

2009-10 ANNUAL REPORT
DEPARTMENT OF BIOLOGICAL SCIENCES
August 11, 2010

PART 1: EXECUTIVE SUMMARY

Learning: Undergraduate

The long-term increase in the number of Biological Sciences majors continued in 2009; the total number of majors has risen by 45% since 2002. Coupled with faculty retirements and no faculty hiring, this trend continues to place pressures on meeting teaching and advising needs. In light of these pressures, we have initiated changes in the curriculum and in the structure of advising, but additional changes will be needed to ensure a quality education for our majors. Despite the pressures, many Biological Sciences majors continue to earn academic honors and awards.

Learning: Graduate

The graduate program remains diverse and vibrant. This year we initiated an electronic filing and review system for all new students, prepared the accelerated BS/MS degree program, updated some policy issues, reviewed 121 applicants, and will admit 13 new students in fall 2011. The ratio of PhD to MS students remained about 5.5, and the total number of students increased slightly. A new graduate director was appointed for the department. Several students who rotated in interdisciplinary graduate programs entered the Department of Biological Sciences at the end of their rotation. Graduate student research was highlighted during the Department's 7th Annual Research Day. Many graduate students in Biological Sciences were awarded fellowships or honors from national programs, Virginia Tech, and the College of Science.

Discovery

The faculty in Biological Sciences has continued a very strong and vibrant program of discovery. Publications and presentations have remained relatively steady with respect to recent years. Efforts to obtain research funding have increased in recent years and have been met with great success. Research in the department is becoming increasingly collaborative and interdisciplinary in all biological science fields. New technologies, particularly in protein science and genomics, are permeating all levels of biological research from nanoscales to whole ecosystems.

Engagement

In 2009-10, faculty and staff in Biological Sciences provided substantial leadership, service, and outreach for the profession, university, and public. Highlights include a new nature center in the Town of Blacksburg, sustained international leadership roles in systems and conservation biology, and high visibility in providing leadership for university policies and procedures.

Diversity

Activities to build sensitivity and mutual respect while continuing to nurture a sense of community included diversity-related activities built into faculty meetings, an annual international luncheon, and a new discussion venue for learning about transitions that foreign graduate students face when starting their graduate programs at Virginia Tech. Efforts continued to enhance recruitment and training of undergraduate and graduate students from underrepresented groups. The Department's diversity committee continued its lead role in facilitating progress.

Honors and Awards

Honors and awards were presented to Biological Sciences faculty, staff, and students. The accolades reflect the high quality and impact of the department's teaching, research, and outreach missions.

Staffing and Facilities

In response to recent budget reductions, the department permitted a small decline in the number of tenure track faculty via attrition, sustained the number of staff graduate student positions, and took a major cut in funds used to support basic departmental operations. After moving nearly half of the department's research and teaching into new buildings, Derring Hall has become a higher priority for facilities enhancements.

Goals for 2010-11

As the 2009-10 academic year was winding down, the Department Head announced that he was accepting a new position at West Virginia University. New major goals for the coming year and beyond will be set after the new leadership is in place in summer 2010. Short-term goals include follow through on faculty hiring initiated in spring 2010, the continued search for new funding sources needed to sustain normal departmental operations, and continued efforts to better align teaching resources with the growing numbers of undergraduate students.

PART 2: ACADEMIC ACCOMPLISHMENTS

I. Learning

A. Undergraduate programs

The long-term increase in the number of Biological Sciences majors continued in 2009; the total number of majors has risen by 45% since 2002. Coupled with faculty retirements and no faculty hiring, this trend continues to place pressures on meeting teaching and advising needs. In light of these pressures, we have initiated changes in the curriculum and in the structure of advising, but additional changes will be needed to ensure a quality education for our majors. Despite the pressures, many Biological Sciences majors continue to earn academic honors and awards.

- Undergraduate enrollment in the Biological Sciences major has increased substantially since 2002. Coupled with a decrease in faculty, this increase places direct pressure on teaching and advising loads and, hence, time commitment of faculty and staff, which in turn limits the quality of teaching and advising as well as the discovery efforts of research-active faculty.
- In addition to 1554 majors in fall 2009, 227 students were enrolled as Biological Sciences minors; each of these is equivalent to approximately one half of a major (measured by hours of biological sciences courses required). If the latter are counted as 113 additional students, then the total enrollment impact in fall 2009 was equivalent to 1667 full-time students.

| | Fall 02 | Fall 03 | Fall 04 | Fall 05 | Fall 06 | Fall 07 | Fall 08 | Fall 09 |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Primary Majors | 1049 | 1217 | 1297 | 1295 | 1312 | 1366 | 1453 | 1498 |
| Secondary Majors | 24 | 43 | 73 | 58 | 65 | 59 | 51 | 56 |
| Total | 1073 | 1260 | 1370 | 1353 | 1377 | 1425 | 1504 | 1554 |

- In academic year 2009-10, 351 students graduated (up from 288 last year and 318 in 2007-08). This increase is likely due to the greater numbers of majors. Many graduates achieved honors, as shown in the following table.

| | Dec 2009 | May 2010 | Total |
|------------------------------|----------|----------|-------|
| Total graduates | 52 | 299 | 351 |
| Magna cum laude | 6 | 50 | 56 |
| Summa cum laude | 5 | 25 | 30 |
| Cum laude | 9 | 47 | 56 |
| Commonwealth scholars | 0 | 11 | 11 |
| In honors | 0 | 1 | 1 |
| Health scholars | 0 | 10 | 10 |
| Honors scholars | 1 | 11 | 12 |
| Honors baccalaureate | 0 | 0 | 0 |

- Virginia Tech Institutional Research, using its Teaching Load Data Sources, reported that total credit hour delivery (measured by all courses with the BIOL prefix) in calendar year 2009 (36,884) increased compared to calendar year 2008 (35,061 hours) and was almost 10% greater than the calendar year 2007 total. Small differences in these estimates occur depending on data sources used.
- Many faculty attended training sessions or workshops to build teaching skills. In calendar year 2009, 20 faculty attended a total of 57 teacher training sessions or workshops (many related to the transition to Scholar).

- **Dr. Art Buikema, Catherine Webb, Chiquita Thomas, and Sharon Sible** designed and implemented revised laboratory exercises to upgrade the freshman biology laboratory course. Students in spring 2010 participated in “design your own experiment,” which enabled them to become more involved in the subject and therefore learn and retain more information. Assessment of this new approach is underway.
- The department continued to add to its portfolio of online classes. In addition to online versions of the BIOL 1105 and 1106 (Principles of Biology) lecture courses, which have now each been offered twice, with continued development by **Dr. Mike Rosenzweig**, two sophomore level courses are in development for Summer II 2010. **Drs. Rich Walker** and **Art Buikema** each received a \$10,000 grant from the Virginia Tech’s Institute for Distance and Distributed Learning to develop BIOL 2104 (Cell and Molecular Biology) and BIOL 2804 (Ecology), respectively, for Summer II.
- According to student perception of teaching (SPOT) assessment, the department had a high level of quality, similar to that observed in the past several years. In fall 2009 and spring 2010 semesters, 51 lecture and upper division (junior and senior) laboratory classes were rated by students, with a mean overall SPOT score of 3.6, which lies between “good” and “excellent.” In the same semesters, of 151 lower division (freshman and sophomore) laboratories offered by the department, taught by graduate students, and evaluated by undergraduate students, the mean overall SPOT score was 3.4.
- The Academic Assessment Committee continued administration of an online assessment test for graduating seniors and incoming freshman Biological Sciences majors. Questions focused on the following areas: Scientific Method, Data Analysis, Genetics, Cell Biology, Evolutionary Biology, and Ecology. Ongoing analysis reveals that seniors score significantly better than freshman in the four content areas, but the two groups are statistically indistinguishable for the Scientific Method and Data Analysis portions. The Committee plans to revise these sections of the test to clarify whether gains are being made in these areas. In addition, the Committee will consider other learning objectives, particularly those associated with science skills, which should be added to the current list. **Dr. Ann Stevens** presented an invited poster describing the Committee’s work at the AAAS and NSF sponsored Transforming Undergraduate Education in Biology: Mobilizing the Community for Change Conference in July 2009.
- Undergraduate advising activities remained extensive in academic year 2009-10. Most academic advising and a large proportion of career advising were provided by the Department’s Center for Academic Advising, which is supported by the full-time efforts of two classified staff and one non-tenure track faculty member and the part-time efforts of one tenure track faculty member. In addition to routine advising, the Center focused on improving flow of information to our majors and departments who require Biological Sciences courses.
- Over the last decade, significant advising responsibility shifted toward Advising Center personnel and select faculty. As student numbers have increased and faculty with assigned advising duties have taken on other responsibilities, retired, or announced plans to retire in the near future, it has been necessary to modify the current advising model. To better balance advising loads and to help integrate faculty, many of whom have never participated in undergraduate advising, into the curriculum, modest numbers of advisees will be assigned to most faculty in the department in fall 2010. The Advising Center will provide support for all academic advising in the department and will work with those students who require additional assistance.
- Biological Sciences continued to lead the Biological and Life Sciences Learning Community (BLSC), which included 40 students in academic year 2009-10. During this time frame, **Dr. Jack Evans** organized this successful residential learning community for students to develop a sense of community and a focus on academics.
- The Department continued its unique freshman advising program in which 12 faculty and staff advisors help students deal with the transition to college life during fall semester, but this approach will be extended in fall 2010. **Dr. Bob Jones** and **Dr. Jack Evans**, along with Dr. Susan Sumner

in CALS, proposed a first-year Life Sciences Foundations course in response to a call from the Provost's Office for QEP First-Year Experiences. This course is an expansion of the successful Biological Sciences Freshman Seminar class that Dr. Evans has run for many years and will run as a two-semester course for BIOL, FST, LFSC and interested US freshman. The emphasis will be on transition to college and student success, as well as identification of the appropriate major within life sciences at Virginia Tech.

- In order to increase the courses available to our majors, a revised version of the 2012 major check sheet added several non-BIOL life science courses that could count as Biological Sciences elective credit. Up to 9 credits of these courses may be used toward major elective credit, and no more than one of the two required upper level lab courses may come from these non-BIOL courses. As with the cross-listed courses, this shift means the department is increasingly reliant on other departments to teach our majors.
- To help ensure majors are adequately prepared for upper division courses and to improve educational quality by limiting student-to-faculty ratio, a progress-to-degree requirement of a minimum grade of "C" or better in freshman chemistry (CHEM 1035 and 1036 or equivalent) was implemented for students entering the department in fall 2010 and thereafter.
- As another approach to improving educational quality by limiting student-to-faculty ratio, the department requested discontinuation of the Biological Sciences Minor since these students represent a significant demand on available seats, particularly in upper level laboratory classes, and because many students (85% of the 265 minors enrolled as of February 2010) are life science majors or are in majors that consist of multiple minors and are completing our Minor out of convenience. This plan was tabled at the request of the Provost's Office, but a one-year suspension of new enrollment in the minor was granted as the department considered revision of the minor requirements and overall curriculum.
- In the departmental exit survey of seniors graduating in May/summer 2010, when students were asked to identify "one thing" they would change about their experience as a Biological Sciences major, 35% of the 165 responses listed needing more and/or smaller classes and 16% listed needing more hands-on or research experiences. Of the 10 most common responses, 7 fell into one of these two categories. This feedback suggests that it will be increasingly difficult to provide a quality science education as our student-to-faculty ratio approaches 50:1.
- An ad hoc faculty group began meeting in spring 2010 to discuss revision of the undergraduate curriculum. Several reasons for considering curriculum revision at this time include:
 - The current curriculum was instituted ~14 years ago.
 - The number of our majors and many other life science majors continue to increase without corresponding increase in faculty hires.
 - The expertise of the faculty has changed (hires, retirements, increased interdisciplinary training/collaborations).
 - We are reliant on faculty in other departments to teach many upper division labs, and several of our current labs are taught by faculty nearing retirement and/or support students in other departments.
 - The university is expecting increasingly sophisticated and effective assessment.
 - There is increasing use and apparent success of online instruction.
 - There is increased emphasis on and evidence for success of pedagogical approaches to science education (e.g., active learning techniques).
 - There is potential for resource improvement (e.g., lab fees, enrollment support of 1000/2000 classes).
 - The department wishes to ensure a quality education for its students.

- One area of concern in our curriculum is the status and future of upper level courses and in particular, upper level laboratory courses. The last new upper level laboratory course was added in 2000 and, since that time, we have lost (or have no faculty available to teach) 9 upper level laboratory classes. Further, of the upper level lab courses currently offered, one-third are cross-listed and are offered by a faculty member outside of Biological Sciences.
- Despite the challenges we face, our upper-tier students continue to be successful. Participation in the University Honors Program provides an indicator of the quality of Biological Science majors. In-house fall 2009 data from the Honor's program show:
 - 8.4% of all Biological Sciences majors (131 out of 1554) were enrolled in the University Honors program.
 - Out of the University's 1455 Honors Students, 9.0% (131) were Biological Sciences majors.
- Undergraduate research provides a capstone experience for many Virginia Tech students, but unfortunately is still limited to a small fraction of our majors.
 - In calendar year 2009, 181 majors carried out research for credit and faculty provided research mentoring for 110 undergraduate students (down from 130 in calendar year 2008).
 - In **Dr. Daniela Cimini's** lab, senior **Isaac Nardi** co-authored two peer-reviewed papers published in 2009, both of which appeared in high-impact journals (*PLoS ONE* and *PNAS*). Mr. Nardi was also awarded a highly competitive ACC Research Fellowship.
 - **Ms. Brittany Gianetti**, an undergraduate researcher in **Dr. Steve Melville's** laboratory, was awarded the nationally prestigious Barry M. Goldwater Scholarship in spring 2010.
 - Undergraduate researchers in the department were supported by a range of stipend and supply funding sources, including NSF-REU, MAOP, VT-PREP, VT-SURF, Sigma Xi, and the ACC.
 - The department continued to offer funding for undergraduate research through a biannual application and review process. A committee chaired by **Dr. Brent Opell** awarded \$1,000 each to four student-generated proposals. The number of proposals remains relatively small compared to the number of students conducting undergraduate research, and the committee will seek ways to increase the number of proposals.

B. Graduate education and postdoc training programs

The graduate program remains diverse and vibrant. This year we initiated an electronic filing and review system for all new students, prepared the accelerated BS/MS degree program, updated some policy issues, reviewed 121 applicants, and will admit 13 new students in fall 2011. The ratio of PhD to MS students remained about 5.5, and the total number of students increased slightly. A new graduate director was appointed for the department. Several students who rotated in interdisciplinary graduate programs entered the Department of Biological Sciences at the end of their rotation. Graduate student research was highlighted during the Department's 7th Annual Research Day. Many graduate students in Biological Sciences were awarded fellowships or honors from national programs, Virginia Tech, and the College of Science.

- Several important changes in graduate program management were made this year. A new graduate director, **Dr. Erik Nilsen**, was appointed. The department initiated the use of an ePortfolio system for student files and student review by our graduate review committee. The requirement for seminars in Biological Sciences was made more flexible to include seminars from other departments of interdepartmental groups. A new policy for the BS/MS degree option was designed. A scholar-gmail web link was used exclusively for managing the graduate selection process.
- The number of graduate students increased marginally in 2009-10 compared to that of 2008-09. The total number of graduate students seeking degrees in Biological Sciences stood at 84 in spring 2010 (see Table below).

- Four Biological Sciences faculty supervised a total of five PhD students in the Genetics, Bioinformatics and Computational Biology graduate degree program, plus two students in Computer Science, one in Psychology, and one in Chemistry, for a total of 93 full-time graduate students across four majors.
- The number of PhD students in the Biological Sciences degree program increased, and the ratio of PhD students to MS students remained relatively similar to last year (see Table below).
- The funds expended for Biological Sciences stipends were \$1,761,380 in 2009-10, which was an increase of \$93,847 (5.6%) over the previous year (see Table below).
- Graduate stipend funding increased dramatically in the GRA category (funded directly from research grants), increased slightly in the GTA category (helping to cover the large laboratory instruction need), and decreased in the fellowship category.
- The number of postdocs (15) decreased this year compared to the past few years; however, we currently have 6 searches ongoing for postdoctoral fellows, and we anticipate a higher number of postdoctoral fellows next year.
- The 7th Annual Biological Sciences Research Day was held on Saturday, February 20, 2010, in Torgersen Hall.
 - The event was co-organized by graduate students **Beth Cheever, Justin Tanner,** and **William Silkworth** and by faculty members **Dr. Birgit Scharf** (lead organizer), **Maurice Valett, Stephen Melville,** and **Roderick Jensen.**
 - Research day included 4 invited talks by current select graduate students, 35 posters by current graduate students, and an invited plenary talk delivered by **Dr. Paul Hoffmann,** who is currently professor of Medicine and Microbiology at the University of Virginia. Dr. Hoffmann obtained his PhD from the Virginia Tech in 1977 under the guidance of **Dr. Noel Kreig.** He discussed his career path and reflected on his research and the current field of antimicrobial compound development.
 - An abstract book was published on the web, and over 125 people attended the meeting, including several from the Biological Sciences Alumni Advisory Board.
 - Also in attendance were nine graduate student prospects for the Biological Sciences degree program; eight were subsequently offered positions and three accepted their offer.
- Department faculty and graduate students participated in or led the organization of two major university seminar series: the Molecular and Cell Biology and Biotechnology series (MCBB) and the Ecology Evolution and Behavior (EEB) series. **Dr. Dana Hawley** chaired the EEB seminar series committee. Weekly seminars were also held by the Microbiology faculty and graduate students (fall semester) and Cell and Developmental Biology faculty and graduate students (spring semester).
- The Department entered the seventh year of supporting the “preparing the future professoriate” project in which graduate students develop skills other than research (e.g., teaching and service) useful for their professional careers. In fall 2009, **Sunny Crawley,** a senior PhD student working with **Dr. Khidir Hilu** and a participant in this project, taught two weeks of Principles of Biology lecture course (BIOL 1105) as part of her preparation for a career in science research and education.

Summary of graduate student enrollment, types of graduate support, graduate stipend payroll, and number of postdocs for FY 2003 through FY 2009.

| | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 |
|------------------------------------------|-------------|-------------|-------------|-------------|-----------------|-----------------|
| PhD students enrolled ¹ | 37 | 46 | 52 | 65 | 69 ⁵ | 71 ⁵ |
| MS students enrolled ¹ | 40 | 26 | 21 | 15 | 12 | 13 |
| Total students enrolled ¹ | 77 | 72 | 73 | 80 | 81 | 84 |
| PhD/MS ratio ¹ | 0.93 | 1.77 | 2.48 | 4.33 | 5.75 | 5.46 |
| | | | | | | |
| Fellowships/training grants ⁴ | | | 13 | 19 | 17 | 17 |
| Funded GRAs ^{1,2} | 27 | 32 | 17 | 24 | 17 | 35 |
| Funded GTAs ^{1,2} | 46.7 | 39 | 41 | 37 | 46 | 46 |
| Active students not funded | | | 2 | 1 | 1 | 5 |
| (GRA+fellow)/GTA ratio ^{1,2} | 0.58 | 0.82 | 0.76 | 1.16 | 1.35 | 1.24 |
| | | | | | | |
| Fellowship payroll ^{3,4} | | | \$231,133 | \$372,438 | \$419,105 | \$306,319 |
| GRA stipend payroll ³ | \$571,061 | \$614,801 | \$413,812 | \$643,863 | \$510,227 | \$690,005 |
| GTA stipend payroll ³ | \$583,192 | \$528,485 | \$567,415 | \$617,790 | \$738,201 | \$765,056 |
| Total Payroll | \$1,154,253 | \$1,143,286 | \$1,212,360 | \$1,634,091 | \$1,667,533 | \$1,761,380 |
| | | | | | | |
| Full-time postdocs ¹ | 10 | 17 | 25 | 25 | 21 | 15 |

¹ Snapshot taken in spring of academic year; roughly half of postdoctoral fellows are funded outside of Department accounting codes.

² Includes a small number of students from other life science departments occasionally funded to meet critical teaching on short notice.

³ Stipend data are for a 12-month basis, August 10 through August 9.

⁴ Fellowships include the “PhD 2010,” Cunningham, Maly, Paterson, Cairns, Fralin Life Sciences Institute, ICTAS Doctoral Fellowships, all GRA support from VBI for Biological Sciences students, various minority fellowships, and training grants.

⁵ There were also ten PhD students advised by Biological Sciences faculty who are in the Genetics, Bioinformatics and Computational Biology Major, two in the Computer Science Major, one in the Psychology major, and one in the Chemistry major. The actual total of PhDs advised is 71+14=85.

- The number of Biological Sciences graduate degrees conferred in 2008-2009 (13 total) was characteristic for most years (see Table below), but fewer MS degrees were awarded than most years because many MS students finished last year and the ratio of PhD to MS students has increased. We anticipate an increase in PhD graduates in future years due to our recent (last three years) increase in the ratio of students pursuing PhD verses MS degrees.

Number of Graduate Degrees in Biological Sciences Awarded

| Degree | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 |
|--------|---------|---------|---------|---------|---------|---------|---------|
| MS | 7 | 9 | 8 | 10 | 7 | 11 | 4 |
| PhD | 5 | 8 | 8 | 4 | 3 | 10 | 9 |

- The quantity of all graduate recruits has not changed appreciably in recent years in terms of number of applicants, percent accepted, and percent accepted who chose to enroll (see Table below). However, a trend continues toward more PhD and fewer MS recruits.

- The quality of recruits has also remained very stable as indicated by GRE and GPA scores of students enrolled in regular status (see following Table).

Graduate student recruitment into Biological Sciences major (includes CDB students in 2007-08 and 2008-09; does not include small numbers of transfers from other recruitment programs)

| Class ¹ | No. Applicants | % Accepted | % of Accepted Enrolled | # Enrolled | GRE Verbal ² | GRE Quantitative ² | GRE Total ² | GPA ² |
|--------------------|----------------|------------|------------------------|------------|-------------------------|-------------------------------|------------------------|------------------|
| 1991 | 125 | 46 | 14 | 8 | 530 | 650 | 1180 | 3.1 |
| 1992 | 114 | 26 | 11 | 3 | 566 | 654 | 1220 | 3.5 |
| 1993 | 99 | 32 | 22 | 7 | 539 | 640 | 1179 | 3.5 |
| 1994 | 108 | 56 | 66 | 40 | 550 | 605 | 1155 | 3.45 |
| 1995 | 154 | 28 | 72 | 31 | 582 | 626 | 1208 | 3.59 |
| 1996 | 121 | 24 | 59 | 17 | 591 | 670 | 1261 | 3.66 |
| 1997 | 113 | 25 | 68 | 19 | 517 | 601 | 1118 | 3.43 |
| 1998 | 93 | 31 | 69 | 20 | 502 | 635 | 1137 | 3.68 |
| 1999 | 102 | 25 | 54 | 14 | 538 | 636 | 1164 | 3.43 |
| 2000 | 98 | 33 | 73 | 24 | 540 | 637 | 1177 | 3.46 |
| 2001 | 93 | 32 | 90 | 27 | 505 | 639 | 1144 | 3.52 |
| 2002 | 115 | 25 | 59 | 17 | 522 | 671 | 1193 | 3.39 |
| 2003 | 113 | 31 | 69 | 24 | 490 | 625 | 1115 | 3.42 |
| 2004 | 79 | 20 | 80 | 13 | 547 | 652 | 1199 | 3.50 |
| 2005 | 105 | 20 | 76 | 16 | 540 | 634 | 1174 | 3.65 |
| 2006 | 115 | 29 | 79 | 26 | 544 | 641 | 1185 | N/A ³ |
| 2007 | 94 | 28 | 69 | 18 | 445 | 681 | 1126 | 3.26 |
| 2008 | 120 | 23 | 59 | 16 | 529 | 664 | 1193 | 3.50 |
| 2009 | 135 | 17 | 65 | 15 | 529 | 661 | 1190 | 3.59 |
| 2010 | 121 | 21 | 62 | 13 | 473 | 684 | 1157 | 3.6 |
| Mean | 111 | 28 | 61 | 18 | 529 | 645 | 1174 | 3.5 |

¹ Students applying for spring and fall semester of indicated year.

² Calculated for students entering in regular status; GPA is for latest degree (undergraduate or MS) for domestic students; GRE is for both domestic and international students.

³ Data on GPA are not available for this year.

- Biological Sciences faculty maintained leadership in four university-wide graduate recruiting programs.
 - The Interdepartmental Microbiology Graduate Program (IMGP) was initiated in 2003 and includes over 40 faculty participants from across the university. Over its first five years, the program has recruited 25 students. Of these, 5 have left without degree, 3 completed MS degrees, and 17 PhDs are in progress with some of them finishing soon. Six more new students arrived in August 2009. New recruits spend their first semester rotating through laboratories before the decision is made on a major advisor. This year three PhD students who entered the IMGP entered the Department of Biological Sciences after their rotation. For more details about the IMGP, see http://www.biol.vt.edu/vtmicro/g_study.html
 - The Graduate Program in Molecular Plant Sciences (MPS) was initiated in 2005 with 20 participating faculty from 7 Departments (2 in Biological Sciences). This coming year marks the fifth year of an aggressive recruiting effort at regional schools, followed by students rotating through labs before a decision is made on a major advisor. Over the 5 years, 27 students have been accepted into the program. Four have moved into the Biological Sciences degree program after an initial academic year of common MPS experiences. For details, see <http://www.molplantsci.org.vt.edu/INDEX.HTM>

- The Graduate Program in Cell and Developmental Biology (CDB) was initiated in academic year 2007, and now includes 11 participating faculty in the department of Biological Sciences. In its first 3 years (fall 2007 - fall 2009), 15 students have been recruited; 14 are currently active. Following the model of the Microbiology program, students in the CDB rotate among faculty mentors before being accepted into a particular lab. For details, see <http://www.biol.vt.edu/research/cdb/index.html>
- The graduate Program in Genetics, Bioinformatics & Computational Biology was established in 2003 as a campus-wide PhD granting degree program housed in the Graduate School (see http://www.grads.vt.edu/academics/programs/gbcb/phd_gbcb.html). In 2009, faculty in Biological Sciences served as major advisors of 30% (13/44) of all students enrolled in the program.

II. Discovery

The faculty in Biological Sciences has continued a very strong and vibrant program of discovery. Publications and presentations have remained relatively steady with respect to recent years. Efforts to obtain research funding have increased in recent years and have been met with great success. Research in the department is becoming increasingly collaborative and interdisciplinary in all biological science fields. New technologies, particularly in protein science and genomics, are permeating all levels of biological research from nanoscales to whole ecosystems.

Summary of research outputs for the departmental faculty (37-42 FTE research and teaching faculty) for calendar years 2002–2009

| Indicator of research/scholarship activity | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Books, book chapters, and journal articles in print or press (calendar year) | 132 | 146 | 187 | 161 | 171 | 171 | NA |
| Presentations at professional meetings and conferences (calendar year) | 103 | 129 | 132 | 137 | 96 | 101 | NA |
| Invited seminars (calendar year) | 26 | 51 | 58 | 64 | 64 | 54 | NA |
| Total overhead generated from contracts and grants [source Banner] (fiscal year) | 555,625 | 740,544 | 1,009,565 | 980,837 | 1,065,301 | 1,087,818 | 869,742 |
| Research expenditures [source 2004-05 institutional research; source 2006-09 COS derived from Banner Hyperion-Credit-Total] (fiscal year) | 3,207,553 | 3,709,643 | 4,488,415 | 4,574,818 | 4,907,291 | 4,938,095 | 4,784,830 |
| New research awards [source COS derived from Banner Hyperion-Credit-Total] (fiscal year) | 3,505,070 | 4,444,148 | 4,786,651 | 4,285,511 | 5,233,039 | 4,644,845 | 7,086,550 |

Notes: numbers in this table do not include any double counting; in cases where more than one Biological Sciences faculty member is an author or Co-PI, data are only counted once. Data from Banner sources are subject to retroactive adjustments; therefore, some numbers in this report do not match perfectly with numbers listed in previous annual reports.

Other significant contributions and accomplishments that reflect the high level of scholarship in the faculty include:

- In calendar year 2009, 23 individual faculty members were invited to present their research at other institutions, and 5 faculty members applied, or were approved for, a total of 5 patents.
- **Dr. Dorothea Tholl** received a \$538,000 NSF grant to study the organization of terpene specialized metabolism in plant roots.
- **Dr. John (Jeb) Barrett** is PI for an NSF grant to study The Role of Snow Patches on the Spatial Distribution of Soil Microbial Communities and Biogeochemical Cycling in the Antarctic Dry Valley. The total grant award is \$825,422, and the Virginia Tech share is \$244,066.
- **Dr. Lisa Belden** has a new NSF funded collaborative research project titled Community Composition and Disease Risk in a Multihost-parasite System. The Virginia Tech portion of this award is \$375,299.
- **Dr. Christopher Lawrence** received two new NSF research grants in 2009. One focuses on how oomycete and fungal effectors enter host cells. Dr. Lawrence is co-PI and is receiving \$70,000. The other, for which Lawrence is PI, is titled “Estimating Speciation/Reticulation Boundaries In Asexual Alternaria: A Genomics Approach,” with a total award of \$990,000.
- **Dr. Zhaomin Yang** successfully organized the 36th International Conference on the Biology of Myxobacteria held from 7/5-7/8/2009 in Boston, MA.

- **Dr. Anne McNabb** was the 2009 speaker in the Distinguished Professor Lectureship Series of the Health Sciences Graduate Students' Association at the University of Manitoba in Winnipeg during the orientation week for the campus in September. She presented two seminars on Avian Thyroid Disruption by Environmental Contaminants at the Medical School on the Ballantyne Campus and in the Biology Department at the Fort Gary Campus.
- **Dr. Rick Jensen** was co-PI on a major NIH project to conduct genomic analyses in support of a UVA-led project titled "Capture-Sequence Analysis of Genomic Regions Associated with Diabetes." Funding to Jensen's lab was \$879,365. He was also a co-PI on an NIH grant to VT titled "MicroRNA Mediated Regulation of Body Weight" with PI Deborah Good and co-PI Rich Helm; total award is \$594,466.
- **Dr. Dana Hawley** is corresponding author for a publication coming out in 2010 that was featured in Nature's News and Views ("Ill wind for finches" *Nature* 463:888). The full citation is *Bouwman, K.M. and Hawley, D.M*. 2010. Sickness behavior acting as an evolutionary trap? Male house finches preferentially feed near diseased conspecifics. doi: 10.1098/rsbl.2010.0020. Biology Letters.*
- **Dr. John Tyson** chaired a NIH Special Study Section for National Centers for Systems Biology.
- **Dr. Daniel Capelluto** is a co-PI with Dr. Bret Tyler (VBI) and **Dr. Chris Lawrence** (VBI and Biological Sciences) for a new NSF project to study how oomycete and fungal effectors enter host plant cells. The total award amount is \$500,000, with \$172,784 to Capelluto's lab.
- **Dr. Carla Finkielstein** received a \$ 1,081,348 National Science Foundation CAREER Award to investigate Circadian Control of Cell Division and Homeostasis.
- **Dr. Ignacio Moore** and his postdoc **Jerry Husak** and colleague Duncan Ischick (U. Mass) co-organized a session at the Society for Integrative and Comparative Biology national conference; Dr. Moore was co-author on five of the session's presentations.
- **Dr. David Popham** (PI) and co-PIs Rich Helm, **Rick Jensen**, and **Steve Melville** received a new \$412,000 NIH award to conduct a proteomic analyses of the *Clostridium difficile* spore germination apparatus.
- **Dr. Ann Stevens** was awarded a \$409,000 NSF grant to study Novel aspects of signal transduction in *Panotea stewartii*.
- **Dr. Florian Schubot** received a \$304,000 American Heart Association Grant to study the Mechanism of Signal Recognition and Transmission by the Sensor Kinase RetS from *P. aeruginosa*.

In recent years, faculty has substantially increased the number of proposals submitted and the funding being requested. According to the VT Office of Sponsored Programs, the total requests (in terms of funding) increased from \$24.8 million in FY 2007 to \$41.6 million in FY 2009.

The faculty has also become highly collaborative, seeking ever increasingly diverse sets of collaborative research projects, with major thrusts being developed in inflammation, ecosystem ecology, infectious disease, cancer, conservation biology, and systems biology. Increasingly, protein science (including proteomics) and genomics are permeating all levels of investigation from nanoscale structures to whole ecosystems.

III. Engagement

In 2009-10, faculty and staff in Biological Sciences provided substantial leadership, service, and outreach for the profession, university, and public. Highlights include a new nature center in the Town of Blacksburg, sustained international leadership roles in systems and conservation biology, and high visibility in providing leadership for university policies and procedures.

A. Outreach

- In 2009, funds provided by VT BioSPIRE (Virginia Tech Biological Sciences Strategic Partners in Research and Education) partners supported the following six undergraduate research projects:

| | | | |
|-------------|------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Fall 2009 | Nora Sherry Advisor: Dr. David Popham | Analysis of spore peptidoglycan strand length | Part of larger project to detect and sanitize anthrax spore contamination |
| | Megan Whitham Advisor: Dr. Ignacio Moore | Correlates of paternal provisioning in the North American barn swallow | Discovering physiological mechanisms in vertebrates that control male investment in the success of their offspring |
| | Dipan Oza Advisor: Dr. Khidir Hilu | Expression of matK in <i>Pichia pastoris</i> | Refining methods to detect genetic diversity and evolutionary history in plants |
| Spring 2009 | Adrianna Ferraioli Advisor: Dr. Khidir Hilu | Structural significance and evolutionary implications of domain X | Refining methods to detect genetic diversity and evolutionary history in plants |
| | Meridth Borza Advisor: Dr. Dorothea Tholl | Analysis of induced volatile formation in lower land plants | Uncovering ways that plants defend themselves against pathogens and herbivores |
| | Kelley Miller Advisor: Dr. Daniela Cimini | Telomere dysfunction and mitotic chromosome mis-segregation | Identifying cell division processes behind many genetic disorders and diseases including cancer |

- Activities for the Biological Sciences Outreach Program (SOuP, <http://www.socm.vt.edu/>) led by **Dr. Mike Rosenzweig** included:
 - Partnerships with PIs on three NSF funded grants providing educational components to research projects.
 - Served 4,823 teachers and students directly in fall 2008 through spring 2009 via outreach programs and kit loans.
 - Made two presentations to educational and research professionals in the region on management of stormwater and freshwater resources in Virginia.
 - In partnership with the Town of Blacksburg, developed a new nature center in the historic Price House. New exhibits were created and the center has been opened for public use
 - Completed a two-day workshop serving 45 teachers at the Virginia Tech Southwest Regional Center in Abingdon.
 - Published a paper on outreach. The full citation is: Carlson, James, M.S. Rosenzweig, and S.L. Sharp. 2009. "Elements for the Development of VT-STEM Outreach." *Journal of Virginia Science Education* 3:2. pp 19-33.
 - Brought Biological Sciences' activities to 105 Blacksburg and Auburn High School students and teachers and 60 children, parents, and teachers at Gilbert Linkous Elementary School through the Biology and Environmental Science classes. In addition to K-12 tours, on-campus tours were available for visiting parents, alumni, and teachers who brought students interested in applying to Virginia Tech.

- **Dr. Rosenzweig** finished a three-year term as co-coordinator of the VT-STEM initiative. This statewide leadership role involves the main campus and all Virginia Tech geographic centers.
- Massey Herbarium activities:
 - **Dr. Khidir Hilu** served as Director and **Tom Wieboldt** as Curator of the Massey Herbarium in 2009-2010.
 - Two work-study students provided valuable assistance in 2010. Brady Fournier was hired principally to enter data from the Herbarium backlog. He finished all specimens in the Lamiaceae (Mint Family) begun the previous year by Delin Varghese and completed about 80% of the Scrophulariaceae (Snapdragon Family). Fournier also assisted the curator in databasing all specimens requested for loans. Brady also assisted the Curator in inventorying the Asteraceae. All told, Fournier entered 3,545 specimens into the data base, bringing the total up to 11,992 in the newly created "Specify Database." Phuong Tran was hired to mount specimens to be accessioned into the collection. She was also responsible for entering those specimens into the database and filing them into the Herbarium. Tran processed about 350 specimens.
 - Standard operations:
 - 411 specimens were accessioned into the herbarium
 - There were 28 visitors from both inside and outside the University who consulted the herbarium for research or identification purposes
 - 359 plant specimens or photographs were submitted for identification, mostly from Extension agents, the Weed Clinic (PPWS), or Plant Disease Clinic (PPWS)
 - Other sorts of plant science information requests continue at about 10 per month
 - Ten loans comprising 381 vascular plant specimens were made to other institutions. Four loans comprising 100 specimens were returned. At present, 1373 specimens are on loan to 20 institutions
 - One loan of a single fungal specimen was requested. Two mycology loans comprising 28 specimens were returned
 - Three loans were borrowed from other institutions comprising 203 specimens. Thirteen loans comprising 912 specimens were returned. At present, 20 loans comprising 1679 specimens are accounted for at VPI as follows:
 - ✓ *Clematis* – 14 loans, 790 specimens (Rhonda Edwards)
 - ✓ *Crataegus* – 4 loans, 687 specimens (Tom Wieboldt & Ron W. Lance)
 - ✓ *Phleum* – 1 loan, 188 specimens (Atia Atia Eisa, Hilu Lab)
 - ✓ *Isoetes* – 1 loan, 14 specimens (Tom Wieboldt)
- The Alumni Advisory Board met in Blacksburg on October 10, 2009 and on April 24, 2010.
 - The Alumni Advisory Board assisted the Department in recruiting high quality undergraduate student prospects from underrepresented groups and in providing the Department advice on curriculum reform and how to reduce costs of equipment maintenance.
 - New officers have been elected: Adrienne Hoffman is Chair, Bruce Petersen is Vice-chair, and John Serabian is recorder.
- The OWLS, the emeritus faculty group, met monthly to keep in contact with the Department's programs. They also attended most of the Department's social events and maintained many professional activities (e.g., publishing papers). The group is co-led by **Drs. Bruce Parker** and **Ernie Stout**. Specific activities include:
 - **Dr. Bruce Parker** continued his assistance in building scholarship funds toward endowment status.
 - **Dr. Robert Benoit** taught an honors section of general microbiology.
 - **Dr. Noel Krieg** taught prokaryote diversity.

- From July 2009 through June 2010, the OWLS met approximately once per month for lunch; each time, Biological Sciences faculty made presentations on the latest in research and departmental activities.
- International aspects of the undergraduate curriculum in the 2009-10 academic year included:
 - Plants and Civilization (BIOL 2204; fall 2009, 82 students enrolled) was taught by **Dr. Khidir Hilu**. This is an Area 7 course within the university's curriculum for liberal education.
 - Study abroad courses in tropical America, the South Pacific, Europe, and Antarctica were taught by **Drs. Ignacio Moore, Lisa Belden, Khidir Hilu, Lori Blanc, and Jerry Via**.
 - International aspects of discovery are a strong element of the Department of Biological Sciences. Seventeen of the Department's faculty had substantive research interactions with researchers or field sites outside of the United States in a total of 13 different countries. Visiting Scholars from overseas were hosted by **Dr. Daniela Cimini** (Judit Pampalona Sala, from Universitat Autònoma de Barcelona),

B. Service

- The following table of committee assignments for academic year 2009-10 shows that the faculty and staff in Biological Sciences provide major service to the Department, College, and University. In addition to the assignments listed in this table, there were many short-term activities that staff and faculty participated in to deal with faculty and staff searches, reviews of policies and procedures, studies of research needs, proposal writing to bring in new support for teaching or administration, etc.
- Some examples of significant activities for the university and profession included:
 - Nine faculty participated in a total of 11 national grant review panels for the National Institutes of Health (four panels), National Science Foundation (three panels), Chinese Natural Science Foundation (one panel), USDA (two panels), and EPA (one panel).
 - Two faculty members conducted reviews for tenure and promotion of faculty outside of Virginia Tech.
 - **Dr. Fred Benfield** served on the US EPA Science Advisory Board, the EPA Scientific and Technological Achievement Awards Committee, was a Voting member of the Joint Task Force "Standard Methods for the Examination of Water & Waste Water" for the US Public Health Service and American Water Works Association, was a member of the Virginia Division of Environmental Quality Academic Advisory Board, and served on the North American Benthological Society election and meeting place committee.
 - **Dr. Brenda Winkel** served as a member of the External Advisory/Review Board for NSF EPSCoR-funded Arkansas State Plant-Powered Production (P3) Center.
 - **Dr. Joe Falkinham** served on the President's committee on establishment of a Virginia Tech campus in India.
 - **Dr. Anne McNabb** chaired both the department and college diversity committees.
 - **Dr. Rick Jensen** was a Steering Committee Member for the ongoing US FDA sponsored Microarray Quality Control (MAQC) Project. He was also a leader in the new US FDA sponsored Sequencing Quality Control (SEQC) Project. He is also an adjunct faculty member at the Center for Human Population Genomics in School of Public Health at the University of Virginia School of Medicine.
 - **Dr. Liwi Li** served on the Board of Directors for the Inflammation Research Association.
 - **Dr. David Popham** was invited to serve on the National Academy of Science/National Research Council "Committee on Review of the Scientific Approaches used during the FBI's Investigation of the 2001 *Bacillus anthracis* Mailings." This committee has held three 2-day meetings in Washington, D.C. and will hold at least two more meetings. A final report should be published in mid-2010. Dr. Popham is also the building manager for Life Sciences I building on the VT campus.
 - **Dr. Mike Rosenzweig** served an interim term on the Blacksburg City Council.
 - **Dr. Art Buikema** served on 12 University, College, or Department committees, including service on the undergraduate honors court as a panelist, where he reviewed 26 cases.

- **Dr. Carla Finkelstein** served on the Project 50 Congressional Liaison Committee, was a member of Scientists without Borders, member of the Board of Directors of the Virginia Breast Cancer Foundation, and a member of Minority in Cancer Research, which is part of the American Association for Cancer Research. She was also chair of Virginia Tech's Commission on Undergraduate Studies and Policies (CUSP).
- **Dr. Khidir Hilu** is part of NISA, an international committee that is advising Iraq on strategies to rebuild its higher education system.
- **Dr. John Tyson** serves on the Board of Governors, National Resource for Cell Analysis and Modeling, University of Connecticut Health Center, Framingham, CT, and on the Board of Advisors, National Institute for Mathematical and Biological Synthesis, University of Tennessee, Knoxville TN.
- **Dr. Robert Jones** chaired the university's new ACC Undergraduate Scholarship Committee, which made 13 awards for undergraduate research in 2009-2010, and chaired the university's SACS Quality Enhancement Plan Implementation Committee, which provided the ground work for VT's current Quality Enhancement Plan initiatives.
- In 2009, **Dr. Erik Nilsen** assumed the role of the Department of Biological Sciences Graduate Program Director, which includes responsibility for recruiting, allocating GTA and GRA resources, and overall supervision and guidance for the department's graduate programs.
- **Dr. Jeff Walters** served as member of five panels, commissions, or review teams involved with nationally/internationally important conservation challenges.
- A number of the faculty members are editors or on the editorial board of professional journals:
 - Fred Benfield – *Journal of the North American Benthological Society*
 - Joe Falkinham – *Applied and Environmental Microbiology, International Journal of Microbiology, Standard Methods for the Examination of Water and Wastewater*
 - Dana Hawley – *Functional Ecology, Special Guest Editor*
 - Khidir Hilu - *Kurtziana, Journal of Systematics and Evolution, Annals of Botany*
 - Bob Jones – *Journal of Ecology*
 - Iulia Lazar – *The Open Proteomics Journal, The Open Spectroscopy Journal*
 - Liwu Li – *Journal of Immunology, Inflammation Research*
 - Anne McNabb – *Journal of Experimental Zoology, Poultry & Avian Biology Reviews*
 - Erik Nilsen – *Journal of the American Rhododendron Society*
 - Brent Opell – *Journal of Arachnology*
 - David Popham – *Journal of Bacteriology*
 - Bruce Turner – *Journal of the American Killifish Association*
 - John Tyson – *Journal of Theoretical Biology, Journal of Nonlinear Science, and Systems and Synthetic Biology*
 - Maury Valett – *Journal of Limnology and Oceanography*
 - Jack Webster - *Freshwater Biology*

**DEPARTMENT OF BIOLOGICAL SCIENCES
2009 -10 SERVICE SCHEDULE: 9/16/09**

Ad Hoc Committee on Assessment

Walker, Chair / Buikema / Evans / Lipscomb / Stevens

Computing and IT committee: Temporarily dissolved

Curriculum Committee

Barrett, Chair / Benfield / Cimini / Evans / Hawley / Lazar
Opell / Walker / Seyler / C. Webb

Diversity Committee

McNabb, Chair / Li / Phillips / Scharf / Surace / Garcia / Tholl

Executive/Personnel Committee

Jones, Chair / Barrett / Kuhn / Moore / Popham / Walker
Walters / Winkel / Valett / Yang

Faculty Recognition Committee

Moore, Chair / Buikema / Jones / Walker

Faculty Search (bio members only)

College Cluster Committee: Melville
Satellite Search Committee Chair: Valett

Graduate Evaluation Committee

Walters, Chair / Cherry / Lawrence / Nilsen
Schubot / Xing

Graduate Selection Committee

Andrews and Nilsen, co-Chairs
Cimini / Moore / Rasmussen / Yang

Honors Advisors

Buikema / Simmons / Jones

Research Day Committee

Valett, chair / Scharf / Jensen / Melville
Cheever / Silkworth / Tanner

Safety Committee

Waller, chair / Benfield / Capelluto / Rodgers / Schubot / Tholl
Tolga Durak (EHSS Rep)

Student Recognition Committee

Lipscomb, Chair / Elgert / Evans / Perez / Rosenzweig
Tholl / Tyson / Via

Department Programs and Technical Functions

Alumni: Blanc / Falkinham / Finkielstein / Jones / Winkel
Animal Care: Elgert / Jarrett
BGSA President: Sunny Crawley
Biological Collections: Hilu / Wieboldt / Rosenzweig
Facilities: Benfield / Waller
Freshman advisors: Evans, Chair / Benfield / Buikema / Haymore
Opell / Lipscomb / Jones / Mathias / Phillips / Simmons / Walker
Wilson
Freshman Labs: Buikema / C. Webb
Dept Greenhouse: Nilsen / Wiley
Micro/immuno labs: Stevens / Rogers

Undergrad Research Committee

Opell, Chair / Kuhn / Seyler / Walker / Jusino

University/College Reps

Biological Life Sciences Community Coordinator: Evans
Biology-VBI Greenhouse: Nilsen, Chair / Hilu / Wiley
CDB Seminar Committee: Cimini / Nicholson
College Curriculum: Walker
College Grad Affairs: Andrews
College Honorifics: Winkel
College P&T: Li
College Instructor Promotion: Lipscomb
College Research: Tyson
College Scholarship: Falkinham / Nilsen / Tyson
EEB Seminar: Hawley, Chair / Belden / Northington
Faculty Senate: Jensen
ILSB Faculty Stakeholders Committee: Banerjee
Library: Cherry
Life Sciences I Building Manager: Popham
MCBB Seminar: Banerjee / Schubot
Phi Sigma Advisor: Popham
Sigma Xi: Webster
Staff Senate: Law
University Animal Care Comm.: Turner
University Biotech Oversight Committee: Walker
Univ. Comm. Undergrad Studies & Policies: Finkielstein (chair)
University Honorifics: Buikema
Univ. Intellectual Properties: Falkinham
Univ. CDB Grad program: Banerjee / Kuhn
Univ. Inflammation Grad Program: Li
Univ. Micro Grad Program: Popham (chair)
Univ. Plant Mol Bio Grad Program: Winkel / Tholl
VT Postdoc Association: Cimini

OWLS / EMERITUS

Bruce Parker and Ernie Stout, Co-chairs
Curt Adkisson / Robin Andrews / Bob Benoit / John Cairns
Bill Claus / Joe Cowles / Jack Cranford / Asim Esen
Al Heath / Al Hendricks / Buck Holliman / Tom Jensen
Noel Krieg / Muriel Lederman / Anne McNabb / Duncan Porter
Charles Rutherford / Steve Scheckler / George Simmons
Harry Steeves / David Stetler / Bruce Wallace / David West
Al Yousten

Assistant Professors: Mentors

Lisa Belden: Jeff Walters
Dana Hawley: Ignacio Moore
Dorothea Tholl: Brenda Winkel
Daniela Cimini: Rich Walker
Carla Finkielstein: Jill Sible
Florian Schubot: Dave Popham
Jeff Kuhn: Rich Walker
Diya Banerjee: Bill Huckle
Jeb Barrett: Jack Webster
Jianhua Xing: John Tyson
Birgit Scharf: Ann Stevens
Daniel Capelluto: Liwu Li

Club Advisors

BGSA: Rosenzweig
Microbiology: Stevens / Nursing: Evans
Optometry: Evans / Pharmacy: Evans
Phi Sigma Honor Society: Popham / Scuba: Waller
SEEDS: Rosenzweig

IV. Diversity (faculty, staff, student)

Activities to build sensitivity and mutual respect while continuing to nurture a sense of community included diversity-related activities built into faculty meetings, an annual international luncheon, and a new discussion venue for learning about transitions that foreign graduate students face when starting their graduate programs at Virginia Tech. Efforts continued to enhance recruitment and training of undergraduate and graduate students from underrepresented groups. The Department's diversity committee continued its lead role in facilitating progress.

A. Diversity Committee Report 2009-2010

Committee membership: Vicki Garcia, Bob Jones, Liwu Li, John Phillips, Birgit Scharf, Michael Surace, Doro Tholl, Anne McNabb (Chair)

Goals:

1. To foster community in the department so that all members, independent of their background, feel there is an atmosphere of sensitivity and mutual respect.
2. To help promote undergraduate and graduate diversity and retention.

Programs sponsored by the Biological Sciences Diversity Committee:

- Lunchtime Discussions about how background experiences and education influence the way we approach our academic lives. The first of these discussions (December 17, 2009) focused on how different international backgrounds present challenges and positives (and surprising things) about living and working abroad. The discussion was initiated by comments from a faculty member of Chinese origin and a US-born graduate student who had spent two years teaching English in another country. The discussion attracted a wide cross-section of faculty and graduate students, national and international, from the different disciplinary fields of the department. The second discussion (March 24, 2010) focused on how our backgrounds influence our approaches to higher education, specifically the dynamics of graduate education. This discussion was initiated by a series of questions about various aspects of graduate education and how different backgrounds (subject fields, international differences, academic conventions, etc.) influence approaches to and communication within degrees. Discussion was again active, although attendance was less at this meeting, probably because it conflicted with several other activities in the department and the graduate school. Overall however, the committee was pleased with the open and wide ranging discussions of background differences and how they affect perceptions and behaviors in an academic department.
- Sixth International Potluck Lunch (April 7, 2010), held in Life Sciences I, was well attended and included international dishes from many countries. Attendees voted for the most popular/tasty dishes, resulting in special recognition for foods from China and India and desserts from Iran and the U.S. Mexican piñatas filled with goodies were broken open in the traditional manner by an emeritus faculty member (Parker) and a graduate student (Surace) who completed his PhD in May 2010.
- A Graduate Studies Recruitment Flyer was produced with help from **Val Sutherland**, **Sue Rasmussen**, and **Dr. Erik Nilsen**. The flyer can be handed out to students by anyone from VT who visits minority serving institutions in hopes of generating interest in graduate studies in the Biological Sciences Department.

Other Issues Discussed by the Committee:

- Establishing relationships with Minority Serving Institutions and coordinating those efforts with other VT initiatives
- Mentoring of minority students (in 2009, 9 of the 13 COS MAOP scholarship students were Biological Sciences undergraduates; the department also had 2 PREP scholars and 1 McNair scholar)
- Fostering good mentoring of international and minority graduate students
- Updating of diversity section of Biological Sciences website
- Developing a process for appointing grad student representatives to the committee
- Assessing information and reactions to diversity-related news in the VT community and statewide

B. Other Significant Diversity Activities:

Access and Equity

- This year saw the continuation of the four-year National Institute of General Medical Sciences grant titled “Virginia Tech Initiative for Maximizing Student Diversity” (IMSD), awarded to Drs. E. J. Smith, **Anne McNabb**, and R. Avery at a total amount of \$1,606,467. This project is providing increased access to PhD science degree programs for people from underrepresented groups, including minorities and first generation college students. **Dr. David Popham** mentored one of the ISMD scholars in 2009 and **Dr. Brenda Winkel** serves as a research area coordinator to help with student selection.
- **Dr. Khidir Hilu** is co-advisor for two international graduate students supported by grants from their home countries (Jordan and Egypt).
- **Dr. Dana Hawley** presented a workshop on *Careers in Biology* to high school students from underrepresented groups through the VT Upward Bound summer program.
- **Dr. Joe Falkinham** has become an active advisor for students from across campus who have military backgrounds and are adjusting to the special challenges of coming back to college after active duty. Many of his advisees are from underrepresented minority groups.
- **Dr. David Popham** provided a presentation on how to apply for graduate school at a NSF-REU sponsored summer program for minority students.
- **Drs. Daniel Capelluto** and **Carla Finkielstein** hosted two students from the Otto Kraus School in Buenos Aires, Argentina. This is the fourth year of this program to help international students from high schools gain hands-on experiences in areas of research that can be helpful to the students’ long-term education and careers.
- **Drs. Jill Sible, Rich Walker**, and Karen Sanders continued their NSF-funded S-STEM scholarship and training program to prepare economically challenged students for careers in biotechnology. In 2009, Drs. Walker and Sible developed a weekly seminar attended by six S-STEM students.
- **Dr. Mike Rosenzweig** worked (as advisor and summer contact) with program leaders of VT-STARS (outreach/pipeline project for Southside VA) to assist in the integration of students into campus academic units.

Campus Climate

- The Department continued its peer mentoring system for pre-tenure assistant professors with two discussion sessions. The group joined associate professors in applying for a small VT Advance grant (successfully funded) to build external mentoring networks by inviting key scholars to Blacksburg for seminars and mentoring sessions.
- **Dr. Rich Walker** attended VT's Executive Development Institute Diversity Workshop.
- **Drs. Anne McNabb** and Dick Burian, with help from **Dr. Diya Banerjee**, organized a welcome picnic for international graduate students held August 10, 2009.
- In keeping with tradition, several department faculty and staff attended the annual university diversity summit, annual Advance VT Workshop, and an AvanceVT luncheon on women in science.

Diversity in the Curriculum

- **Dr. Art Buikema** and **Catherine Webb** implemented a diversity exercise to break the ice among our diverse graduate teaching assistants and then instructed the GTAs to bring this exercise into the classroom to use with their students. It has been an overwhelming success both with the GTAs and students.
- **Dr. Bruce Turner** developed and taught a human genetics course where he explicitly addresses the concept of "human race" using historical and social contexts as well as modern genetic information.

Learning and Development

- **Drs. Daniel Capelluto** and **Erik Nilsen** each hosted a VT-AMP undergraduate student in their lab. The student in Dr. Capelluto's lab has decided to continue in the lab to obtain a Master of Science degree through the accelerated BS/MS program.
- **Dr. Art Buikema** continued his studies of applied Neuro-Linguistic Programming techniques to identify learning and recall strategies of freshman taking Principles of Biology. In 2009-10 he then worked with about 20 auditory and kinesthetic learners.
- **Dr. Anne McNabb**, largely through her role as ½ time Associate Dean of the Graduate School, has incorporated many elements of diversity into the annual GTA Workshop (about 650 students participated in fall 2009).
- Engagement with the University's Multicultural Academic Opportunities Program (MAOP) included one graduate student advised (by **Dr. Carla Finkelstein**) and eight undergraduate participants (supervised by **Drs. Fred Benfield, Jack Webster, Dorothea Tholl, David Popham, Erik Nilsen, Zhaomin Yang, and Daniel Capelluto**).
- **Drs. Dana Hawley, John Phillips, and Zhaomin Yang** each mentored a VT PREP student in 2009. This program, which is funded by an NIH grant to Virginia Tech, uses "developmental and experiential learning activities to prepare post-baccalaureate scholars from ethnic groups who have been historically underrepresented in the biomedical and behavioral sciences for the successful pursuit of a Ph.D and a research career." As part of this program, faculty advisors attend a special VT PREP mentoring workshop.

V. Honors and Awards (faculty, staff, student) for AY 2009-2010

Honors and awards were presented to Biological Sciences faculty, staff, and students. The accolades reflect the high quality and impact of the department's teaching, research, and outreach missions.

• Teaching and Advising

- **Drs. Mary Lipscomb and Jack Webster** received 2010 Department of Biological Sciences Outstanding Teaching Awards.
- The 2010 Outstanding Undergraduate Advisor Awards from the Department was presented to **Dr. Jack Evans**.
- **Dr. Daniel Capelluto** received certificates of appreciation for having mentored VA-NC AMP and MAOP students in his lab.
- **Dr. Lisa Belden** was recognized as the 2010 Biological Sciences Outstanding Undergraduate Research Mentor.
- The 2010 Most Influential Professor Award from the Department, as determined by a vote of the senior class, was presented to **Dr. Ann Stevens**.
- Ph.D. student **Sheena Friend**, from **Dr. Khidir Hilu's** lab, received the 2010 Graduate Student Teaching Award from the Department.
- **Justin Beckett** and **Amanda Nizam** were named 2010 Outstanding Seniors in Biological Sciences.

• Research and Professional

- **Drs. Jeb Barrett and Daniela Cimini** received 2010 Department Outstanding Research Awards.
- **Dr. Carla Finkelstein** was presented with a 2010 Minority Scholar Award in Cancer Research by the American Association for Cancer Research.
- **Dr. Ignacio Moore** was recognized as a "Scholar of the Week" by the Research Division of Virginia Tech.
- **Dr. Bruce Parker**, Professor Emeritus, received an Award of Excellence from the Psychological Society of America.
- **Dr. Bruce Turner** was elected as a Fellow of the American Killifish Association.
- **Joshua Williams**, from **Dr. Ann Stevens's** lab, received a Graduate School Honorable Mention for an Outstanding Dissertation in Engineering, Mathematics, and Science.
- **Bonnie Fairbanks**, a Ph.D. student in **Dr. Dana Hawley's** lab, was selected for recognition and support by the scientific research society Sigma Xi.
- **Sarah Foltz**, a Ph.D. student in **Dr. Ignacio Moore's** lab, was named a 2009 Institute for Critical Technology and Applied Science Doctoral Scholar.
- **Dr. M. Camille Harris**, a Ph.D. student in **Dr. Dana Hawley's** lab, was named the Outstanding Doctoral Student for 2009-2010 by the College of Science. Harris was also honored with a College of Science Make a Difference Scholarship and a 2009 National Institutes of Health Graduate Research Fellowship.
- **Karen Drahos**, a M.S. student in **Dr. Carla Finkelstein's** lab, received a 2009 William Preston Society Award in Life Sciences.
- **John Welsh**, from **Dr. Carla Finkelstein's** lab, received the College of Science Outstanding Master Thesis Award for 2010.
- Best Poster Awards for the Annual Research Day, held February 20, 2010, were presented to **Raymond Danner** (1st), **William Silkworth** (1st), **Andrea Hartman** (2nd), **Jonathan Moore** (2nd), **Victoria Garcia** (3rd), and **Xing Jing** (3rd). The award for the Best Oral Presentation was presented to **Erin Hewett**.

- Two graduate students in **Dr. Dorothea Tholl's** lab were honored for research presentations at the 2010 VT Molecular Plant Science Symposium. **Reza Sohrabi** won the "Best Graduate Student Poster" award, while **Martha Vaughn** won the Graduate Student Oral Presentation competition.
- **Brittany Gianetti**, a sophomore in Biological Sciences, was recognized as a 2010 Goldwater Scholar.
- The 2010 Undergraduate Research Award from the Department was presented to **Issac Nardi** who was supervised by **Dr. Daniela Cimini**.
- Undergraduates in Biological Sciences **Alexa Karatskisis** (supervised by **Dr. Joe Falkinham**) and **Isaac Nardi (Dr. Daniela Cimini)** were named 2010 ACC Undergraduate Research Scholars.
- **Service**
 - **Jake Waller**, Lab Instrument Maker for the Department of Biological Sciences, was honored with a 2010 President's Award for Excellence.
 - 2009 Department Outstanding Service Awards were presented to **Dr. Ignacio Moore** and Lab Instrument Maker **Jake Waller**.
 - **Renee Irvin** was recognized as the Staff Employee of the Week in June 2010.

VI. Staffing and Facilities

In response to recent budget reductions, the department permitted a small decline in the number of tenure track faculty via attrition, sustained the number of staff graduate student positions, and took a major cut in funds used to support basic departmental operations. After moving nearly half of the department's research and teaching into new buildings, Derring Hall has become a higher priority for facilities enhancements.

A. Personnel

Staff

- The department employs nine FTE administrative staff on regular appointments.
- A total of nine, full-time technical staff are also employed on regular appointments to support building maintenance (1 person), information technology (1), teaching (4), and outreach/research (3). In the past year, two FTE regular appointments to supervise laboratory teaching operations were converted to professional faculty lines, reflecting the increasing sophistication and responsibilities for these positions.
- Staff on restricted appointments (i.e., full time, but are covered by grants and contracts and other externally derived funds) currently include 10 FTE positions, almost all involved in research and funded by research grants.
- Total staffing from all sources is 28 FTEs.

Faculty

- Tenure-track faculty positions are declining due to recent state and university budget reductions, which have been met largely by giving up unfilled faculty positions derived from retirements (see Table below).
- Non-tenure track positions have increased in recent years, reflecting significant growth in postdocs hired for research and the conversion of two staff positions to professional faculty lines (see table below).
- Given the rise in number of undergraduate majors and increasing research productivity in the department, these faculty trends show that new resources to support research are being generated by faculty (thus the increase in grant-supported research faculty and graduate students supported in research assistantships); however, the state and university are not increasing faculty positions to meet the growing demands in teaching. We conclude that more tenure-track faculty members are needed to sustain current levels of teaching in upper division and graduate courses. The outlook for 2010-11, however, is for continued decline in the number of tenure-track faculty due to budget reductions in Virginia's institutions of higher education.

Trends in FTE Faculty Positions in the Department of Biological Sciences. Data from VT Institutional Research.

| Type of Appointment | Fall 2000 | Fall 2001 | Fall 2002 | Fall 2003 | Fall 2004 | Fall 2005 | Fall 2006 | Fall 2007 | Fall 2008 | Fall 2009 | Fall 2010 | NOTES |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|----------------------------------------------------|
| Tenured Instructional Faculty | 35 | 33 | 29 | 28 | 29 | 30 | 31 | 28 | 25 | 25 | 24 | These two categories are "tenure-track" |
| Tenure-Track Instructional Faculty | 5 | 7 | 7 | 6 | 5 | 5 | 8 | 11 | 12 | 12 | 12 | |
| Non-tenureTrack Instructional Faculty | 3 | 3 | 4 | 5 | 3 | 3 | 4 | 5 | 4 | 5 | 5 | Full-time instructors |
| Research Faculty | 5 | 7 | 7 | 9 | 12 | 18 | 21 | 16 | 20 | 18 | 14 | Mostly postdocs |
| P-14 Faculty, 9A-9B only ** | 8 | 6 | 6 | 6 | 5 | 7 | 5 | 9 | 7 | 7 | 7 | Part-time people paid to teach |
| Professional Faculty without Tenure | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | Lead lab teaching staff converted to faculty lines |
| Grad/Sr Grad Teaching Assistants | 49 | 46 | 45 | 46 | 43 | 39 | 49 | 51 | 54 | 49 | 46 | |
| Grad/Sr Grad Research Assistants | 19 | 21 | 30 | 25 | 30 | 32 | 23 | 32 | 31 | 36 | 36 | |
| GRAND TOTAL | 124 | 123 | 129 | 125 | 127 | 134 | 141 | 152 | 153 | 154 | 146 | |
| Tenure-Track Faculty | 40 | 40 | 36 | 34 | 34 | 35 | 39 | 39 | 37 | 37 | 36 | |
| Non-tenure Track Faculty | 16 | 16 | 18 | 20 | 20 | 28 | 30 | 30 | 31 | 32 | 28 | |
| TOTAL FACULTY | 56 | 56 | 54 | 54 | 54 | 63 | 69 | 69 | 68 | 69 | 64 | |
| | | | | | | | | | | | | |
| GRA+GTA | 68 | 67 | 75 | 71 | 73 | 71 | 72 | 83 | 85 | 85 | 82 | |

B. Budgets

- The following table shows trends in actual dollar support for personnel and operating funds. In both real (shown) and inflation adjusted dollars (not shown), operating budgets declined between FY 2007-08 and 2008-09, then remained approximately flat for 2009-10.
- The decline in operating funds was offset by deferring equipment maintenance and reducing support for research and outreach. As a result of increasing student enrollments, flat operating budgets for many years, and increasing costs over time, the department recently calculated that \$166,000 of teaching support is not being covered by base funding.
- Increased teaching pressures, particularly in lecture courses, have been substantially offset by the rise of enrollment support from the university (reaching \$404,101 in FY 2010). The enrollment support funds provide GTAs for freshmen and sophomore labs and adjunct faculty and instructors to teach freshman and sophomore lecture courses.
- We conclude that further increases in teaching support are needed to purchase supplies and equipment for laboratories and to cover teaching junior/senior/graduate level courses. Much of the shortfall for laboratory support could be generated by charging students fees in laboratory courses.
- Additional teaching capacity for laboratory courses could be provided if a full-time teaching staff position was created and stationed in the Fralin Hall, where teaching lab space is available to support new sections in laboratory courses.

| INCOME CATEGORY | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 |
|------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 208 base allocations* | | | | | | | |
| Faculty salary | 2,929,976 | 3,035,261 | 3,032,734 | 3,456,068 | 3,520,986 | 3,518,485 | 3,299,568 |
| Staff salary | 556,285 | 567,867 | 581,541 | 606,014 | 628,680 | 688,649 | 643,690 |
| GTAs | 446,301 | 456,793 | 554,371 | 594,379 | 618,051 | 632,772 | 632,773 |
| Operating | 392,946 | 392,946 | 421,946 | 422,946 | 422,946 | 341,651 | 342,520 |
| TOTAL | 4,325,508 | 4,452,867 | 4,590,592 | 5,079,407 | 5,190,663 | 5,181,557 | 4,918,551 |
| Changes in base from previous year | -119,000 | +127,359 | +137,725 | +488,815 | +111,256 | -9,106 | -263,006 |
| | | | | | | | |
| Enrollment support | 62,000 | 86,812 | 98,230 | 238,345 | 226,418 | 333,469 | 378,267 |
| | | | | | | | |
| Summer teaching funds | 72,100 | 65,900 | 80,300 | 94,418 | 116,343 | 147,697 | 148,576 |
| SCHEV equipment | 260,800 | 202,458 | 200,870 | 240,872 | 251,747 | 235,220 | 253,222 |

C. Space

- High quality research space is now sufficient for molecular biology research (see main report for status of two newly completed research buildings).
- In Derring Hall, a 50+ year old building that houses laboratory space for research active computational biology faculty (2), ecology, evolution and behavior faculty (13), teaching faculty (7), and the departmental administrative offices, the quantity of space is sufficient for most functions; however, the quality of all of the space is mediocre to poor.
- Significantly, Derring Hall teaching laboratory space is mediocre to poor and insufficient to permit growth in lab course offerings.
- The Department does not have any lecture rooms in Derring Hall, nor any spaces that are adequate for student lounges or study spaces.
- Two new classroom/lecture halls (one in Life Sciences I and the other in Integrated Life Sciences Building) have been built in the past two years. Both can be scheduled by Biological Sciences faculty for teaching and seminars. These new rooms are excellent spaces and are used heavily by the department.
- We conclude that for Derring Hall, the greatest shortage of quantity and quality of space is in teaching facilities. Therefore, the department proposes to find funds to renovate the following teaching lab and lecture rooms in Derring Hall:

| Room | Square Feet | Current Use | Need |
|-------------|--------------------|--------------------|------------------------------------------------------------------------------------------------------|
| 2084 | 819 | Storage | Convert to classroom |
| 3004 | 833 | Teaching lab | Renovate to fix poor condition of benches, poor seating arrangement, poor audio-visual capacity |
| 3094 | 907 | Teaching lab | Renovate to fix poor condition of benches and poor seating arrangement |
| 4076 | 880 | Research lab | Renovate and convert into a teaching laboratory with flexible seating for multiple teaching purposes |

VII. Goals for 2010-11

As the 2009-10 academic year was winding down, the Department Head announced that he was accepting a new position at West Virginia University. New major goals for the coming year and beyond will be set after the new leadership is in place in summer 2010. Short-term goals include follow through on faculty hiring initiated in spring 2010, the continued search for new funding sources needed to sustain normal departmental operations, and continued efforts to better align teaching resources with the growing numbers of undergraduate students.

A. Facilities

- Find funds to renovate outdated and poor quality facilities in Derring Hall where one-half of the faculty reside
- Explore new models to cover operating costs in the two largest new building spaces: Life Sciences I and Integrated Life Sciences

B. Undergraduate Learning Programs

- Follow through on the new program initiating a Life Sciences Foundations course, funded by the university's Quality Enhancement Program
- Continue planning at the department, college, and university level for new ways to align faculty teaching resources at Virginia Tech with demands for learning in the life sciences

C. Graduate Learning Programs

- Continue building on recent years' success in adding external support for graduate student stipends (e.g., training grants, endowed fellowships, regular research grants, etc.)
- Evaluate current ePortfolio system and modify and expand as needed

D. Discovery and Faculty Recruiting

- Revisit the department's strategic plan for discovery
- Hire two tenure-track faculty in the current Integrated Studies of Earth Systems cluster
- Follow through on one opportunity for a faculty hire (part of Virginia Tech dual career hiring opportunities) in evolutionary biology to support and work in the Integrated Organismal Biology Group

E. Budgets, Staffing, and Administration

- Identify a new department head to replace the current head who is leaving for a position at West Virginia University
- Build a new comprehensive budgeting spreadsheet that will assist the new departmental administration in planning where to allocate scarce resources to support operations
- Seek external sources of funding to support building and equipment maintenance costs