Academic Year 2013-2014
College of Science Annual Report
Department: Biological Sciences

EXECUTIVE SUMMARY

This year was characterized by strong achievements in research and scholarship, growth in faculty numbers, a major facilities move, and a number of other positive changes. We welcomed three new faculty members, Cayelan Carey (Freshwater Ecology; Cornell) and Zack Nimchuk (Plant Cell and Molecular Biology; CalTech) in August, and Silke Hauf (Molecular Cell Biology; Max Planck Tuebingen) in January. We also successfully recruited two others, Jamie Smyth\(^1\) (Cardiovascular Biology, VTCRI; Cedars Sinai) and Shihoko Kojima (Molecular Cell Biology, UT Southwest Medical Ctr.), who are starting in July 2013 and January 2014, respectively. We were also pleased that Michael Rosenzweig was promoted to the rank of Senior Instructor. We did see one long-time faculty member move to emeritus status, Immunologist Klaus Elgert, who retired in December after almost 40 years at Virginia Tech. Also, Jeff Kuhn left us to take a research scientist position at the University of Texas. We had a number of new staff join the department including Stacie Quesenberry in the Business Office (replacing Katie Akers who moved to Foreign Languages), Wooram Lee in the Freshman Teaching Labs (now taking over for Catherine Sarmadi), and Michael Athanas as lead IT Support Specialist (replacing Josh Akers who made a strategic career move to Network Infrastructure and Services). This was the fourth year for the current department head, Brenda Winkel, prompting an internal review and support from the department and the dean for a second four-year term. We also saw a major facilities move, with research labs at the ILSB moving to the VBI and the accompanying appointment of five faculty as VBI faculty fellows: Capelluto, Cimini, Finkielstein, Hauf, and Kojima.

The year was also remarkably successful with regard to new grants for the department’s research programs, despite the ongoing downturn in federal funding. This reflects very strong – and strategic - efforts on the part of the research faculty that resulted in seven grants from the NIH, 12 from NSF, and 16 from other agencies, for a total of $6.3M in new research funding for Biological Sciences T&R faculty and another $1.4M for our research faculty at the VTCRI. These included projects as diverse as Brent Opell’s new grant to study “Performance and evolution of environmentally responsive biomaterials in a unique biological adhesive system: spider orb web capture threads,” and Daniel Capelluto’s grant on “Molecular mechanism of TIRAP/MAL membrane targeting.” Especially good news was that Birgit Scharf was awarded a five-year NSF CAREER Award entitled, “Novel determinants of motility and chemotaxis in Sinorhizobium meliloti” – the fifth CAREER award to date in the department. Notable scholarship included numerous papers published in high-impact journals, including PNAS, Ecology, Cell Cycle, the Journal of Cell Biology, Biological Reviews, Lab on a Chip, the Journal of Biological Chemistry, The Plant Cell, PLOS Biology, and Nature. A number of faculty were recognized with awards that reflected their standing in their scientific communities, including Cayelan Carey (the Dave Pearson Watershed Excellence Award), Michael Fox\(^1\) (the Jordi Folch-Pi Award from the American Society for Neurochemistry), Michael Friedlander\(^1\) (the first annual University of Alabama-Birmingham Undergraduate Neuroscience Society Distinguished Scholar Award), Dana Hawley (the Mitchell A. Byrd Award from the Virginia Society of Ornithology), Deborah Kelly\(^1\) (elected to the Royal Society of Chemistry), and John Tyson (honored on the occasion of his 65th birthday at the “International Conference on Computational Cell Biology”).

Teaching highlights included piloting the flipped classroom approach in our freshman lecture courses, introduction of General Biosciences as an entry point into the major, and approval of a new Microbiology undergraduate degree by the Board of Visitors in the spring. There were also substantial and diverse...
contributions by department faculty to the development of the college’s new Neuroscience, Systems Biology, and Nanoscience degree programs, as well as the Integrated Science Curriculum. We saw a major upgrade of the freshman teaching laboratories and institution of lab fees at the 3000 level. And we were very pleased to record several major teaching awards among our faculty: Lori Blanc selected as a Diggs Teaching Scholar, Dana Hawley recognized with an Alumni Award for Excellence in Teaching, and Brent Opell receiving a COS Certificate of Teaching Excellence. Staff member, Bobbie Niederlehner, received the department’s Outstanding Service award, in part for her exceptional contributions to the freshman teaching operation over the past several years in addition to her oversight of the multiuser ecosystems analytical laboratory. Department faculty also held some $2.8M in grants associated with teaching and learning.

Graduate students recorded many successes, including numerous masters theses (6) and doctoral dissertations (17) defended in FY14. Several of these students went on to permanent positions in academia or industry, while many continued to pursue additional degrees or secure postdoctoral positions at other prominent institutions. Our graduate students also garnered numerous awards and fellowships, including Bianca Baker (Li lab), who was recognized with an Honorable Mention for the Virginia Tech Graduate Student of the Year, and Reza Sohrabi (Tholl lab), who received an Honorable Mention for the Virginia Tech Graduate School Outstanding Dissertation Award for his work entitled, “Biochemical and functional characterization of induced terpene formation in Arabidopsis roots.” Remarkably, three graduate students were awarded prestigious NSF Doctoral Dissertation Improvement Grants this year, Vicki Garcia (Walters lab), Sarah Foltz (Moore lab), and James Skelton (Brown lab), while Tamara Fetters (McGlothlin lab) was awarded a NSF Graduate Research Fellowship and Camille Harris (Hawley) received a Southern Regional Education Board Dissertation Award. Really tremendous achievement overall.

The department continues to grow and flourish thanks to the efforts of its many members and despite being located in seven different research buildings, including in Roanoke and the CRC. We marked the 10th annual Research Day, a highlight for the department again this year, which does much to bring everyone together and focusing on the great science that is being done across the subdisciplines. We continued to place a premium on maintaining a positive department climate in which faculty, staff, and students can thrive. This included providing substantial mentoring activities aimed at our junior faculty, many dealing with successful research programs; these included the department’s monthly mentoring lunch discussions, two of our faculty (McGlothlin and Strickland) participating in the Proposal Development Institute, and three faculty (Carey, Hauf, and Nimchuk) being awarded Mentoring Grants from the Provost’s Office. Two pre-tenure faculty also served on the department’s Executive and Personnel Committee (Brown and Fox). We continued to benefit from the wisdom and support of an enthusiastic Alumni Advisory Board. And our OWLS, very ably led by Professor Emeritus Bruce Parker, remain a lively and engaged group of emeritus faculty who add an important dimension to department life. The bottom line is that we have another remarkable year behind us and the future appears to be very bright.

Note that superscripts are used to denote VTCRI/VBI-affiliated (1), emeritus (2), and adjunct/affiliated faculty (3) throughout this document.
Notable new research awards in 2013-2014 (since last annual report, where this section went through 2012)

National Institutes of Health:

1. (R03): “Molecular mechanism of TIRAP/MAL membrane targeting”
   PI: Daniel Capelluto; $160,000, 6/14-5/16

2. (R21): “Structural dynamics of rotavirus transcription”
   PIs: Deborah Kelly¹ and Sarah McDonald¹ (VetMed); $402,500, 6/14-5/16

3. (R01): “IRAK-M in lung defense against rhinovirus infection”
   PI: Hong Chu (National Jewish Health Center), Co-PI’s: Liwu Li, Linda Van Dyk (National Jewish Health Center); VT Share: $117,000 per year for five years, 12/13 - 11/18

4. (R01): “Probing dynamics in protein-DNA interactions during disease development using live animals and ultrasensitive microfluidic assays”
   PI: Chang Lu (Ce, 75%); CoPI: Liwu Li (25%); $1,483,595 total, 04/14-03/18*

5. (R21): “Characterization of a Type II secretion system in a Gram-positive pathogen”
   PI: Stephen Melville; $412,724, 7/14-6/16

6. (R21): “Stabilization and regulation of a Bacillus anthracis spore lytic enzyme”
   PI: David Popham; CoPI: Florian Schubot; $412,000, 1/14 – 12/15

7. (K01): “Role of target-derived FGFs in maintaining and repairing synapses”
   PI: Greg Valdez¹, $679,068, 2013-2016

National Science Foundation:

1. “Microfluidic platform for accurate sampling of biological signaling events”
   PI: Iuliana Lazar; Co-Investigators: Elankumaran Subbiah (Vet Med, 10%), Jianhua Xing (5%), $769,619, 3/13-2/16

2. “Collaborative Research: Understanding how a hormone-signaling pathway modulates behavioral phenotype within a social network.”
   PI: Ignacio Moore; $320,000*

   PI: Todd Blackledge (University of Akron), Co-PIs: Ali Dhinojwala (University of Akron) and Brent Opell, $945,317 (Opell $452,909), 9/13-8/17

4. (EAGER): “Magnetic field effects on head direction and subicular place cell responses”
   CoPIs: John Phillips and Jeffrey Taube (Dartmouth), $160,378 ($145,000 to Phillips Lab), 9/13-2/15

5. (EAGER): “Integration of Magnetic and Visual Cues by C57BL/6 Mice in a 4-armed (plus) water maze”
   PI: John Phillips, $160,000, 9/13-8/15

6. (CAREER): “Novel determinants of motility and chemotaxis in Sinorhizobium meliloti”
   PI: Birgit Scharf , $896,693, 8/13-7/18

7. (Univ. New Mexico subcontract): “A Synthesis of LTER community data to test metacommunity theory
under different ecological conditions”  
PI: Eric Sokol; CoPIs: John Barrett and Bryan Brown; $30,000, 1/13-7/13

8. (NY Botanical Garden subcontract): “The macrofungi collection consortium: Unlocking a biodiversity resource for understanding biotic interactions, nutrient cycling, and human affairs”  
PI: Thomas Wieboldt; $15,884, 8/13-12/15

9. “Type IV Pilus in Myxococcus xanthus EPS Regulation and Social Motility”  
PI: Zhaomin Yang (75%), Co-PI: Florian Schubot (25%), $100,000, 6/13-5/15

10. “On T4P genetics and the motor ATPase PilB”  
PI: Zhaomin Yang (67%), Co-PI: Florian Schubot (33%), $291,846, 7/14-6/16

Other agencies/foundations:

PI: Carola Haas (FWC); CoPIs: Lori Blanc (20%), Thomas Gorman (FWC; 20%), Jeff Walters (10%); $484,000 ($71,676 to LB), 1/14-12/15

2. American Heart Association (Grant in-aid): “Structural basis and regulation of the Tollip-Tom1 complex formation”  
PI: Daniel Capelluto, $154,000, 7/13-6/15

3. The Thomas F. Jefferson and Kate Miller Jefferson Memorial Trust: “Molecular basis of Tollip-IRAK-1 complex formation”  
PI: Daniel Capelluto; $10,000, 7/11-12/14

4. Virginia Academy of Science Small Project Research Funds: “Structural basis of membrane targeting of the innate immunity adaptor TIRAP”  
PI: Daniel Capelluto; $1,250, 07/13-06/14

5. Global Lake Ecological Observatory Network: “Travel support to attend GLEON conference”  
PI: Cayelan Carey; $2,650, 8/13-12/13

PI: Deb Kelly¹; CoPI: Zhi Sheng¹ (VetMed); $233,000; 7/14-6/16

7. Concern Foundation: "Molecular basis for BRCA1 in transcription-coupled repair mechanisms"  
PI: Deborah Kelly¹, $60,000, 7/14 - 6/15

8. Bristol-Myers Squibb: "In Situ analysis of antibody drug-target interactions"  
PI: Deborah Kelly¹, $20,000, 7/14 - 6/15

PI: Iulia Lazar, ~~$260,000

10. Western Virginia Water Authority: “Western Virginia Water Authority Fellowship”  
PI: Cayelan Carey; $32,700, 9/13-9/14

11. American Rhododendron Society: “Plant functional traits associated with diversification of Rhododendron section Shistanthe into the tropics”  
PI: Erik Nilsen; $5,540. 7/13-7/15
12. **Novozymes**: “Enzyme-facilitated spore germination”  
   PI: David Popham; **$37,821**, 5/14-8/14

13. **Binational Agricultural Research and Development Fund (BARD)**: “How temperature stress changes carrot flavor: Elucidating the genetic determinants of undesired taste in carrots”  
   PI: Mwafaq Ibdah (Agriculture Research Organization, Newe Yaar, Israel); CoPIs: **Dorothea Tholl**; Phillip Simon (USDA, ARS Wisconsin); $ 297,090 (**$132,879** to Tholl); 7/14-6/17*

14. **Research Triangle Institute**: “Impacts of climate change on management of red-cockaded woodpeckers at Marine Corps Base Camp Lejeune”  
   PI: **Jeffrey Walters**; **$188,645**, 2/13-1/16

15. **Department of Defense**, “Demographic and population response of red-cockaded woodpeckers on Camp Lejeune Marine Base to a basewide management plan”  
   PI: **Jeffrey Walters**; **$123,791**, 9/13 – 9/14

16. **USDA**: “Interactions between antibiotic resistance in soil microbial communities and coupled elemental cycles”  
   PI: **Michael Strickland**; Co-PIs: John Barrett, Brian Badgley (CSES), Katherine Knowlton (FWC); $493,333 (**$478,616** to Biological Sciences), 9/13 - 8/17

*Recommended for funding, not yet initiated

**Support for Conferences (FY14)**

1. **NSF**: “Workshop: Value and development of grassroots networks for doing team science”  
   PI: Kathleen Weathers (Cary Institute of Ecosystem Studies); Co-PIs: Paul Hanson (Univ. Wisconsin) and Cayelan Carey (33% responsibility), **$84,983**, 11/13-10/16

2. **NIH (NIAID, R13)**: “Innate Cell Plasticity Conference Society of Leukocyte Biology”  
   PI: Liwu Li; **$8,000**, 6/14-5/15

3. **NIH (NIAID, R13)**: “47th Annual Meeting for the Society of Leukocyte Biology”  
   PI: Liwu Li; **$15,000**, 6/14-5/15

4. **NIH**: “Mid-Atlantic Microbial Pathogenesis Meeting 2013”  
   PI: Stephen Melville, **$5,000**, 1/13-12/13

5. **USDA NIFA**: “Mid-Atlantic Microbial Pathogenesis Meeting 2013”  
   PI: Stephen Melville, **$13,000**, 1/13-12/13

6. **Society for Integrative and Comparative Biology 2014 Meeting** (IOS-1344255), “Adaptation or developmental constraint? Uniting evolutionary theory and empirical studies of phenotypic plasticity”  
   CoPIs: Kendra Sewall, Haruka Wada (Auburn Univ.), **$14,995**, 1/13

7. **Burroughs Wellcome Fund**, “International Conference on Computational Cell Biology”  
   PI: Jianhua Xing, **$5,000**, 12/12-11/13

8. **US Army Research Office**: “International conference in computational cell biology: From the past to the future”  
   PI: Jianhua Xing, **$15,000**, 5/13-4/14
Faculty awards/honors (e.g., Humboldt Fellowships, NSF CAREER awards, etc.) in FY14

- Assistant Professor **Cayelan Carey**, graduate student **Alex Gerling**, and collaborators, Paul Gantzer and Mark Mobley, were recognized with the Dave Pearson Watershed Excellence Award from the Virginia Lakes and Watersheds Association in spring 2014

- Associate Professor **Michael Fox** was recognized with the Jordi Folch-Pi Award from the American Society for Neurochemistry

- Professor **Michael Friedlander** received the first annual University of Alabama-Birmingham Undergraduate Neuroscience Society Distinguished Scholar Award

- Associate Professor **Dana Hawley** received the Mitchell A. Byrd Award for outstanding research in ornithology from the Virginia Society of Ornithology

- Assistant Professor **Deborah Kelly** was elected to the Royal Society of Chemistry

- Assistant Professor **Birgit Scharf** was awarded a five-year NSF CAREER Award entitled, “Novel determinants of motility and chemotaxis in *Sinorhizobium meliloti*” for $896,693 (also listed above under new research awards)

- University Distinguished Professor **John Tyson** was honored on the occasion of his 65th birthday at the closing banquet of the “International Conference on Computational Cell Biology,” held at Virginia Tech in August, 2013, for career-long contributions in the field

- Three faculty members were named Scholars of the Week: Associate Professor **Lisa Belden** (July, 2013), Professor **Jack Webster** (September, 2013), and Professor **Liwu Li** (October 2013)

- Professor **John Phillips** received the Department of Biological Sciences Outstanding Research Award

Number of manuscripts, number of books and book chapters (CY13); high impact papers highlighted in gray:

Biological Sciences faculty edited two books and were authors of six book chapters and 136 journal articles, as follows (names of department faculty indicated in bold; 4 identifies students or postdocs publishing alone or without BioSciences faculty co-authors):

Edited Books (published or in press):


Book Chapters:


Peer-reviewed journal articles*


90. Orlofske, S.A., **Belden, L.K.,** and Hopkins, W.A. (2013). Larval wood frog (Rana = Lithobates sylvatica) development and physiology following infection with the trematode parasite, Echinostoma trivolvis. Comparative Biochemistry and Physiology a-Molecular & Integrative Physiology 164, 529-536.


Number of presentations; notable invited lectures (CY13)

Biological Sciences faculty gave 41 invited lectures at universities and research centers in the U.S. and abroad and many more talks and posters at conferences during 2013. Notable talks included the following:

- Jeb Barrett gave an Invited Symposium Talk at the American Society of Limnology and Oceanography Annual Meeting, New Orleans, LA and an Invited Plenary Talk at the Transantarctic Mountains Science Meeting, Minneapolis/St. Paul, MN.
- Lisa Belden gave a guest lecture at the Universidad San Francisco de Quito, Ecuador; in the Ecology and Evolution of Infectious Disease meeting at State College, PA; at the meeting of the American Society of
Parasitologists in Quebec City, Quebec, Canada; and the Ecological Society of America meeting in Minneapolis, MN.

- **Bryan Brown** gave a talk at Clemson University, Clemson, SC (invited by the Graduate Student Association).
- **Daniel Capelluto** was a keynote speaker at the 92nd Annual Meeting of the Virginia Academy of Science, VCU, Richmond, VA.
- **Cayelan Carey** gave an invited talk at the Ecological Society of America meeting, Minneapolis, MN.
- **Daniela Cimini** gave seminars at the Geisel School of Medicine at Dartmouth, Hanover, NH and the University Roma Tre, Rome, Italy. She gave invited talks at the Dynamic Kinetochore Workshop, Porto, Portugal; The CNIO Frontiers Meeting: Chromosome instability and aneuploidy in cancer: from mechanisms to therapeutics in, Madrid, Spain; the SIMA Workshop on chromosome instability: mechanisms and health effects in Padova, Italy, the first International Conference on Computational Cell Biology in Blacksburg, VA; the Symposium on Meiosis and chromosome segregation – a mammalian perspective in Stockholm, Sweden; the 108th International Titisee Conference on Causes and Consequences of Aneuploidy in Titisee, Germany; and 13th HFSP Awardees Meeting in Strasbourg, France.
- **Joseph Falkingham** gave a talk at the Epidemiology of Nontuberculous Mycobacteria Patient-Physician Conference of the American Thoracic Society, Philadelphia, PA.
- **Carla Finkielstein** gave seminars at Texas A&M University, College Station, TX; the University of Rochester Medical Center, Rochester, NY; the National Institutes of Health, Center to Reduce Cancer Health Disparities, Bethesda, MD; for the Appalachian Cancer Community Network, Philadelphia, PA; at the Cancer Science Institute of Singapore, Singapore and the National University of Singapore, Singapore.
- **Michael Fox** gave invited seminars at Georgia Reagent University, Augusta, GA; Vanderbilt University, Nashville, TN; Duke University Medical Center, Durham, NC; and for the American Chemical Society, Blue Ridge Chapter, Radford University.
- **Silke Hauf** gave invited seminars at IFOM-IEO Milan, Italy; the Max Planck Institute for Cell Biology and Genetics, Dresden, Germany; the University of Sussex, UK; the Max Delbrueck Center for Molecular Medicine, Berlin, Germany; the Institute of Computational Biology, Munich, Germany; the Institute of Science and Technology Austria, Klosterneuburg, Austria; the Centre de Recherche de Biochimie Macromoléculaire, Montpellier, France. She also gave presentations at the Nordic Mitosis Network Meeting, Oslo, Norway; the Dynamic Kinetochore Workshop, Porto, Portugal; the EMBO Workshop on Chromosome segregation and aneuploidy, Breukelen, Netherlands; and the EMBO Conference on Fission Yeast: Pombe 2013, London, UK.
- **Dana Hawley** gave an invited seminar at the Center for Infectious Disease Dynamics, Pennsylvania State University, State College, PA.
- **Rick Jensen** gave an invited presentation at the Global Biomarker Conference, Toronto, Canada.
- **Deborah Kelly** gave the Sydney S. Negus Memorial Lecture at the Virginia Academy of Sciences meeting in Blacksburg; and an invited talk at the Gordon Research Conference on 3D Electron Microscopy, Colby Sawyer College, NH.
- **Iulia Lazar** gave a keynote lecture at Microscale Bioseparations, Charlottesville, VA; at the International
Conference on Omics Studies, Orlando, FL; and at the 38th International Symposium on High Performance Liquid Phase Separations and Related Techniques, Amsterdam, Netherlands.

- **Liwu Li** gave invited seminars at the University of Kentucky Cardiovascular Research Center, the University of Louisville School of Medicine, and the University of Connecticut School of Medicine. He also gave invited plenary talks at the 10th Aegean Innate Immunity Conference in Kos, Greece; and the Annual Meeting of the Society for Leukocyte Biology, Newport, RI.

- **Adi Livnat** gave a talk at the Evolution Conference, Snowbird, Utah, that was featured on a blog titled, “Evolution 2013 Greatest Hits.”

- **Joel McGlothlin** presented an invited lectures at the University of Idaho, a seminar at North Dakota State University, Fargo, ND, and two seminars at Michigan State University, East Lansing, MI.

- **Steve Melville** gave an invited seminar at the University of Alberta, Alberta, Canada.

- **Konark Mukherjee**\(^1\) gave invited oral presentations at Robinson College, Cambridge, UK and at the International Conference on Psychology, Autism and Alzheimer’s disease, San Antonio, Texas.

- **Zack Nimchuk** gave a seminar at the University of Oklahoma and was an invited speaker for the 2014 Interdisciplinary Plant Group Symposium at the University of Missouri, Columbia, MO.

- **Brent Opell** gave a seminar at Washington and Lee University, Lexington, VA.

- **John Phillips** gave invited lectures at the International Spin Chemistry Meeting, Bad Hofgastein, Austria; in the EMF Biological Research Trust Workshop on Biological Interactions of Low-Frequency Fields, London, UK; and at the meeting of the Royal Institute of Navigation, Egham, UK.


- **Michael Rosenzweig** gave a talk at the National Science Teachers Association, 2013 Area Conference Organizing Workshop, Denver, CO.

- **Birgit Scharf** gave an invited talk at Davidson College, Davidson, NC.

- **Florian Schubot** gave an invited talk in the Eastern Tennessee State University Biological Sciences /Health Sciences Seminar series, Johnson City, TN.

- **Kendra Sewall** gave a talk at the annual meeting of the Society for Integrative and Organismal Biology in San Francisco, CA.

- **Ann Stevens** presented a seminar at St. Augustine University in Raleigh, NC.

- **Michael Strickland** gave a seminar at James Madison University and gave an invited talk at the ASA, CSSA, & SSSA International Annual Meeting, Tampa, FL.

- **John Tyson** presented seminars at the University of California at Irvine, the University of Illinois at Urbana/Champaign, the University of Chicago, Oxford University, Rutgers University-Camden. He also spoke at the Winter Q-BIO Meeting, Honolulu HI and gave the keynote address at the Workshop for Young Researchers in Mathematical Biology, Mathematical Biosciences Institute, Columbus OH.

- **Dorothea Tholl** was invited to give a talk at Terpnet 2013 in Kolymvari, Crete, Greece.

- **Greg Valdez**\(^1\) gave invited talks at Children’s National Medical Center; Georgia Regents University, Georgia; and the Jefferson College of Health Sciences. He also gave invited talks in the NIH’s National Institute on Aging Workshop: Age-related Changes in Neuromuscular Junction in Bethesda, MD; and at
the Brazilian Society for Neuroscience annual meeting, Brazil, and at a dual symposium of the Integration of Graduate Programs in Cell Biology/Symposium of Cell Biology, held at the Universidade Federal de Minas Gerais, Brazil.

- **Jeff Walters** gave an invited talk at the Smithsonian Institution, National Zoo, Washington, D.C and made presentations at the Greenberg Innovation Sessions, Chestertown, MD, and the Wilson Ornithological Society Meeting, Williamsburg, VA.

- **Brenda Winkel** was an invited keynote speaker at the meeting of the 160th Committee on Plant Biotechnology for the Environment, Food, and Resources at Hokkaido University, Sapporo, Japan, and gave seminars at Tohoku University, Sendai, and Kyoto University, Kyoto, Japan.

- **Jianhua Xing** presented seminars at the Hokkaido University, Japan; the Beijing Computational Science Research Center, China; Stony Brook University; Albert Einstein College of Medicine; and the University of Wisconsin. He also gave invited talks at the 2nd Zing Enzymes, Coenzymes and Metabolic Pathways Conference in Cancun, Mexico; the Kavli Institute for Theoretical Physics China at the Chinese Academy of Sciences, Beijing, China; the Young Mathematician Forum in Celebration of the 150th Anniversary of the School of Mathematical Sciences at Peking University, Beijing, China; and the 35th IEEE Engineering in Medicine and Biology Society Conference in Osaka, Japan.

- **Zhaomin Yang** gave an invited talk at the 40th International Conference on Myxobacteria, Beijing, China.

**Links and support from university’s research investment institutes in 2013-2014**

**Institute for Critical Technology and Applied Science**

- **Junior Faculty Collaborative Grant**: “Filming biomolecules in action with terahertz spectroscopy”  
  PI: Vinh Nguyen (Physics); CoPI: Daniel Capelluto; $120,000, 7/13-6/15

- **Junior Faculty Collaborative Grant**: “H2S-releasing nanoparticles for cancer therapy”  
  PI: John Matson (Chemistry); CoPI: Carla Finkielstein; $60,000 ($24,500 to CVF), 7/13-6/14

- **Junior Faculty Collaborative Grant**: “Improving biofuel crop growth and photosynthesis through the use of non-transgenic genome editing technology”  
  PI: Zachary Nimchuk; CoPI: Bingyu Zhao (Horticulture); $120,000, 7/14-6/16

- **Established Investigator Grant**: “Uncovering the role of the microenvironment in cancer progression and therapeutic intervention using a multi-disciplinary tumor engineering platform.”
  PI: Nicole Rylander; Co-PIs: Carla Finkielstein, Pavlos Vlachos (Mech. Eng.), John. Robertson (VetMed). $300K ($30,000 to CVF), 7/13-6/15

**VBI/Fralin Institute Small Grants Program**

- “Deciphering the complexity of a cleaning symbiosis: Combining next-gen sequencing with field experimentation to elucidate the microbial component”  
  PI: Bryan Brown; $14,156

**Fralin Life Sciences Institute**

- Organismal Biology and Ecology Group: “The core issue: Linking biodiversity and management in an urban hydroscape at multiple spatial scales using paleolimnological reconstruction of water quality and zooplankton dynamics”
PIs: Bryan Brown and Cayelan Carey; $7,300 (spring 2013)

- Organismal Biology and Ecology Group: “The bioaccumulation of cyanotoxins in aquatic food webs: unexplored consequences of impaired water quality due to land use and climate change”
  PIs: Cayelan Carey and William Hopkins (FWC); $8,000

  PI: Erik Nilsen; Co-PIs: John Barrett, M. Williams, Jacob Barney; $4,744

- Microbiology Group: “Function and localization of Type IVb pili components in Sinorhizobium meliloti”
  PI: Birgit Scharf; $3,527, 10/13

- Microbiology Group: “Development of a chemotaxis-driven, tumor-targeting Salmonella typhimurium strain”
  PI: Birgit Scharf; $2,188, 10/13

- Microbiology Group: “Temporal analysis of the plant pathogen Pantoea stewartii subspecies stewartii”
  PI: Ann Stevens; $5,000

- Vector-Borne Infectious Disease Group: “Avian malaria-arboviral interactions in mosquito vectors”
  PI: Dana Hawley (75% responsibility); co-PI: Sally Paulson (Entomology); $3,060, 12/13-05/14

Virginia Tech Cancer Seed Grants

- “A proteomic approach to investigate the effect of Pin1 on cancer cell proliferation”
  PIs: Iulia Lazar and Felicia Etzkorn (Chemistry); $3,000, 5/13-7/13

Virginia Tech-Children’s National Medical Center Collaborative Pilot Grants

- “Cellular and molecular basis of focal refractory epilepsies”
  PI: Greg Valdez¹, CoPI: Judy Liu (CNMC); $50,000, 2013-2014

Post-doctoral fellows and Research Scientists in STEM-H research areas (CY13, research advisors in parentheses)

2. David Ball (Tyson)  10. Pavel Kraykovskiy (Tyson)
3. Lori Blanc (Walters)  11. Alida Palmisano (Tyson)
4. Kathy Chen (Tyson)  12. Jignesh Parmar (Tyson)
5. Shuo Geng (Li)  13. Emanuele Rosioli (Cimini)
6. Tetsuya Gotoh (Finkielstein)  14. Chandra Shrestha (Hilu)
7. Sherry Hildreth (Winkel)  15. Eric Sokol (Barrett/Brown)
8. Myra Hughey (Belden)  16. Xiao-Jun Tian (Xing)

Examples of links with NCR for research into issues of security and resiliency N/A

Examples of partnerships with external collaborators which have enabled VT to compete more effectively for external funding N/A
Faculty and departmental teaching awards in FY14 (incl. college, university and national awards)

- The department’s Outstanding Teaching Awards went to Assistant Professor Diya Banerjee and Associate Professor Steve Melville
- Research Scientist Lori Blanc was selected as one of two 2014 Diggs Teaching Scholars
- Three faculty members were named Scholars of the Week: Associate Professor Lisa Belden (July, 2013), Professor Jack Webster (September, 2013), and Professor Liwu Li (October 2013)
- Six members of the faculty were recognized by students as Virginia Tech “Favorite Faculty Members”: Art Buikema, Daniel Capelluto, Jack Evans, Khidir Hilu, Mike Rosenzweig, and George Simmons
- Advanced Instructor Jack Evans and Professor Ann Stevens were recognized as the department’s Outstanding Undergraduate Advisors
- Associate Professor Dana Hawley received one of two 2014 Virginia Tech Alumni Awards for Excellence in Teaching
- Professor Brent Opell received a College of Science Certificate of Teaching Excellence
- Professors Jill Sible (Sept 2013) and Art Buikema (Jan 2014) were recognized as CIDER Teachers of the Week
- Alumni Distinguished Professor Emeritus George Simmons was recognized by the department’s Class of 2014 as the Most Influential Professor, for the fifth time in six years

Undergraduate student achievements and awards in FY14 (e.g., Goldwater Scholars, Man/Woman of the Year)

- Kaitlyn Andreano (Finkielstein) and Kristen Fread (Capelluto) received Sigma Xi Undergraduate Research Awards
- Julia Button, Spencer Cesar, Megan Coughlin, and Sergio Patton were recognized with the department’s Albert and Sharon Hendricks Undergraduate Excellence Award:
- Kelly Drews (Kale lab, VBI) was awarded the Deborah Koller Scholarship and an American Society for Microbiology Undergraduate Research Fellowship
- Zachary Gajewski (Belden) received the Biology Undergraduate Research Excellence Award for his proposal, “The effect of zooplankton feeding on the amphibian Chytrid fungus”
- Jessie Gibbons received the I.D. Wilson Memorial Scholarship
- Darya Nesterova was named the College of Science Outstanding Graduating Senior 2014 and was selected to receive the department’s 2014 Buikema Outstanding Senior Award
- Heather Lafance received the Ralph E. Carlson Memorial Freshman Scholarship
- Elizabeth Lee (Turner) was awarded the Stacey Smith Biology Research Excellence Award for her proposal, “Evolutionary genetics of growth acceleration in African Killifishes.”
• Carl Levy (Fox²) received the department’s 2014 Buikema Undergraduate Research Award
• Jessica Li received both the Patricia C. Perna Scholarship and a College of Science Dean’s Roundtable Scholarship
• Vraj Patel received the Stephen D. Lutz Scholarship
• Bishal Paudel received the Rachael Hill Memorial Scholarship
• Sydney Robinett received the Ralph E. Carlson Memorial Scholarship in Ornithology
• Jenna Sackenheim received an Amenta Robeson Sjogren World Hunger Scholarship
• Stephanie Seto (Finkielstein) received a Fralin Summer Undergraduate Research Fellowship
• Natalie St. Clair was awarded the Class of ’54 Ut Prosim Scholarship
• Meredith Swartwout received the Joe and Barbara Cowles Scholarship
• Christine Tin was awarded the Class of ’56 Ut Prosim Scholarship
• David Vasquez (Hawley) received the Clinton Wiley Baber Scholarship as well as the Robert Jones Undergraduate Research Excellence Award for his project entitled, “Social behavior and disease transmission in house finches”

Graduate student achievements and awards in FY14 (research advisors in parentheses)

Awards:
• Bianca Baker (Li) was recognized with an Honorable Mention for the Virginia Tech Graduate Student of the Year
• The department’s Lewis Edward Goyette Scholarships went to Alison Kernen Burke (Stevens) and Yan Chen (Popham)
• Kevin Geyer (Barrett) received the department’s John Palmer Memorial Scholarship
• Camille Harris (Hawley) and Regina Wallace (Yang) were named MAOP Graduate Scholars
• Brad Howard (Lawrence¹) received the 2014 Buikema Graduate Student Teaching Award
• Michelle Jusino (Walters), Lukas Landler (Phillips), and James Skelton (Brown) won the Third Place Poster Award for their joint presentation at the 7th Annual Woodpecker Conference
• Josh Nicholson (Cimini) was named the College of Science Outstanding Doctoral Student; he also won the Best Oral Presentation award at the department’s 2014 Research Day
• Reza Sohrabi (Tholl) was recognized with an Honorable Mention for the Virginia Tech Graduate School Outstanding Dissertation Award
• Best Poster awards at the Department of Biological Sciences 2014 Research Day went to Sahnzi Moyer (EEB 1st Place; Hawley), Matt Becker (EEB 2nd Place; Belden), Benjamin Webb (MCMC 1st Place; Scharf), and Jordan Manci (MCMC 2nd Place; Schubot); the award for Best Poster by a First or Second Year Student went to Laura Schoenle Thomas (Moore)
• The Harvill Award for Best Presentation in the Botany Division at the 2013 Virginia Academy of Science Annual Meeting went to Stephanie Voshell (Hilu)
• The award for Best Student Oral Presentation at the 2013 Virginia Branch Meeting of the American Society for Microbiology went to **Benjamin Webb** (Scharf), who also won awards for Best Poster Presentation at the Virginia Tech Molecular Plant Science Mini Symposium and the department’s 2014 Research Day (see above)

• The Second Place Poster Award at the 4th Interdisciplinary Research Symposium of Iota Delta Rho went to **Hang Zhang** (Xing)

**Grants and scholarships in FY14:**

• **Zhe Bao** (Nilsen), **Sarah Foltz** (Moore), and **Laura Schoenle Thomas** (Moore) were ICTAS Doctoral Scholars in FY14

• Six Biological Sciences graduate students were MultiSTEPS IGERT Fellows: **Nicolaas Baudoin** (Cimini), **Jingren Deng** (Lazar), **Ellen Garcia** (advisor TBD), **Fumio Ikenishi** (Lazar), **Renee Pietsch** (Schmale³, PPWS), **Jack Whitehead** (Phillips), and **Hang Zhang** (Xing)

• The department’s Ralph E. Carlson Memorial Scholarships in Ornithology went to **Camilo Escallon** (Moore), **Sarah Foltz** (Moore), **Vicki Garcia** (Walters), **Sahnzi Moyers** (Hawley), **Laura Schoenle Thomas** (Moore), and **Michelle Jusino** (Walters)

• **Tamara Fetter** (McGlothlin) was awarded a prestigious NSF Graduate Research Fellowship

• **Camille Harris** (Hawley) received a Southern Regional Education Board Dissertation Award

• 2013-2014 Virginia Tech Graduate School Doctoral Assistantships went to **Brad Howard** (Lawrence¹), **Jeff Norman** (Benfield), **James Skelton** (Brown), and **Michael Painter** (Phillips)

• **Aboozar Monavarfeshani** (Fox¹) was awarded the 2013-2014 VTCRI Medical Research Scholars Fellowship

• **Sahnzi Moyers** (Hawley) received an Animal Behavior Society Student Research Grant as well as a Sigma Xi Ph.D. Research Award

• **Josh Nicholson** (Cimini) was awarded the Robert and Marion Paterson Graduate Scholarship and also won the Best Oral Presentation award at the department’s 2014 Research Day

• Three Biological Sciences graduate students were awarded prestigious NSF Doctoral Dissertation Improvement Grants:
  
  
  o **Sarah Foltz** (Moore), “Phenotypic responses to urban habitats: a potential role for DNA methylation,” **$13,646**, 7/13-6/15
  

**Graduate students defending in FY14***:

**Master’s theses**

2. **Rick Browne** (CEE, Little/Carey), “The effects of hypolimnetic oxygenation on the chemical, physical, and biological properties of a shallow drinking water reservoir,” 8/15/13

3. **Dragana Avirovik** (Pierera³/Lawrence¹), “Transformation of a transposon construct into tomato for functional genomics studies,” 8/29/13

4. **Regina Wallace** (Yang), “*Myxococcus xanthus* CRISPR3 regulates cellular functions that affect exopolysaccharide production,” 9/19/13

5. **Wooram Lee** (Lazar), “Protein set for normalization of quantitative mass spectrometry data,” 12/10/13


**Doctoral dissertations**


2. **Bonnie Fairbanks** (Hawley), “Bidirectional interactions between behavior and disease in banded mongooses (*Mungos mungo*) infected with *Mycobacterium mungi*,” 7/26/13


6. **Laurence Hao-Ran Lin** (Webster), “Influences of mountainside residential development to nutrient dynamics in a stream network,” 12/7/13

7. **Nimisha Khanduja** (Kuhn/Cimini), “Processive acceleration of actin barbed end assembly by N-WASP,” 12/9/13


10. **Revathy Ramachandran** (Stevens), “Investigation of the quorum-sensing regulon in the corn pathogen *Pantoea stewartii*,” 3/21/14

11. **Shernita Lee** (GBCB, Lawrence¹), “Ironing out the host-fungal interaction in airway epithelial cells,” 3/21/14


*major advisors were in Biological Sciences; degrees were in Biological Sciences except as indicated

**Grants in undergraduate teaching and learning in FY14**

1. **Virginia Tech First Year Experience Program Grant** (Office of Undergraduate Education): “Successful Starts in Science: Da Vinci and Curie Living-Learning Communities” PI: Lori Blanc, $27,075, 7/13 - 6/14

2. **National Science Foundation**: “Transforming Undergraduate Education in STEM: The use of high-frequency data to engage students in quantitative reasoning and scientific discourse” PI: Catherine O’Reilly (Illinois State Univ.); Co-PIs: Rebekka Darner (Illinois State Univ.) and Cayelan Carey (33% responsibility, 100% responsibility for VT subcontract), $199,656, 7/13-6/16

3. **National Science Foundation**: "unPAK: undergraduates Phenotyping Arabidopsis Knockouts: A distributed genomic approach to examine evolutionarily important traits"; PI: Matthew T. Rutter (College of Charleston), Dorothea Tholl is participant among 11 undergraduate research labs; $724,878 ($27,276 to Tholl); 08/14-07/17

4. **NIH Bridges to the Baccalaureate.** co-PDs: Jill Sible and Karen Eley-Sanders, $1,965,401, 9/13-8/18
   The program is designed to work with students from the Virginia Community College System to increase the number of transfer students pursuing degrees and research career paths in biomedical and behavioral sciences. The purpose of the program is to provide research experiences, skills development, activities, and support during the student’s undergraduate career at Virginia Tech.

5. **4VA Initiative**, funded by the State of Virginia, $772,605 ($650,000 to Biological Sciences).
   Coordinated by Richard Walker in collaboration with Terri Bourdon (Department of Mathematics).

**Grants in graduate education (e.g., IGERTS) continuing in FY14**

1. **NSF IGERT: MultiScale Transport in Environmental and Physiological Systems**
   PI: Mark Stremler; Co-PIs: Pavlos Vlachos, David Schmale9, Rafael Davalos, Shane Ross, Daniela Cimini, Jeffrey Kuhn; participating faculty from Biological Sciences include Iulia Lazar, John Phillips, Jianhua Xing, and Zhaomin Yang. $2,843,830, 08/10-07/15
Textbooks (published or in press) in CY13


One to two notable events or programs related to undergraduate education in CY13 (e.g., first year of a signature course or FYE)

- The 4VA-funded Introductory Biology Course Redesign project drove a dramatic change in pedagogy of large-enrollment courses during CY2013. The redesign team is led by Richard Walker and includes Lisa Belden, Jack Evans, Eric Hogan, Mary Lipscomb, Kacey Meisel, Mike Rosenzweig, and Stephanie Voshell. Roger Sheppard, George Simmons, and Jonathan Watkinson also contributed in CY13. The goal of the project is to convert the BIOL 1105 and 1106 Principles of Biology courses from traditional lecture format to an active class format in which video lectures are provided online prior to class and class time predominantly consists of active learning exercises. The project also involves assessment development and implementation (in collaboration with the Office of Academic Assessment), and collaborative work with Terri Bourdon and colleagues (Mathematics) to incorporate biological examples into the math classes required by most life science majors.

   The group orchestrated the transition from design during Spring and Summer of 2013 to implementation of the first pilot courses in Fall 2013. Design of the second-semester course also continued during the fall. A progress report on BIOL 1105 and 1106 Redesign was presented to 4-VA (GMU, JMU, UVA, VT) Presidents and Provosts on 5/31/13. Eric Hogan and Mike Rosenzweig served as in-class instructors for the first two “active classroom” versions of BIOL 1105 in Fall of 2013. A new undergraduate teaching assistant (UTA) program was created to involve qualified undergraduates in teaching the redesigned course. This course can be taken P/F or A-F for 2 or 3 general education credits. The UTAs were trained and mentored throughout the semester in responsibilities that included facilitating in-class, active learning exercises, grading of these activities, developing activity and test questions, and grading. UTAs also generated a written reflection, highlighting constructive feedback, at the end of the semester. Students who elected to take the class for 3 credits were also asked to provide an office hour during the week to answer student questions. This class provides excellent in-class teaching experience for students wishing to become teachers, while providing BIOL 1105 and 1106 instructors with the assistance essential for implementing an “active classroom” format for these large-enrollment courses.

- Four Biological Sciences faculty members taught in the “Integrated Science Course,” a new initiative of the College of Science that aims to teach the fundamental principles of chemistry, biology, physics and mathematical sciences in an integrated fashion and in an active learning environment. The goal of the course is to provide students with a strong foundation in interdisciplinary scientific thinking. The framework was developed by John Tyson. He has since taught in both the freshman- and sophomore-level ISC courses. In 2013 the freshman-level lecture section (6 credit hours per semester) was taught by Iulia Lazar, Rick Jensen, and Will Mather (Physics) in the spring and by Eric Nilsen, Gary Long (Chemistry), and Tatsu Takeuchi (Physics) in the fall. The sophomore-level lecture section (also 6 credit hours per semester) was co-taught by John Tyson and Michel Pleimling (Physics) in Spring and Zack
Lewis (Physics) in Fall.

- **Ann Stevens** and **David Popham** developed a proposal to convert the department’s Microbiology Option to a Microbiology Degree and Major. In 2013 the proposal was revised based on feedback from SCHEV, with expert input from Robin Panneton (Psychology). **Richard Walker** helped guide the documents through university governance. Student survey data was compiled and letters of support were gathered from potential employers. By the end of 2013 all VT committees had been cleared except University Council (completed by 2/14). The proposal was approved by the BOV (on 3/14) and went to SCHEV in summer 2014.

- Biological Sciences faculty members contributed to proposals for the College of Science’s new degrees in Neuroscience [*Ignacio Moore* working with Kirby Dieter-Deckard (Psychology)] and in Systems Biology [*John Tyson*], with additional input from **Richard Walker**.

- The department’s Microbiology group participated in an ongoing collaborative project with the University of Maryland aimed at assessing student mastery of key concepts in microbiology. In CY13 the group continued research to understand student misconceptions about the topic of antibiotic resistance using pre- and post-course surveys across the microbiology curriculum. The VT and UM faculty groups meet independently (twice per semester at VT), but work in a coordinated/cooperative manner to analyze the survey data, design updates to the surveys, and to discuss strategies for increasing student understanding and retention of concepts. Outcomes of the study were presented at the 2013 Conference on Higher Education Pedagogy in Blacksburg in February 2013 and at the American Society for Microbiology Conference for Undergraduate Educators in Englewood, CO, in May, 2013. The VT Office of Assessment and Evaluation provided a student on GRA support during the summer of 2013 to help with data analysis. The VT group had a proposal accepted to lead an oral discussion session at the 2014 Conference on Higher Education Pedagogy in Blacksburg and a manuscript on this work is in preparation. The VT effort is led by **Ann Stevens**, who also completed the Biology Scholars Research Residency: Scholarship of Teaching and Learning Institute, receiving training on the proper research designs to use to enable production of publication quality educational research scholarship. Other Biological Sciences faculty involved in the project during CY13 were **David Popham**, **Stephen Melville**, **Birgit Scharf**, and **Richard (Tad) Seyler**.


- **Dana Hawley** led a class for first-year Biological Sciences students on “Dealing with Stress and Frustration.”

**One to two notable events or programs related to graduate recruitment and/or education in CY13**

- **Jeff Walters** co-taught FIW 5004, Global Change Seminar, with Bill Hopkins as lead instructor, a new course associated with the new Interfaces of Global Change Interdisciplinary Graduate Education Program, to 13 students (1 credit, 1.5 hours per week) in Fall 2013.

- The Interfaces of Global Change Science Interdisciplinary Graduate Education Program proposal (PI: **Bill Hopkins**; co-PI **Jeff Walters**) was funded in early 2013 and launched in Fall 2013. The Program, which involves 18 core faculty from 10 departments and six colleges, has already accepted 10 students from 4
Departments

- **Dana Hawley** developed the Outreach in Biology course and offered it for the first time in Spring 2013 as the educational component of my NSF CAREER grant which aims to improve graduate student communication of science to the broader public. In order to accomplish this goal in a pedagogically rigorous way, Hawley collaborated with colleagues from VT’s Science Education program, one of whom (Jessica Stephensen, a former middle school science teacher) co-led the course. The course covered the components of an effective outreach project, the constraints that K-12 teachers face in incorporating outreach into their classrooms, essential science communication skills, and key methods of inquiry-based teaching. Each graduate student then completed a semester-long outreach project that was directly related to their dissertation research and adhered to the Virginia Standards of Learning. The activities that the graduate students developed included an advanced high school lesson on infectious disease mathematical models that uses zombies to engage students, a fourth-grade lesson on how urbanization affects wildlife called “Bright Lights, Big City”, and a board game designed to teach ninth graders about the population dynamics of birds. The graduate students had their lesson plans reviewed by their peers, allowing them to learn from each other and revise their lesson to make it as effective as possible. The graduate students then took their lessons into various local venues, including 9th grade classrooms at Pulaski High School, the Price House Nature Center, Radford University’s undergraduate Parasitology course, and the VT Entomology Department K-12 group tours. The graduate students in the course improved their ability to communicate their own research both to their academic peers and to the broader public. By viewing their dissertation research from the perspective of a community member, the graduate students were forced to step back and consider the key motivation for their work. Most importantly, the course created a lifelong interest in education and outreach amongst the students. One student wrote on the SPOT evaluation that “Because of this class I know I want to teach.” Another student said “The instructors were both inspiring and motivating, providing us with concrete strategies to continue to be involved with extension/outreach in the future.” Hawley plans to teach this course again in Fall 2014 and looks forward to improving it and expanding it further.

**Examples of research experiences and experiential learning opportunities for undergraduates in CY13**

**Number of students enrolled in undergraduate research for credit**

<table>
<thead>
<tr>
<th></th>
<th>Spring 2013</th>
<th>Summer I 2013</th>
<th>Summer II 2013</th>
<th>Fall 2013</th>
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<td>68</td>
<td>4</td>
<td>0</td>
<td>60</td>
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<tr>
<td>BioSci majors enrolled</td>
<td>31</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>in other departments’ 4994</td>
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</tbody>
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**Faculty hosting undergraduates in their research labs (number of students for CY13 in parentheses):**

- Andrews² (1)
- Banerjee (1)
- Barrett (10)
- Belden (8)
- Benfield (2)
- Brown (10)
- Capelluto (9)
- Carey (3)
- Cimini (7)
- Finkielstein (15)
- Fox¹ (7)
- Hawley (13)
- Hilu (6)
- Kelly¹ (2)
- Lawrence (2)
- Lazar (2)
- Li (6)
- Livnat (1)
- McGlothlin (20)
- Melville (5)
- Moore (15)
- Mukherjee¹ (4)
- Nilsen (5)
- Nimchuk (1)
Opell (5)               Schubot (1)               Tholl (5)               Xing (1)
Phillips (9)            Sewall (5)               Tokuhisa (1)           Yang (1)
Popham (3)              Stevens (4)              Valdez (7)              Winkel (3)
Scharf (12)             Strickland (4)           

Examples of international experiences for undergraduate students

Lori Blanc, Research Scientist in Biological Sciences, led the study abroad programs, BIOL 3954 Hokies Abroad: Antarctica, in fall/winter 2013 (17 students total: 7 from VT, 10 enrolled through SUNY Brockport and from Hampshire College, University of Montana, Adrian College, SUNY Albany, University of Florida, SUNY Binghamton, Florida State University, SUNY Albany, and Brown University). BIOL 3954 Australia & New Zealand: Conservation-Based Service Learning, in summer 2014 (28 students total: 19 from VT, 9 from SUNY Brockport).

Both of these courses focus on the complex interdisciplinary topic of sustaining humans and the environment and are open to all majors. The Australia & New Zealand course provides students with the opportunity to learn about conservation biology through hands-on service work with ecological restoration projects, educational outreach programs and ‘citizen science’ data collection for long-term ecological studies. The Antarctica course is a collaborative effort between Virginia Tech, State University of New York, American Universities International Programs, University of Canterbury, New Zealand, and Gateway Antarctica: Centre for Antarctic Studies and Research. This course explores Antarctica – its history, geology, climate, and marine and terrestrial biology. Special attention is given to contemporary legal, psychological, and anthropological aspects of human activity in the region, conservation of ecosystems, and sustainable use of natural resources. Students attend weekly online lectures (delivered by faculty from the Antarctic Research Center in Christchurch, New Zealand) and prepare an independent research paper in their area of interest. They then participate in a two-week field study during winter break that consists of three days in Tierra del Fuego, Argentina, and 11 days aboard an expedition cruise ship to the Antarctic Peninsula.

Examples of international experiences for graduate students in CY13

- Carla Finkielstein collaborated with Dr. Dan Lloyd in the Department of Biosciences at the University of Kent UK to establish a graduate student exchange program. This program was a direct result of her participation in the 2012 International Faculty Development Program and built on a pre-existing MOU between Kent and Virginia Tech. The first exchange of students took place over Summer 2013 and involved the visit of one student from VT (Jacob Graham) for 10 weeks in a collaborative project with
Dr. Michaelis at the University of Kent. Two students from Kent (Samuel Kirkham and Michela Barbato) arrived in September and stay until mid-October in the Finkielstein lab working on their M.S. theses. Funding was provided by the PI’s NSF CAREER Award for the VT student and from the Commonwealth for UK students.

**Any additional examples that address goals in Virginia Tech’s “Plan for a New Horizon”**

- Professor Emeritus Asim Esen³ was awarded a Fulbright Research/Teaching grant to support a two-semester lecturing appointment during the 2013-2014 academic year. His host institution was Al-Farabi Kazakh National University in Almaty (Alma Ata), Kazakhstan.

**Ways in which computational science and skills for managing and analyzing complex data sets are integrated across a wide range of disciplines**

- Eric Sokol, a postdoc in the Barrett laboratory, developed a metacommunity simulation model named MCSIMs ([https://sites.google.com/site/metacommunitysimulation/](https://sites.google.com/site/metacommunitysimulation/)). MCSIMs is written in the R package to simulate metacommunity dynamics and calculate measures of diversity (diversity partitioning and variation partitioning). The development of this model is supported by an LTER grants from NSF and has as its short-term goal the synthesis of information collected from across the LTER network.

**Use of technology in classrooms and examples of distance-learning opportunities N/A**

**Incentives for teaching and learning through distance education N/A**

**Creation of flexible classroom spaces that fully support e-learning components in CY13**

- The four Derring laboratory classrooms used for teaching the introductory biology laboratory courses underwent their first renovation since Derring opened in 1969. The rectangular lab tables were replaced by standing-height octagonal tables, which are more ergonomic and allow for better interaction. The rooms also have new lab stools, whiteboards, podiums, and benches. In addition to the new furnishings, the rooms received a new coat of paint, a redesigned air handling system, and dropped ceilings. Overall, a major improvement that was welcomed by the staff, the instructors, and the students.

![Derring biology lab circa 1984](image1)

![Pre-renovation](image2)

![Post-renovation](image3)
Quality and availability of academic advising from orientation through graduation (CY13)

- **Richard (Tad) Seyler** and **Jack Evans** served as a Primary Evaluator for Students in Healthcare Careers. The Office of Healthcare Professions Advising (OHPA) provides guidance for students interested in healthcare areas including medicine, dentistry, pharmacy, nursing, physical and occupational therapy. As a primary evaluator in this office, Seyler and Evans advise students in preparation for interviews, personal statements, and other aspects of their applications. They also offer a “mock interview” and feedback; a composite letter is written on behalf of the office. These letters are important components of successful professional school applications. Last year Seyler interviewed 52 students.

- Associate Head Richard Walker directed the department’s Undergraduate Program Office, assisted by Instructor Jack Evans and three staff members, Karen Fraley, Angela Mathias, and Emily Overend. This office is a vital part of the department’s operations, providing expert academic advising to the 1300+ majors and many non-majors needing assistance or advice. This office also organizes the annual departmental Commencement Ceremony, held in Burruss Hall, and leads orientation sessions during the summer. In addition, this office manages all teaching-related administrative work, which includes making teaching assignments, providing assistance with new degree proposals, coordinating with other departments on course scheduling, and many other tasks.

**Examples of STEM-related activities fostering entrepreneurship, science and technology policy, and ethics**

N/A
Recognition for Outstanding Service and Outreach Contributions (FY14)

- Associate Professor Carla Finkielstein was recognized with the 2013 College of Science Outreach Award (individual) and the Microbiology Outreach Group [co-chairs Ann Stevens and Birgit Scharf, and members, Florian Schubot and Richard (Tad) Seyler] was recognized with the 2013 College of Science Outreach Award (team).
- Professor David Popham was recognized with the 2013 Jack Kenney Award for Outstanding Service on the Editorial Board of the Journal of Bacteriology.
- Michael Rosenzweig was awarded the 2014 Alumni Award for Outreach Excellence (individual).
- Professor Ann Stevens was elected to the Virginia Tech Academy of Faculty Service in fall of 2013.
- 2014 Department of Biological Sciences Outstanding Service Award: Associate Professor Michael Fox and Professor Liwu Li.

Faculty service, CY13 (Editorships, NSF/NIH program managers or panel members, leadership positions in professional societies)

- Fred Benfield served on the Society of Freshwater Science Election & Place Committee; as Member of the Editorial Board & Book Review Editor for “Freshwater Science;” on the Selection Committee for “Freshwater Science” Rosemary MacKay Articles; on the Society for Freshwater Science Constitutional Revision Committee; on the Voting Committee Member of Joint Task Force, Standard Methods for the Examination of Water and Waste Water, US Public Health Service; and on the Virginia Department of Environmental Quality Academic Advisory Committee.
- Lori Blanc served on the faculty advisory panel for American Universities International Programs, providing input on the future direction of their South Pacific study abroad programs offered by many North American universities; she also served on the American Ornithologists' Union Historical Committee member, assisting with the ongoing production of the “Voices of Ornithology” digital media project to interview scientists and document their contributions to ornithology.
- Cayelan Carey chaired the Collaborative Climate Committee for GLEON; was a member of the GLEON Steering Committee and Development Committee; was a member of the Lake and Reservoir Specialist Working Group for the International Water Association; served as co-leader of the GLEON Plankton Theory Group; and was a Guest Editor for Ecological Applications.
- Daniela Cimini was co-organizer and co-chair of a special interest subgroup meeting on “Mechanics and Dynamics of Mitosis,” at the 2013 ASCB annual meeting and served as Academic Editor for PLoS ONE (since Jan 2010).
- Joe Falkingham served on the Editorial Board of Applied and Environmental Microbiology and was Editor for the International Journal of Microbiology and the International Journal of Mycobacteriology.
- Carla Finkielstein served on the Organizing Committee for the Virginia Academy of Science Structural...
Biology Session and for the Interdisciplinary Research Society. She served on review panels for the American Heart Association (National and Regional Affiliate).

- **Michael Fox** served as President of the Central Virginia Chapter of the Society for Neuroscience; Alternate Council member for the American Society of Neurochemistry; Chair of the Young Investigator Educational Enhancement (travel award) Committee for the American Society of Neurochemistry; member of the Planning Committee for the 2014 Annual American Society of Neurochemistry Meeting in Long Beach, CA; member of the Editorial Board for PLoS ONE; and was elected to Editorial Board of Developmental Neuroscience (Service begins 01/01/14).

- **Dana Hawley** was an Associate Editor for Functional Ecology and served on an NSF IOS grant panel (Organism-Environment Interactions).

- **Khidir Hilu** served on the editorial boards of the Journal of Systematics and Evolution, Frontiers in Ecology and Evolution, and Webbia (referee committee).

- **Rick Jensen** was a leader in the U.S. FDA-sponsored Sequencing Quality Control (SEQC) Project.

- **Deborah Kelly** served on the Editorial Boards of the Journal of Analytical and Molecular Techniques and the Journal of Visualized Experiments.

- **Iulia Lazar** was a grant review panel member for NIH-S10 Shared Instrumentation Grants and the NSF Instrument Development for Biological Research program.

- **Liwu Li** served as Secretary of the Inflammation Research Association; Development Chair for the Society for Leukocyte Biology; Editor for Inflammation Research; Academic Editor for PLoS ONE; and Member of the College of Distinguished CSR Reviewers, NIH. He was also a member of the American Heart Association Immunology Review Panel; the NIH Study Section on Innate Immunity and Inflammation (III); and the NIH Study Section on Transformative R01 Initiatives.

- **Joel McGlothlin** was Associate Editor for Ecology and Evolution and reviewer for The Tangled Bank: An Introduction to Evolution, 2nd ed., Roberts and Co. He also served as a panelist for the NSF Graduate Recruitment Fellowships (Evolutionary Biology) program, NSF IOS Preliminary Proposals (Animal Behavior), and NSF DEB Full Proposals (Evolutionary Genetics). He served on the Hamilton Award Committee for the Study of Evolution.

- **Steve Melville** chaired the Mid-Atlantic Microbial Pathogenesis Meeting (Wintergreen, VA).

- **Ignacio Moore** served as Associate Editor for General and Comparative Endocrinology, Associate Editor for Functional Ecology, and Divisional Program Officer of the Society of Integrative and Comparative Biology.

- **Brent Opell** was on the Editorial Board of the Journal of Arachnology.

- **Dave Popham** served on two grant proposal review panels for the NIH Topics in Bacterial Pathogenesis Study Section.

- **Florian Schubot** was a member of the American Heart Association spring and fall cycle grant review panels for protein crystallography.

- Kendra Sewall co-organized a symposium at the Society for Integrative and Organismal Biology, titled “Adaptation or developmental constraint? Uniting evolutionary theory and empirical studies of phenotypic plasticity.” She also served on an NSF IOS Behavioral Systems DDIG Review Panel.
• **Jill Sible** was a member of the NSF STEM education grant review panel.

• **Ann Stevens** served on the American Society for Microbiology’s Committee on Undergraduate Education, also chairing the Task Force charged to write learning objectives for national ASM Vision and Change curriculum statements.

• **Mike Strickland** served as Vice Chair of the Ecological Society of America’s Microbial Ecology Section and was a member of the NSF DEB Ecosystem Studies DDIG Review Panel.

• **Dorothea Tholl** was a member of the grant review panel for the NSF Plant Genome Program; the Scientific Advisory Board for the Leibniz Institute for Plant Biochemistry, Halle, Germany; Editorial Board for The Plant Journal (since 2012); Editorial Board for Recent Advances in Phytochemistry (2013); Advisory Board for New Phytologist (since 2011).

• **John Tyson** served on the Editorial Board of the Journal of the Royal Society Interface Focus.

• **Jeff Walters** chaired the 2013-2014 National Research Council Committee on Independent Scientific Review of Everglades Restoration Progress, which produces a biennial report to Congress assessing progress with the $13 billion Everglades restoration, with a particular focus on scientific issues. He was also a member of the Guam Micronesian Kingfisher Recovery Committee, formed in 2001 to advise the US Fish and Wildlife Service and develop a plan to reintroduce the Guam Kingfisher, which exists only in captivity currently, and other bird species extirpated by Brown Tree Snakes to Guam. And he served as Chair of the Cooper Ornithological Society / American Ornithologists’ Union Conservation Task Force, charged with developing a policy proposal to implement major new conservation activities to be conducted jointly by the two societies.

• **Jack Webster** served on the Coweeta Long-Term Ecosystem Research Project Science Advisory Committee, a position he has held since 1999.

• **Brenda Winkel** was a member of the grant review panel for the NSF / Israeli Binational Science Foundation International Collaborations in Organismal Biology Program (ICOB) and served as an ongoing member of the technical advisory committee for the NSF EPSCOR Arkansas Plant Powered Production program.

• **Jianhua Xing** was chair of the organizing committee of the International Conference on Computational Cell Biology, held in Blacksburg and served as a guest editor for the theme issue, Computational Cell Biology, Interface Focus (Royal Society Publishing).

• **Zhaomin Yang** was a judge for the NSF IGERT 2013 video and poster competition (Group B) and served as Session Chair at 40th International Conference on Myxobacteria, Beijing, China.

**Examples of economic development (e.g., industrial partnerships, patents)**

• **Joe Falkingham** served as a consultant for Dr. Reddy’s Laboratories (Bristol, TN; Shreveport, LA; Princeton, NJ).

• **Chris Lawrence** was a member of the Scientific Advisory Board (fungal allergy therapeutics development) and cofounder of Alergenetica SL, allergy therapeutics company, Tenerife, Spain and Manchester, UK. He initiated a collaboration with Leone Bioventures in Roanoke to develop human antifungal therapeutic based on existing leads from Dr. Joe Falkingham’s group at Virginia Tech.
Study Abroad programs (FY14)

- Lori Blanc, Research Scientist in Biological Sciences, led the study abroad programs, BIOL 3954 Hokies Abroad: Antarctica (fall/winter 2013) and BIOL 3954 Australia & New Zealand: Conservation-Based Service Learning (summer 2014). See details under “Examples of international experiences for undergraduate students” on p. 27.

PK-12 STEM programs (CY13)

- Jeb Barrett: Science Outreach with A. Blatt’s 6th grade classes at Glenvar Middle School.
- Lori Blanc: hosted four STEM educational outreach displays at the VBI Kid’s Tech University program for children between the ages of 9 and 12. Educational activities were run by life science undergraduate students in topics ranging from Antarctic studies to non-Newtonian fluids and water quality.
- Carla Finkielstein: hosted five Virginia High School students in her lab. Students interned in the laboratory for a minimum of 10 weeks and at least twice a week, shadowing graduate students and running some small experiments. One of these students won first place for her presentation of her work at a regional high school meeting.
- Michael Fox: gave a 4 hr lecture in the Roanoke Valley School District Lecture Series on “The Brain.”
- Eric Hogan: helped chaperone a group of high school juniors and seniors from the Southwest Virginia Governor’s School to the Edward Via School of Osteopathic Medicine in the Virginia Tech Corporate Research Center.
- Iulia Lazar: hosted senior from Auburn High School in her research laboratory.
- Joel McGlothlin: Graduate student Tamara Fetters developed outreach activities for preschoolers and elementary school students via Blacksburg Nature Center’s SEEDS program.
- Mike Rosenzweig: Biological Sciences Outreach Program (Bio SOuP) directly supervised 16 highly engaged students and an additional 120 other undergraduate service students; Participated with the VT STEM K12 Outreach Initiative, and with VT Engage. Bio SOuP shares classroom kits (see http://www.biol.vt.edu/outreach) with area teachers. Continued to maintain a working relationship with area school districts, especially the 400 square mile mostly rural Montgomery County Public School district, to better coordinate with their Science, Math, Vocational, and Social Studies Curriculum Coordinators. Planned and hosted a workshop for eight preK-2nd grade teachers in May 2013. Activities revolved around using active learning at the nature center to develop S.O.L. – correlated activities. One of the teacher participants, Jackie Hodge of Gilbert Linkous Elementary School planned and held a week-long summer camp for her students during summer 2013.
- Birgit Scharf: visited Giles County High School 10th grade with her graduate students, demonstrating the importance of microbes and microbial motility and diversity.
- Ann Stevens: Chaired the Gilbert Linkous Elementary School Science Fair (2010-2014); Tad Seyler was co-chair.
Examples of Community and Student Engagement (CY13)

- **Lisa Belden**: SEEDS Board of Directors (non-profit nature education, 2012-present); Designed and completed science activities with local elementary school students (PreK-1) on “Amphibian life cycles and biodiversity.”

- **Bryan Brown**: Led the Urban Waterbodies project that works directly with The Columbia Association, the aquatic management agency in Columbia, MD (a suburb of Baltimore). Their management activities inform the Brown laboratory’s work and, in turn, the results of the Brown lab’s surveys and experiments inform the agency about the effects of management on biodiversity. Along with Cayelan Carey, they are translating their efforts to understand biodiversity in urban systems to information for the general public, and in particular, for the public of Blacksburg. To this end, they have been working with Mike Rosenzweig to organize workshops at the Blacksburg Nature Center and have conducted one such workshop already (see below under Carey).

- **Art Buikema**: Achieved Master Instructor status from the Virginia Department of Game and Inland Fisheries; was a member of the Executive Committee of the Blue Ridge Fulbright Organization; taught 12 hours of hunter education course work that emphasizes ecology, population dynamics, sustainability, conservation, ethics, and safety; gave a talk on sub-Saharan Africa to the Blacksburg Rotary Club.

- **Daniel Capelluto**: delivered short talks at the Rockledge on Mill/American Heart Association and at the New River Valley Heart Walk, Radford, VA.

- **Cayelan Carey**: created a lab website that highlighted her lab’s research and collaborations with the Western Virginia Water Authority; worked with Rosaire Bushey, Communications Director of the College of Science, and J. Scott Parker, VT’s Web Video Journalist with University Relations, to highlight her lab’s collaboration with the Western Virginia Water Authority to improve drinking water quality in the Roanoke region; also worked with Tim Ciesco and Dawn Jefferies from NBC’s local WSLS station to create an outreach story on this project for the local news; organized a Saturday event at the Blacksburg Nature Center with Bryan Brown and Mike Rosenzweig, entitled “What’s in your neighborhood pond and stream?”

- **Joe Falkingham**: Speaker to support groups of individuals suffering from nontuberculous mycobacterial infections throughout the United States (New York, Philadelphia, San Francisco) on epidemiology, current research, and methods to reduce infection. The support groups are supported and sponsored by the NTMir Research and Information, Inc. Foundation.

- **Carla Finkielstein**: Participant, National Breast Cancer Lobby Day 2013; Organizer, Breast Cancer Advocates’ annual visit to Virginia Tech; Organizer, “Pretty in Pink;” Speaker, Breast Cancer Prevention Strategies, Rackspace Software Development (Blacksburg) and Fairington Apartments (Roanoke); Speaker, Henry St. Heritage festival for Komen Foundation Blue Ridge Affiliate; Volunteer, Susan G. Komen Blue Ridge Affiliate Race for the Cure. Her work was featured in the Susan Love Research Foundation Report (2013, Facilitating Research); National Science Foundation - Discovery (Studying Molecules that Regulate the Body’s Circadian Rhythms); Outbursts - Spotlight on International Faculty Development Program (Fighting Breast Cancer Worldwide); Virginia Tech – Outreach and International Affairs (Breast Cancer Researcher Travels to Singapore); National Public Radio - Pulse of the Planet; HealthCanal (Studying molecules that regulate the body’s circadian rhythms); Cancer Today (Standing Strong); Collegiate Times (Associate Professor Finkielstein works toward breast cancer cure).

- **Michael Fox**: gave a 2013 VTCRI Brain School lecture “The Stuff of Brains;” was interviewed for local
news twice in 2013; served as a judge for Roanoke Valley Governor School Science Forum and the Virginia Junior Academy of Science.

- **Dana Hawley**: gave citizen science talk for the Ambler Johnston Residence College-students followed by a citizen science project on birds; presented a poster at the VT Engagement Showcase about her new course, Outreach in Biology; led a class for first-year Biological Sciences students on “Dealing with Stress and Frustration.” PR: was interviewed for SLATE magazine (and was quoted therein); worked with the Cornell Laboratory of Ornithology to put together a public-friendly press release about her PLoS Biology paper. This research was featured on >10 various public websites including Science Daily.

- **Deborah Kelly**: established the Kelly Lab for a Cure Foundation, a local community initiative to raise money for breast cancer research, coordinated by Felicia Ferrara and Elizabeth McBride (VTCRI). Raised ~ $2000 to date from private donations.

- **Ignacio Moore**: Wild World Celebration at Price House Nature Center, 4-27-13. Sarah Foltz in the Moore lab gave a presentation on her work on urban birds, which she also subsequently gave to elementary school classes in Christiansburg and at weekend events at the Price House Nature Center. He also met with students from the USFQ in Ecuador to talk about biological research in the cloud forest; led a group of Ecuadorian university students as part of the Mindo Christmas Bird Count in December, 2013 (noting more than 450 species, ~5% of the world’s total!); gave a presentation on Ecuador/Galapagos to Margaret Beeks Elementary School first grade class.

- **Zack Nimchuk**: Scientific outreach and education, Blacksburg High School: participated in all day science education project entitled “What’s in a cell?” Students were organized into groups directed by Dr. Nimchuk and Dr. Glenda Gillaspy (Department of Biochemistry), and participated in hands-on research on what gene expression patterns tell us about plant development. Students generated their own scientific hypotheses, and were asked to justify their hypotheses through data collection and analysis.

- **Michael Rosenzweig**: Advisor to The Virginia Tech Chapter of Unicef; Founder and Director of SEEDS (Seek Education, Explore, DiScover), which brings informal and K-12 STEM education and community outreach to families in the region through programs, camps and collaboration with Bio SOuP. Directed activities at the Blacksburg Nature Center; coordinated service learning experiences for 20 students from three courses in three different departments; in collaboration with SEEDS’ parent and teacher volunteers, created year-round programs and exhibits serving the campus community and the surrounding Blacksburg and NRV communities. Price House Nature Center: 1 Stream clean up with VT volunteers; Big Event volunteer group site; Town of Blacksburg Parks and Recreation Arbor Day activities with VT and Blacksburg Middle School students; Co-led a town/gown/community project called “Blacksburg Freshwater Heritage” implementing education programs related to restoration of Stroubles Creek, Cedar Run, and Toms Creek. Also gave a presentation on Environmental/Outdoor Education Experiences for Children to the Blacksburg United Methodist Church mothers group and served on the Phycological Society of America Archives Committee, including assisting with collections housed at VT Special Collections.

- **Richard (Tad) Seyler**: Faculty advisor to the Pre-Student of Osteopathic Medicine (Pre-SOMA) organization, including serving as a liaison with the Virginia College of Osteopathic Medicine. Faculty advisor to Emerging Healthcare Leaders, a newly-established student organization that helps unite and assist students who are interested in any healthcare career.

- **Birgit Scharf and Ann Stevens**: co-advisors for the Virginia Tech Microbiology Club (~25 members), including advising on educational outreach efforts at VT Kids’ Tech University and Gilbert Linkous
Elementary School in Blacksburg, VA, demonstration/display at the Gilbert Linkous Elementary Annual Science Fair, and hands-on activities for 3rd grade at Riverlawn Elementary School in Pulaski County.

- **Dorothea Tholl**: collaborated with assistant professor, Mike Wolyniak, at Hampden-Sydney College, Virginia, on an undergraduate research module to examine herbivory phenotypes of Arabidopsis wild type and selected T-DNA insertion mutants in response to insect feeding. Students conducted pilot herbivory experiments with larvae obtained from Dr. Anthony Shelton, Cornell University. The experiments were conducted to optimize protocols and set up controls for future feeding studies using T-DNA insertion mutants of genes with putative functions in plant defense. The collaboration with Dr. Wolyniak was supported by the NSF Research Coordination Network - Undergraduate Biology Education program, titled "Course-based Undergraduate Research Experiences Network," or CUREnet, in which Dr. Wolyniak and I participate under the coordination by Dr. Erin Dolan (University of Georgia).

- **Jim Tokuhisa**: Argonne National Laboratory “Ask Newton” website: answered questions from the general public about biology; served as judge in the Botany section of the Virginia Junior Academy of Science annual meeting.

- **Zhoamin Yang** was faculty advisor to VT Badminton Club.

**International collaborations and programs (CY13; include description along with region and country)**

- **Daniela Cimini** was a visiting faculty member at the University “Roma TRE" in Rome, Italy for two weeks in June, 2013, where she worked with colleague and collaborator, Dr. Antonella Sgura.

- **Silke Hauf** was Planning Group Member for the Japanese-German Frontiers of Science (JaGFoS) Symposium in Kyoto, Japan, in October 2013, organized by JSPS and the Alexander von Humboldt Foundation, aimed at fostering scientific interactions between the two countries. While there, she visited several Japanese colleagues: Toru Hirota, Cancer Institute of the Japanese Foundation for Cancer Research, Tokyo; Yoshinori Watanabe (her former postdoc advisor) and Shigehiro Kawashima at the University of Tokyo; and Tomoya Kitajima, RIKEN CDB, Kobe.

- **Kidir Hilu** continues to work with a former postdoctoral fellow, Dr. Susana Neves, from the Instituto de Tecnologia Quimica e Biologica, Universidade Nova de Lisboa, Portugal on a National Geographic Society grant proposal and and field work on the islands of Madeira and Corsica. He also helped a former student (joint Mansura University, Egypt/VT) and a doctoral student from Najef University, Iraq to obtain scholarships from their governments to spend six months in his lab in 2014.

- **Steve Melville** has ongoing collaborations with Dr. Bruno Dupuy at the Pasteur Institute, Paris, France, to examine the mechanism of toxin secretion in *Clostridium difficile*; with Dr. Mario Feldman of the University of Alberta, Edmonton, Canada, on glycosylation of *C. perfringens* pilins; and with Dr. Lisa Craig at Simon Fraser University, British Columbia, Canada, to determine the structure of the *C. perfringens* PilB2 protein.

- **Zack Nimchuk** is collaborating with Dr. Michael Hothorn at the Max Planck Institute-Tuebingen, Germany, and Dr. Teva Vernoux at the Ecole Normale Supérieure de Lyon, France.

- **John Phillips** is engaged in two projects involving international collaborators, one with Bill Hopkins at VT and Peter Hore at Oxford University, UK, on “Magnetic alignment behavior, and effect of mercury toxicity on yearling snapping turtles,” and another with Chris Anderson of the US Naval Academy and Hynek Burda at the University of Essen, Germany, on “Magnetic field involvement in hunting behavior...
of red foxes (collaboration with). Collecting preliminary data,” which is being led by doctoral student, Mike Painter, in the Phillips lab.

- **Birgit Scharf** is collaborating with Steven Porter from the University of Exeter (UK) and Orkun Soyer from the University of Warwick (UK) to study the phosphate sink containing two-component signaling systems in bacteria as tunable threshold devices.

- **Dorothea Tholl** has research collaborations with Dr. Mwafaq Ibdah of the Agriculture Research Organization, Newe Yaar, Israel and Roderick Jensen at VT, as well as with Dr. Woei-Jiun Guo at the National Cheng Kung University, Taiwan, and Dr. Phillip Brewer at the University of Queensland, Australia.

- **Zhaomin Yang** hosted a visiting scholar from China, Chengyun Li, in his laboratory; he also co-edited a book on Myxobacteria with Penelope Higgs of the Max Planck Institute for Terrestrial Microbiology, Marburg, Germany, mentioned above.

Any additional examples that address goals in Virginia Tech’s “Plan for a New Horizon”

N/A

Partnerships with businesses and government that “address critical and complex problems by co-locating researchers and practitioners in ‘living labs’ where users, in partnership with researchers, drive problem formulation and research design”

- **Chris Lawrence¹** served as a Scientific Advisory Board Member (fungal allergy therapeutics development) and cofounder of Alergenetica SL, an allergy therapeutics company, Tenerife, Spain and Manchester, UK. Initiated collaboration with Leone Bioventures in Roanoke to develop human antifungal therapeutic based on existing leads from Joe Falkinham’s group at Virginia Tech. ALSO ABOVE.

Examples leveraging the strengths of our business programs to provide a competitive advantage

N/A

Examples of strategic global investment, development of research programs on energy and critical technologies, informatics, infrastructure, policy and planning at VT’s international centers

N/A
DIVERSITY

One to two notable activities by students, faculty and/or staff activities promoting diversity (CY13)

- **Lori Blanc** secured a $500 Women in Leadership and Philanthropy Endowed Lecture Fund Grant in January 2013 to bring guest speaker Sunniva Sorby to present a seminar entitled, “Bold Endeavors: Leadership Lessons Learned by the 1st All-Women Expedition to the South Pole”

- **Cayelan Carey** created initiatives to better engage and integrate non-native English speakers into GLEON’s scientific working groups as chair of GLEON’s Collaborative Climate Committee. This included short training workshops for working group leaders on how to manage working groups more effectively, post-meeting assessment for participants, and mentoring for new-to-GLEON researchers.

- **Carla Finkielstein** fosters diversity through her International Training Program that she has run in her laboratory for seven years. It gives international high school and graduate students from developing countries the opportunity to gain hands-on experience in areas of research that are either new to them and can impact their future career goal or that are needed in their home laboratories. Two students were hosted in her laboratory for six weeks in 2013. They returned to their home and enrolled in graduate education at the School of Natural Sciences, Buenos Aires, Argentina in Biochemistry or Biomedical Engineering. She also hosted a high school student from Germany and a graduate student from the School of Medicine in Argentina.

- **Chris Lawrence¹** was the major advisor for three African-American Ph.D. Students: IMSD Scholar, Tristan Hayes, and GBCB students, Shernita Lee, and Yared Kidane

- **Liwu Li** was the major advisor for Bianca Baker, an IMSD Scholar

- **John Phillips** was co-chair, with Professor Emerita **Anne McNabb**, of the Biological Sciences Diversity Committee. Activities in 2013 included organizing the annual International Potluck Luncheon, sponsoring a diversity reading group that worked with Tatum-Daniels’s book, “Why are all the Black Kids Sitting Together in the Cafeteria?”, and collaborating with the COS Diversity Committee on an Annual MLK Week Seminar, with Dr. Doris Zallen (VT) in 2013.

- **Dave Popham** and **Steve Melville** hosted minority students in their labs as part of the NSF REU “Microbiology in the Post Genome Era” Summer Program.

- A number of faculty served as major advisors for VT-PREP Scholars (a one year NIH-funded post-baccalaureate program): Leah Guthrie (**Stevens**) and Karla Sanchez (**Capelluto**) in 2012-2013 and Kevin Hughes (**Cimini**), Alexa Hendricks (**Phillips**), and Simone Campbell (**Sewall**) in 2013-2014.

- **Lisa Belden, Daniel Capelluto, Birgit Scharf, Kendra Sewall, and Dorothea Tholl** all supervised one or two minority students in their laboratories as part of the MAOP Undergraduate Summer Research Fellows program; the student in the Tholl lab continued in the fall.

- **Jill Sible** is the PI on three grants that target underrepresented populations of students. NSF S-STEM is a scholarship and mentoring program for financially-needy students. NSF STEP offers a summer bridge program and living learning community to increase retention and diversity in the physical and quantitative sciences. NIH Bridges aims to increase the success of underrepresented students transferring from community colleges to Virginia Tech to major in the biomedical and behavioral sciences.
Richard (Tad) Seyler is the faculty sponsor for the Emerging Healthcare Leaders student group that consists of >90% ethnic minorities. He serves as a career advisor to these students, both as a group, and individually. Additionally, he sponsored the Gough Scholarship application of a woman who is an ethnic minority.

Diversity awards and honors in FY14 (e.g., MAOP scholarships; McNair Scholars)

Faculty
- Associate Professor Jeb Barrett was recognized with a Virginia Tech Excellence in Access and Inclusion Award

Graduate Students
- Bianca Baker (Li) was recognized with an Honorable Mention for the Virginia Tech Graduate Student of the Year*
- Bianca Baker (Li), Tristan Hayes (Lawrence¹), and David Vasquez (Hawley) were IMSD Scholars
- Vicki Garcia (Walters) was awarded a prestigious NSF Doctoral Dissertation Improvement Grant entitled, “How life history traits contribute to lifetime fitness and affect responses to environmental change in an endangered vertebrate,” $15,201, 6/13-5/14*
- Camille Harris (Hawley) and Regina Wallace (Yang) were recipients of MAOP Scholarships*
- Camille Harris (Hawley) received a Southern Regional Education Board Dissertation Award*

Undergraduates
- Ayana Stukes (Capelluto) was the recipient of a VT-AMP, McNair, and IMSD undergraduate fellowships
- Davia Blake (Capelluto) was the recipient of VT-AMP and IMSD undergraduate fellowships
- Meryl Anne Dexter (Scharf), Yasir Hussein (Tholl), and Juliana Pham (Capelluto) were recipients of MAOP undergraduate summer research fellowships
- Jancarla Ocampo (Belden) won the 1st place poster presentation award at the VA-NC AMP Symposium
- Albert Hinman (Cimini) was the recipient of an IMSD undergraduate fellowship

*also listed in a previous section of this report
### I. Budget trends (past ten years)

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>04-05</th>
<th>05-06</th>
<th>06-07</th>
<th>07-08</th>
<th>08-09</th>
<th>09-10</th>
<th>10-11</th>
<th>11-12</th>
<th>12-13</th>
<th>13-14</th>
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</thead>
<tbody>
<tr>
<td>208 base allocations</td>
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<tr>
<td>Staff salary</td>
<td>567,867</td>
<td>581,541</td>
<td>606,014</td>
<td>628,680</td>
<td>688,649</td>
<td>643,690</td>
<td>602,731</td>
<td>602,731</td>
<td>644,070</td>
<td>679,658</td>
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<td>GTAs</td>
<td>456,793</td>
<td>554,371</td>
<td>594,379</td>
<td>618,051</td>
<td>632,772</td>
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<td>632,773</td>
<td>632,773</td>
<td>646,967</td>
<td>677,120</td>
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<td>Operating</td>
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<td>421,946</td>
<td>422,946</td>
<td>422,946</td>
<td>341,651</td>
<td>342,520</td>
<td>342,520</td>
<td>342,520</td>
<td>352,325</td>
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<tr>
<td>TOTAL</td>
<td>4,452,867</td>
<td>4,590,592</td>
<td>5,079,407</td>
<td>5,190,663</td>
<td>5,181,557</td>
<td>4,918,551</td>
<td>4,746,705</td>
<td>4,937,003</td>
<td>5,120,685</td>
<td>5,435,554</td>
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<tr>
<td>Change in base from previous year</td>
<td>+127,359</td>
<td>+137,725</td>
<td>+488,815</td>
<td>+111,256</td>
<td>-9,106</td>
<td>-263,006</td>
<td>-171,846</td>
<td>+190,298</td>
<td>+183,682</td>
<td>+314,869</td>
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</table>

1. includes T&R, AP, and regular instructors
2. conversion of two staff to AP
3. includes 2% and VRS increase
4. includes $9,805 adjustment for new CNS charges
5. 1000-level labs in FY12; 1000 and 2000-level labs in FY13 – estimates based on projected enrollments.

<table>
<thead>
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<th>Enrollment support</th>
<th>86,812</th>
<th>98,230</th>
<th>238,345</th>
<th>226,418</th>
<th>333,469</th>
<th>378,267</th>
<th>397,844</th>
<th>400,619</th>
<th>307,277</th>
<th>294,815</th>
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<tr>
<td>ASO hire behinds</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>65,000</td>
<td>68,500</td>
<td>10,500</td>
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<tr>
<td>Summer teaching funds</td>
<td>65,900</td>
<td>80,300</td>
<td>94,418</td>
<td>116,343</td>
<td>147,697</td>
<td>148,576</td>
<td>168,167</td>
<td>200,658</td>
<td>213,655</td>
<td>231,420</td>
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<tr>
<td>Lab Fees</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>169,000</td>
<td>247,750</td>
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<td>VTCRI faculty return</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25,480</td>
<td>89,180</td>
<td>144,320</td>
<td>206,800</td>
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<tr>
<td>SCHEV equipment</td>
<td>202,458</td>
<td>200,870</td>
<td>240,872</td>
<td>251,747</td>
<td>235,220</td>
<td>253,222</td>
<td>180,000</td>
<td>187,000</td>
<td>123,749</td>
<td>195,000</td>
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</table>

### II. Grant funding (past ten years)

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<th></th>
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<tbody>
<tr>
<td>Grants in force</td>
<td>4,317K</td>
<td>4,772K</td>
<td>4,530K</td>
<td>5,578K</td>
<td>5,503K</td>
<td>6,549K</td>
<td>4,658K</td>
<td>5,126K</td>
<td>4,183K</td>
<td>5,304K</td>
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<tr>
<td>Overhead return to department</td>
<td>174,028</td>
<td>228,815</td>
<td>197,651</td>
<td>214,630</td>
<td>217,294</td>
<td>175,210</td>
<td>226,784</td>
<td>205,711</td>
<td>240,468</td>
<td>213,088</td>
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<tr>
<td>COS overhead return to Pls</td>
<td>18,499</td>
<td>22,339</td>
<td>18,499</td>
<td>22,339</td>
<td>18,499</td>
<td>22,339</td>
<td>18,499</td>
<td>22,339</td>
<td>18,499</td>
<td>22,339</td>
</tr>
</tbody>
</table>

1. first half of 2014; 2 data from VT Institutional Research; 3 25% returned to Pls starting in 2013; 4 quarters 1, 2, and 3, of FY13
### III. Trends in FTE faculty positions in the department (past ten years)

<table>
<thead>
<tr>
<th>Type of Appointment</th>
<th>Fall 2004</th>
<th>Fall 2005</th>
<th>Fall 2006</th>
<th>Fall 2007</th>
<th>Fall 2008</th>
<th>Fall 2009</th>
<th>Fall 2010</th>
<th>Fall 2011</th>
<th>Fall 2012</th>
<th>Fall 2013</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenured Instructional Faculty¹</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>28</td>
<td>25</td>
<td>25</td>
<td>22</td>
<td>25</td>
<td>30</td>
<td>33</td>
<td>These two categories make up “tenure-track” below</td>
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<td>Pre-tenure Instructional Faculty</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Tenure Track Instructional Faculty</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>Full-time Instructors and Professors of Practice</td>
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<td>Research Faculty</td>
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<td>21</td>
<td>16</td>
<td>20</td>
<td>18</td>
<td>9</td>
<td>16</td>
<td>18</td>
<td>16</td>
<td>Postdocs, Research Scientists</td>
</tr>
<tr>
<td>P-14 Faculty, 9A-9B only</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>4</td>
<td>10</td>
<td>9</td>
<td>7</td>
<td>Part-time Instructors</td>
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<tr>
<td>Professional Faculty without Tenure</td>
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<td>0</td>
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<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Lead lab teaching staff converted to A/P faculty lines</td>
</tr>
<tr>
<td>Graduate Teaching Assistants</td>
<td>43</td>
<td>39</td>
<td>49</td>
<td>51</td>
<td>54</td>
<td>49</td>
<td>47</td>
<td>47</td>
<td>51</td>
<td>48</td>
<td>Including some non-Biological Sciences Graduate Students</td>
</tr>
<tr>
<td>Graduate Research Assistants</td>
<td>30</td>
<td>32</td>
<td>23</td>
<td>32</td>
<td>31</td>
<td>36</td>
<td>32</td>
<td>32</td>
<td>22</td>
<td>26</td>
<td>Graduate Students supported on grants and/or fellowships</td>
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<tr>
<td><strong>GRAND TOTAL</strong></td>
<td><strong>127</strong></td>
<td><strong>134</strong></td>
<td><strong>141</strong></td>
<td><strong>152</strong></td>
<td><strong>153</strong></td>
<td><strong>154</strong></td>
<td><strong>132</strong></td>
<td><strong>148</strong></td>
<td><strong>151</strong></td>
<td><strong>152</strong></td>
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<tr>
<td><strong>Tenure-Track Faculty</strong></td>
<td>34</td>
<td>35</td>
<td>39</td>
<td>39</td>
<td>37</td>
<td>37</td>
<td>34</td>
<td>35</td>
<td>43</td>
<td>46</td>
<td>Includes VTCRI, but not administrative faculty or UDP</td>
</tr>
<tr>
<td><strong>Non-tenure Track Faculty</strong></td>
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<td>28</td>
<td>30</td>
<td>30</td>
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<td>32</td>
<td>20</td>
<td>33</td>
<td>35</td>
<td>34</td>
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</tr>
<tr>
<td><strong>TOTAL FACULTY</strong></td>
<td><strong>54</strong></td>
<td><strong>63</strong></td>
<td><strong>69</strong></td>
<td><strong>69</strong></td>
<td><strong>68</strong></td>
<td><strong>69</strong></td>
<td><strong>53</strong></td>
<td><strong>69</strong></td>
<td><strong>73</strong></td>
<td><strong>80</strong></td>
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</tr>
<tr>
<td><strong>GRA+GTA</strong></td>
<td><strong>73</strong></td>
<td><strong>71</strong></td>
<td><strong>72</strong></td>
<td><strong>83</strong></td>
<td><strong>85</strong></td>
<td><strong>85</strong></td>
<td><strong>79</strong></td>
<td><strong>79</strong></td>
<td><strong>73</strong></td>
<td><strong>74</strong></td>
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</table>
I. Undergraduate Majors in Biological Sciences: Enrollment Trends (past ten years)

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<tr>
<th></th>
<th>Fall 04</th>
<th>Fall 05</th>
<th>Fall 06</th>
<th>Fall 07</th>
<th>Fall 08</th>
<th>Fall 09</th>
<th>Fall 10</th>
<th>Fall 11</th>
<th>Fall 12</th>
<th>Fall 13*</th>
</tr>
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<tbody>
<tr>
<td>GBSC*</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>348</td>
</tr>
<tr>
<td>First Major</td>
<td>1297</td>
<td>1295</td>
<td>1312</td>
<td>1366</td>
<td>1453</td>
<td>1498</td>
<td>1602</td>
<td>1568</td>
<td>1517</td>
<td>1015</td>
</tr>
<tr>
<td>Second Major</td>
<td>73</td>
<td>58</td>
<td>65</td>
<td>59</td>
<td>51</td>
<td>56</td>
<td>52</td>
<td>65</td>
<td>49</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>1370</td>
<td>1353</td>
<td>1377</td>
<td>1425</td>
<td>1504</td>
<td>1554</td>
<td>1654</td>
<td>1636</td>
<td>1566</td>
<td>1410</td>
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<tr>
<td>Freshmen</td>
<td>334</td>
<td>327</td>
<td>347</td>
<td>324</td>
<td>382</td>
<td>342</td>
<td>428</td>
<td>443</td>
<td>404</td>
<td>348</td>
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* General Biosciences, introduced Fall 2013

II. Undergraduate students graduating with honors in FY14

<table>
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<th></th>
<th>Dec 2013*</th>
<th>May 2014</th>
<th>Total</th>
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<tbody>
<tr>
<td>Total graduates</td>
<td>78</td>
<td>278</td>
<td>356</td>
</tr>
<tr>
<td>Magna cum laude</td>
<td>9</td>
<td>52</td>
<td>57</td>
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<tr>
<td>Summa cum laude</td>
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<td>47</td>
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<tr>
<td>Cum laude</td>
<td>10</td>
<td>42</td>
<td>52</td>
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<tr>
<td>Commonwealth scholars</td>
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<td>3</td>
</tr>
<tr>
<td>In honors</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Health scholars</td>
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<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Honors scholars</td>
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<td>17</td>
<td>20</td>
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<tr>
<td>Honors baccalaureate</td>
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</table>

*numbers include Summer I/II 2013 graduates.
### III. Summary of graduate student enrollment, types of support, and graduate stipend payroll (past ten years)

<table>
<thead>
<tr>
<th></th>
<th>04-05</th>
<th>05-06</th>
<th>06-07</th>
<th>07-08</th>
<th>08-09</th>
<th>09-10</th>
<th>10-11</th>
<th>11-12</th>
<th>12-13</th>
<th>13-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD students enrolled¹</td>
<td>37</td>
<td>46</td>
<td>52</td>
<td>65</td>
<td>69</td>
<td>71</td>
<td>63</td>
<td>63</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>PhD students in other programs²</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>20</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>MS students enrolled¹</td>
<td>40</td>
<td>26</td>
<td>21</td>
<td>15</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>MS students in other programs²</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Total students enrolled</td>
<td>77</td>
<td>72</td>
<td>73</td>
<td>80</td>
<td>91</td>
<td>84</td>
<td>87</td>
<td>94</td>
<td>88</td>
<td>83</td>
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<tr>
<td>PhD/MS ratio</td>
<td>0.93</td>
<td>1.8</td>
<td>2.5</td>
<td>4.3</td>
<td>6.6</td>
<td>6.2</td>
<td>5.7</td>
<td>6.4</td>
<td>5.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Fellowships³</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funded GRAs¹</td>
<td>27</td>
<td>32</td>
<td>17</td>
<td>24</td>
<td>17</td>
<td>35</td>
<td>28</td>
<td>36.5</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>Funded GTAs¹,²</td>
<td>46.7</td>
<td>39</td>
<td>41</td>
<td>37</td>
<td>46</td>
<td>46</td>
<td>48</td>
<td>44</td>
<td>48.3</td>
<td></td>
</tr>
<tr>
<td>Active students not funded</td>
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<td>N/A</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>73.7</td>
<td>71</td>
<td>73</td>
<td>81</td>
<td>81</td>
<td>103</td>
<td>90</td>
<td>97.5</td>
<td>77</td>
<td>76.3</td>
</tr>
<tr>
<td>(GRA+fellow)/GTA ratio</td>
<td>0.58</td>
<td>0.82</td>
<td>0.76</td>
<td>1.16</td>
<td>1.35</td>
<td>1.24</td>
<td>0.93</td>
<td>0.97</td>
<td>0.70</td>
<td>0.54</td>
</tr>
<tr>
<td>Fellowship payroll³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRA stipend payroll⁴</td>
<td>$571K</td>
<td>$615K</td>
<td>$414K</td>
<td>$644K</td>
<td>$510K</td>
<td>$690K</td>
<td>$791K</td>
<td>$663K</td>
<td>$662K</td>
<td>$408K</td>
</tr>
<tr>
<td>GTA stipend payroll⁵</td>
<td>$583K</td>
<td>$528K</td>
<td>$567K</td>
<td>$618K</td>
<td>$738K</td>
<td>$765K</td>
<td>$779K</td>
<td>$767K</td>
<td>$783K</td>
<td>$799K</td>
</tr>
<tr>
<td>Total Payroll</td>
<td>$1,154K</td>
<td>$1,143K</td>
<td>$1,212K</td>
<td>$1,634K</td>
<td>$1,668K</td>
<td>$1,761K</td>
<td>$1,667K</td>
<td>$1,560K</td>
<td>$1,621K</td>
<td>$1,448K</td>
</tr>
</tbody>
</table>

¹ Snapshot taken in spring of academic year

² An increasing number of students advised by Biological Sciences faculty are enrolled in other programs, particularly in Genetics, Bioinformatics and Computational Biology (GBCB), but also in other departmental programs including Chemistry, Computer Science, Physics, Psychology, and Engineering Science and Mechanics.

³ Fellowships include the Graduate School Dissertation Award (formerly PhD 2010), Fralin Life Sciences Institute, MAOP, IMSD, ICTAS, and IGERT Fellowships.

⁴ Does not include a small number of students on international fellowships or funded on non-departmental accounting codes.

⁵ Stipends are generally for the academic year only; a small number of students (5-10) are supported on summer teaching funds, the remainder on grants. This number also includes a few students from other life science departments occasionally funded to meet critical teaching on short notice.

N/A = data not available
IV. Number of Graduate Degrees Awarded in Biological Sciences (past ten years)

<table>
<thead>
<tr>
<th>Degree</th>
<th>04-05</th>
<th>05-06</th>
<th>06-07</th>
<th>07-08</th>
<th>08-09</th>
<th>09-10</th>
<th>10-11</th>
<th>11-12</th>
<th>12-13</th>
<th>13-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S.</td>
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<td>8</td>
<td>10</td>
<td>7</td>
<td>11</td>
<td>4</td>
<td>11</td>
<td>6</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Ph.D.</td>
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<td>8</td>
<td>4</td>
<td>3</td>
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<td>9</td>
<td>7</td>
<td>12</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Total:</td>
<td>17</td>
<td>16</td>
<td>14</td>
<td>10</td>
<td>21</td>
<td>13</td>
<td>18</td>
<td>18</td>
<td>17</td>
<td>16</td>
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</table>

V. Graduate student recruitment into Biological Sciences (includes CDB students starting in 07-08; does not include small numbers of transfers from other recruitment programs)

<table>
<thead>
<tr>
<th>Class1</th>
<th>No. Applicants</th>
<th>% Accepted</th>
<th>% of Accepted Enrolled</th>
<th>No. Enrolled</th>
<th>GRE Verbal2</th>
<th>GRE Quantitative2</th>
<th>GRE Total2</th>
<th>GPA2</th>
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<td>8</td>
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<td>11</td>
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<td>654</td>
<td>1220</td>
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<td>99</td>
<td>32</td>
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<td>539</td>
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<td>17</td>
<td>591</td>
<td>670</td>
<td>1261</td>
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<tr>
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<td>19</td>
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<td>601</td>
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<td>538</td>
<td>636</td>
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<td>637</td>
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<td>1193</td>
<td>3.50</td>
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<tr>
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<td>17</td>
<td>65</td>
<td>15</td>
<td>529</td>
<td>661</td>
<td>1190</td>
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<tr>
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<td>22</td>
<td>78</td>
<td>14</td>
<td>535</td>
<td>681</td>
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<td>20144</td>
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<td>22</td>
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<td>13</td>
<td>153</td>
<td>158</td>
<td>311</td>
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<tr>
<td>Average</td>
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<td>27</td>
<td>63</td>
<td>17</td>
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<td>N/A4</td>
<td>N/A4</td>
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</tr>
</tbody>
</table>

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 not available for this year.
4 New GRE scoring system instituted in 2012.
FACILITIES REPORTS

The Biological Sciences Research and Teaching Greenhouse Facilities

The department continues to operate greenhouse facilities on Washington Street adjacent to the Horticulture Garden and also oversees the BIOL/VBI Plant Research Facility on Plantation Road. The director for the latter is Dr. Erik Nilsen. Both operations are expertly managed by Deborah Wiley, a long-time staff member in the department. The facilities together provided space and services for 12 plant research projects in the 2013-14 school year. Dr. Erik Nilsen used both our Washington St. and Smithfield Rd. facilities with four research projects. Dr. Khidir Hilu (4) and Dr. Dorothea Tholl (1) used our Washington St. facilities. Dr. Amy Brunner (Forestry Resources and Environmental Conservation), Dr. M. A. Saghai-Maroor (Crop and Soil Environmental Sciences), and Dr. Joel Shuman (Plant Pathology, Physiology and Weed Sciences) rented space from our Plant Growth facility on Smithfield Rd. Several classes used the greenhouses: General Biology, Plant Taxonomy, Field and Lab Ecology, and Plants and Civilization. We employed four student greenhouse assistants who were willing to work weekends and holidays to make sure research projects and teaching collections were taken care of every day of this past year. Several mechanical and software improvements were reviewed and quotes pursued, with some updates done and some pending. The biggest hurdle encountered was an invasion of a pesticide-resistant thrip species that required research on types of IPM practices to eliminate them. It was a very typical year with lots of plants, insects, and mechanical issues.

Executive summary from the Service Center Rate Review for period 1/1/2013 - 12/31/2013:

Occupancy of the BIOL/VBI Plant Growth Facility began the year at 70%, and increased to 90% by the end of the year. There were several minor maintenance issues this year that resulted in a relatively manageable maintenance cost. For example, ceiling fans were added to Bay 91 to minimize the failure of the 1000W lights. The roof opening system continues to need frequent lubrication in order to keep the bushings from failing. We attempted a contract for maintaining the heating system this year, but we are not sure this was cost effective. The cost/revenue comparison for the 2013 calendar year ended out with a small surplus of $1,534. This annual surplus eliminated the small negative balance of the 230600 account carried from previous years. As a result, the 230600 account sits at 577.52 as of December 31, 2013. The equipment account (230601) has over $15,000 as of December 31, 2013, which serves as a buffer in case a major piece of equipment fails. Based on future occupancy projections we believe the cost structure can remain the same for calendar year 2014.

Massey Herbarium (Derring Hall), June 2013-May 2014:

The Massey Herbarium is directed by Tom Wieboldt, with Khidir Hilu in a supervisory role. This was the herbarium’s busiest year ever, in large part a consequence of two grant activities that allowed us to hire additional student workers. A grant from Virginia Uranium, Inc., concluded in December, 2013, and an NSF grant to the Macrofungi Collections Consortium (of which VT is a part) began in July 2013 and will continue at least through December 2014. Four student workers and two volunteers contributed to the ongoing efforts as follows:

- Bonnie Long, senior Geography major, was hired to work on the Macrofungi grant to take digital images and barcode the fungal specimens.
- Eli Archer, sophomore Geography major, mounted specimens and expanded the vascular plant collection into space made available by the transfer of mycology specimens to NYBG.
• Clay Word, sophomore Environmental Resources Management major, databased and georeferenced specimens in the vascular plant collection (Asteraceae and assorted loan requests).
• Rachel Durkan, junior Environmental Horticulture major, databased and georeferenced specimens in the vascular plant collection (Diapensiaceae, Primulaceae)
• John Ford, volunteer and retired from Radford University IT, finished databasing the lichen collection, cleaned up the bryophyte database, and assisted with batch georeferencing for the Macrofungi grant.
• Vicky Barden, retiree with interest in native plants, databased the bryophyte collection and assisted the Macrofungi project by inserting new archival labels and repackaging fungal specimens.

The Curator was busy keeping ahead of and directing these workers and trouble-shooting problems. For the Macrofungi Collections Consortium, the curator was responsible for purchasing equipment, installing new programs, learning and training. By years end, about 2000 specimens had been processed and uploaded to Mycoportal where data and images are available on the World Wide Web.

Curatorial operations at the Massey Herbarium continued at about the same level as the previous year with several exceptions which include:

1. The number of specimens databased was up from 426 to 2150, and the number of records georeferenced up from 600 to 1405. This was made possible by hiring Clay Word and Rachel Durkan. Clay was especially good at georeferencing and his efforts bumped up the percentage of database records with latitude-longitude coordinates from about 4% to 16%. The number of records in the database just tipped the 20,000 mark at the end of the Spring semester.

2. Major progress was made in the Bryophyte and Lichen collections. Since both of these are small, the Curator decided to try to get them fully databased and barcoded before embarking on the same task for the vascular plants. The databases were completed, although a good many new specimens are still in the process. Barcodes were purchased for both collections, and the process of affixing barcode labels to the packets was begun for the lichens. The curator contacted the managers of the Bryophyte and Lichen Portals about contributing our data. Both were eager to include VPI and begin serving our data over the World Wide Web.

3. Loan activity was up from the previous year with a notable increase in the number of additional information requests. Now that so many herbaria are developing databases, it is becoming routine to get inquiries for data apart from the specimens themselves. A large number of borrowed specimens were returned due to the completion of a study on a select group of Carex species by the Curator.

4. Another major accomplishment was to expand the vascular plant collection from 88 cabinets to 104 cabinets by occupying the space created when the major portion of the mycological collection was transferred to the New York Botanical Garden. This involved moving all 107,000 vascular plant specimens. Our space needs were greatest toward the “front” of the collection, so the shelf space had to be incrementally allocated as we went. This took careful supervision and most of the Spring Semester using a work study assistant.

Other grants and significant activities:

Another major effort for the Curator was completing fieldwork for the Virginia Uranium, Inc., grant, year two of that project. The project produced a cumulative list of 722 species and 265 specimens, all of which were mounted, databased and georeferenced. I don’t have a breakdown of how much of that was completed during each of the two years of the study. The vouchers mostly constituted county records and species at or near the limits of their ranges in Virginia. Dichanthelium leucothrix was a new record for Virginia, and Cyperus acuminatus had not been seen in Virginia since 1942 and provided evidence that it is a native species.
The Curator was invited to submit a grant proposal to the Army Corps of Engineers to study several exotic species on the Fort A.P. Hill military base. This took considerable time and effort following the Winter Break. It was submitted to the Army Corps in March and final approval is expected soon.

After having provided lots of information last year on violets of the Appalachian region to Dr. Harvey Ballard of Ohio University, the Curator assisted Dr. Ballard in the field on two occasions during the current year. These efforts, together with loaning herbarium specimens, are proving to be especially beneficial for understanding this complex group of plants and likely the naming of a new species endemic to Virginia!

The Curator continues his involvement with the Virginia Botanical Associates and the Digital Atlas of the Virginia Flora. The Atlas continues to grow in its use and now receives 7,000-8,000 visits per month (up from ca 4,000) two years ago. Tom continues as co-site administrator. The decision was made in October to explore adding bryophytes to the Atlas. The work began in earnest in February, continued through April, and is expected to be completed in the next six month. Preliminary maps are online, but thousands are distributional records will be added from records downloaded from the Consortium of North American Bryophyte Herbaria (Bryophyte Portal). Since many of these records are old, the work involved a review of over 900 bryophyte names. Tom worked with individuals from the Virginia Natural Heritage Program and the University of Richmond to accomplish this. Tom has also been working with website developers to restructure the site, both for displaying bryophyte data and to work properly with mobile devices.

**Biological Sciences Vivarium (Derring Hall)**

The Derring vivarium is managed by Bambi Kelly, an experienced animal care technician who has been with the department for many years in this position. She was supervised by Klaus Elgert until his retirement in December 2013, when Dana Hawley took over this role. The facility currently houses primarily bird species in support of research conducted by Dana Hawley and Kendra Sewell’s laboratories in the department. Ms. Kelly supervised two student employees, supported by funds from the Hawley and Sewall laboratories, who provided care on weekends and holidays. The vivarium provides cage-washing facilities for the Hawley, Phillips, and Sewall groups. Of note is that Ms. Kelly and Jake Waller worked with a local company to find a cost-effective repair for the cage washer. Ms. Kelly also provided expert advice on animal care issues and support to the laboratories of Joel McGlothlin and Jake Socha³ (ME), whose animals are housed in other areas of Derring Hall, and to John Phillips’s operations, housed at the ESL on Plantation Road.