists such as Karl Correns and Hugo DeVries which indicated mutations as the driving force of speciation, and the slower processes of natural selection envisioned by Darwin, was crafted largely in the mid-20<sup>th</sup> century by botanists including Sir Ronald Fisher and Ledyard Stebbins in what became known as the "New Synthesis."

Today, botany and the study of plants is important as never before. Discovery of new enzymes for DNA studies, genetic modification of crop plants, the discovery of new pharmaceuticals, solutions to problems of global warming, remediation of oil spills and environments damaged from mining, the creation of biofuels to replace dwindling petroleum stocks, all depend on botany.

Weber State University is to be commended for its foresight in keeping botany well within the constellation of disciplines in the arts and sciences necessary to produce qualified students and a learned faculty. The visiting committee members are united in lauding WSU for maintaining botany as a viable and important program at the university.

### *Strengths of Botany Department*

1) The Botany Department is composed of excellent teachers, who have a genuine desire for the students to learn botany and love plants. In our private lunch and meetings with students, the visiting committee was stunned at the tremendous enthusiasm the students have for their botanical studies and for the remarkable esteem in which they hold the botany faculty. This small department offers a remarkable diversity of high quality courses while operating the greenhouse, maintaining a herbarium collection, and undertaking research. The faculty is collegial to each other and the university faculty at large. Dr. Bozniak is to be commended for assembling a remarkable staff.

2) The Botany Department is unique in Utah and one of the few strong Botany Departments in the nation. Dr. Bozniak frequently comments that Weber State's Botany Department is the sixth largest in the nation, but this claim gains even more significance when it is realized that Weber State University, unlike the other institutions with botany departments, has no graduate program. The department offers a solid undergraduate education in basic botany. Track A and B are distinct and prepare students with the knowledge and skills appropriate to the botany employment outlooks in Utah. The review committee recognizes the importance of not only maintaining this unique program, but seeing it develop and grow in the future.

3) The Department is highly efficient with very limited resources. Much of the material for class labs is grown in-house or collected in the area. Only those plants not easily grown or collected are purchased for class labs. We note that there is no botanical garden on campus, but that several students independently suggested the space south of the Science Building as a suitable site.

The herbarium at Weber State University is superbly curated and represents well the flora of northern Utah. It was pleasing to the visiting committee to note that the herbarium is contiguous to laboratory areas and the student lounge, facilitating easy exploration of plant diversity by students.

4) This is a student-friendly department. All of the Botany majors love this department. They feel that the faculty are personally invested in their intellectual development and that the interaction of the faculty and students feels like that of an extended family. They appreciate that classes are scheduled to not conflict with other classes in the department and required classes in supporting departments. Most students felt the portfolio was a significant investment of time and effort but was worthwhile.

#### *Challenges for Botany Department*

1) Department visibility and marketing to high school students and general education students at the university continues to be a challenge. Lack of visibility negatively impacts department SCHs and the number of majors. This is not unique to the Botany Department at Weber State University, but is part of a national trend in plant biology departments. Students just do not know what botany is and what kinds of career opportunities are available to botany majors.

We note that Weber State University as a whole is doing relatively well compared to other Utah institutions in recruiting and mentoring Native Americans, Pacific islanders, and African Americans who compose 8 percent of the student body. Notably absent, however, are Latin American students and those of Hispanic descent. It is in these students' interests and the interests of the State of Utah to find ways to encourage Hispanic students in the state to pursue higher education. We believe that Weber State University, which is surrounded by one of the largest and most vibrant Hispanic cultures in Utah, is ideally situated to explore new ways of mentoring and recruiting Hispanic

students. Given the prominence of herbal medicine and plants in general in Hispanic cultures, we believe that the WSU Botany Department may play a key role in addressing the imbalance of Hispanic students in Utah's institutions of higher education.

2) The Botany Department has done an effective job of cobbling together equipment from various sources to develop effective teaching labs. However, the need for new teaching equipment outpaces resources. This is particularly true in the area of equipment for currently applied molecular biology and molecular genetics techniques. In addition, as the university moves toward increased research expectations of faculty, then additional resources will be required to obtain and maintain research quality equipment. The department has also reached limits in terms of space, particularly in terms of laboratory, greenhouse and herbarium space. While the Botany Department has done a good job of maintaining current laboratory resources, more space and equipment are desperately needed.

3) The current semester schedule is a challenge for integrating field aspects of the taxonomy, ecology, and field botany courses. The spring semester is ending just as plants are beginning to flower in Utah.

4) The Department receives inadequate support from Facilities Management and Technology Support. This failure negatively impacts the ability of the faculty to teach students. Since this is the primary mission of the university, this problem is especially glaring. The Department also receives inadequate post-award support from the Office of Sponsored Programs. Faculty need assistance in accounting for grant expenses and disbursements.

5) The Department currently has one-half of a full-time secretary. The other half of her position is in the Microbiology Department. When the secretary is not in the Botany Office, the Department Chair becomes the first point of contact for students and visitors. This is an inefficient use of resources since the Chair is often interrupted in his work for relatively mundane problems that could easily be handled by the secretary.

6) Although some faculty have maintained strong research programs, in general faculty research has waned over the last decade. With current course loads and other duties there is little time for research, grant writing, or growth of the herbarium. This can have a negative impact on mentoring undergraduate students.

### *Recommendations for Change*

1) The Department should consider methods to make its general education courses more competitive in the SCH market. Assuming that NUTR LS1020 is going to continue to be a GE course, then Botany will need to compete for students in the life science area. The Department should consider offering the Environment Appreciation and Plant in Human Affairs courses in formats that are appealing to students, such as on-line or hybrid courses. Currently the department offers Environment Appreciation at one high school in

concurrent registration. An effort should be made to seek or develop additional high school biology teachers capable of delivering this course.

Other potential areas for increasing enrollment would be to seek an integrative M.S. degree in Criminal Justice or an M.S. in Ethnobotany. The Botany Department could contribute the forensic botany portion of a professional M.S. degree in forensic science. The professional M.S. degree in Ethnobotany would require a new position, which could potentially be funded by the plant-based medicine industry in Utah. Both degrees would be almost unique and increase the profile of and enrollment in the Department of Botany.

2) The Department does an excellent job teaching basic botany but needs to update its curriculum with current cellular and molecular techniques. These techniques have thoroughly penetrated plant science and are tools used by even the most field-oriented taxonomists and ecologists. A position with some dedicated research time that would drive the department into the future should be considered as a replacement for Dr. Bozniak when he retires next year.

Although we are loathe to increase the already staggering load of undergraduate courses offered by the department, we wonder if a team-taught introductory course in biology shared by the Departments of Botany, Microbiology, and Zoology might be a useful way to allow entering undergraduates to determine their own personal interests in biology. Perhaps this course could replace one of the current introductory courses for majors. Furthermore, we are concerned that no single course in the WSU natural sciences focuses specifically on evolution. Although we are aware that societal resistance exists for the teaching of evolution, we note that Utah as a whole is far more progressive on this issue than say, Kansas or Florida, and that successful courses in evolution are currently taught at the University of Utah and Brigham Young University. As Theodius Dobzhansky said, "nothing in biology makes sense except in the light of evolution." We suggest that a senior level course team-taught by lecturers from Zoology, Geology, and Botany be offered in evolution.

3) The Department should take advantage of Lisa Largent, the superb development person assigned to the College of Science. We suggest that the Department hold a bimonthly lunch with Lisa and the faculty in which lists of potential donors, possible approaches, and evaluation of successful proposals be considered on an ongoing basis. The review team sees the potential for endowed positions and external support in the areas of plant-based medicine and forensic botany. The Department should develop a development needs list in consultation with the College administration and work with the development office to meet these needs. Individual professors and even students could meet with potential donors and prosperous alumni. We challenge the Botany Department to start bringing in at least \$500,000 annually from private individuals within five years. Such resources can greatly increase the visibility of Botany within WSU, and provide needed equipment and increased faculty resources, and can provide crucial linkages for undergraduates who seek to pursue careers in plant sciences. We also challenge the Botany Department to seek external funds to endow an additional FTE in plant medicine.

4) The Department should find methods to channel the energy of Botany Club to increase department visibility and as a student recruiting tool. This could be through the development of on-campus gardens or off-campus presentations to elementary, junior high, high school and community groups. Perhaps the Botany Club could offer small prizes for science fair projects in botany, with students serving as judges. We also think that the Botany Club might sponsor weekend field trips for plant collection and even longer expeditions to tropical areas. The Kampong, a garden in Coconut Grove, Florida, administered by the National Tropical Botanical Garden, has dormitories, laboratory space, and a superb living collection for students with faculty supervision.

5) Students seem anxious for more field experiences and the department may have to continue to experiment with summer field courses that will more closely fit student needs.

#### *Additional Recommendations*

1) The Department needs college or university support for marketing its program to potential majors and the community. The faculty are excellent teachers and scholars but they are not experts in recruiting, marketing, and development. This could be achieved by hiring a COS recruitment person, which perhaps could be an enthusiastic retired person, recent graduate, or homemaker. Either a volunteer or a paid employee would help advance marketing and recruitment for the department. Although initially filling a staff position seems like sacrificing a faculty position (which could be obviated if the position were funded by a grant from a local nutraceutical company), growing the college of science enrollments would in the long run increase the number of faculty, potentially for all departments. The COS should also develop a 50 minute DVD of COS programs (including all departments) that could be distributed to all schools, appropriate for 8<sup>th</sup>-12<sup>th</sup> grades. Done well, this could excite students about both education and careers in sciences, and they could find out what Botany actually is about!

2) The Department needs better support from the academic support services on campus. The primary mission of the university is compromised when the faculty are not supported with adequate facilities and technology to do their jobs. This is particularly true for computer technology, powerpoint projection, and other audio visual support for undergraduate lectures. We note that the College of Education has a full-time technical person to ensure that audio visual needs of professors are fully met. The current system is not working and in effect wastes precious student and faculty time and adversely impacts student learning when projectors don't work, screens fail to descend, bulbs blow in projectors, etc. It would be more effective to have in-house support to accomplish this goal unless significant changes are made in the current way Facilities Management and Technology Support are operated.

3) Faculty with external grant-funded research projects should receive support for purchasing, bookkeeping, and other administrative grant activities. This is expected for government grants in which an overhead fee is paid by the government to WSU. If these

fees are insufficient, then WSU should renegotiate the overhead rate with NSF, NIH, DOE, USDA, and other government agencies. The visiting committee finds that the current low-level of support offered by WSU to researchers is negatively impacting faculty incentives to apply for and obtain external funding and is negatively impacting the undergraduate mission of WSU.

4) The department secretary position should be changed from half-time to full-time which would free considerable time for the chair. It is poor use of WSU resources for the Chairman to perform tasks which could be more efficiently and better performed by a full-time secretary.

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