

**A PROPOSAL FOR A
BACHELOR OF SCIENCE
IN BIOLOGICAL SCIENCE**

Prepared by the Steering Committee of the Cross-College BS Major in Biological Science

Members

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Abstract

The Colleges of Agriculture and Life Sciences and Arts and Sciences propose to offer a new, integrated cross-college major that will award a Bachelor of Science degree in Biological Science. The new major replaces the existing Bachelor of Science major in Biology offered through the College of Arts and Sciences, and the Bachelor of Science in Biological Sciences major offered through CALS. The new major will be in Biological Science offered through an integrated program between the College of Agriculture and Life Sciences and the College of Arts and Sciences. Those interested in a Bachelor of Science degree in Biological Science may enroll in either College depending on their interests and career choices.

Our goal is to utilize the strengths of existing faculty in the life sciences across life science units at UVM (CALS, CAS, COM, SNR) to produce an outstanding program that will attract highly motivated, academically strong students, many of whom will be seeking to enter graduate school or pursue professional careers in the life sciences. Graduates of this program will be well prepared to compete in the job market as B.S. level scientists for jobs in industry, the private sector, government agencies, pharmaceutical or biotechnology companies, or to continue with advanced studies leading to M.S., Ph.D., M.D., or D.V.M. degrees and subsequent employment in academia, industry, work in government (e.g., USDA, USFS, US Department of Fish and Game) or the health sciences professions.

The degree program will draw upon established strong academic, advisory, and research programs in CALS, CAS, COM and SNR to provide students with a modern science-based education designed to emphasize fundamental knowledge of biology along with advanced specialization in a subdiscipline of the student's choice. Although the choice of a subdiscipline is not formalized at the upper-level (i.e., students do not need to formally choose a concentration), they will plan their course of study with their academic advisor.

The curriculum will consist of a core set of courses in biology, chemistry, physics and mathematics, and a diverse group of advanced electives in several areas of biology (e.g., genetics, population or organismal biology, neurobiology) that students will choose in close collaboration with their academic advisor. The opportunity to participate in experiential learning in the outstanding research labs of faculty members in CALS, CAS, COM and SNR or in the broader community will be an integral component of the curriculum.

The Biological Science degree program will be administered by a joint Steering Committee consisting of representatives from CALS, CAS, and COM and led by two Co-Directors – one from CALS and one from CAS, selected by the Deans and appointed by the Provost. The new Biological Science degree program will be offered in September, 2004.

I. Title, director, participating faculty, responsible academic unit, and description of the curriculum, research, or service endeavor as it would be included in the University, Graduate College Catalogue or appropriate circulars.

Title: Bachelor of Science in Biological Science

Directors: Alison K. Brody (Biology Department) and James P. Hoffmann (Botany Department)

Participating Faculty: Steering Committee: Rona Delay (Biology), Greg Gilmartin (MMG), Steve Pintauro (NFS). The faculty of the Biological Science Cross-College major will be comprised of faculty members in the College of Agriculture and Life Sciences and the College of Arts and Sciences who are teaching courses, or advising, or providing research opportunities for students in the major, or who have done so within the last two years.

Academic Unit: College of Arts and Sciences, College of Agriculture and Life Sciences

Description and Catalog Copy:

Description of Degrees

UVM offers two degrees in biology. One is a Bachelor of Arts in Biology offered through the College of Arts and Sciences. The other is a Bachelor of Science in Biological Science offered through an integrated program between the College of Agriculture and Life Sciences and the College of Arts and Sciences. Students interested in a Bachelor of Science degree in Biological Science may enroll in either college.

Students in both degree programs begin their studies with courses that provide a strong base in chemistry, mathematics and introductory biology. They proceed to a core of intermediate-level courses that include genetics, ecology and evolution, and cell and molecular biology, as well as physics. In addition, students will have access to the rich array of advanced life sciences courses available across the University. Both degrees offer students the opportunity to do collaborative research with faculty drawn from across the University, including the highly regarded University of Vermont College of Medicine. Students in either program are expected to choose from a broad range of research opportunities and internships, some as early as the first year of study.

Students will choose from two majors, either the Bachelor of Arts degree in Biology or the Bachelor of Science degree in Biological Science. The BA degree includes both an emphasis in arts and humanities as well as the sciences, and the BS degree, while requiring courses in arts and humanities, focuses more attention on the sciences. The Bachelor of Arts degree requires fewer courses in the major at the upper level as compared to the Bachelor of Science degree, and also requires a minor. Both Colleges pride themselves on close faculty advisor-student relationships and excellent “hands-on” experiential learning opportunities. Graduates with either the BA or BS are well prepared for health professional careers, graduate school, and technical careers.

Catalog Copy

CALS

Students wishing to complete a Biological Science, BS degree within a college that explores a range of basic and applied fields in life sciences should enroll in the College of Agriculture and Life Sciences. After completing the BioCore courses, CALS Biological Science BS majors can design their coursework to fit their career interests. Majors in CALS take the first-year “Foundations” course that integrates the first-year experience with oral communication and computer technology skills, thereby enhancing a student’s preparation for success in college. Qualified CALS majors also have access to the Justin Morrill Honors Program, a program that promotes honors studies in individual majors while fostering academic and social interactions among all honors students in the College. Students can readily switch from the Biological Science major to any of the other biologically-based majors within CALS -- animal science, biochemistry, botany, dietetics, ecological agriculture, environmental sciences, microbiology, molecular genetics, nutrition and food science, sustainable landscape horticulture.

CAS

Students wishing to complete a Biological Science BS degree within a liberal arts college should enroll in the College of Arts and Sciences (A&S), where they can join with other life science majors in ZEBNET (a zoology, environmental science, biology network) and design their coursework to fit their career interests. In addition to rigorous courses for the science major, A&S offers a full array of liberal arts courses, and students may sample broadly across the disciplines. Majors in A&S may begin with a Teacher-Advisor Program course, highly interactive seminars led by the students’ first-year advisor. Qualified Arts and Sciences students have access to the John Dewey Honors Program – a program that offers an interdisciplinary experience while allowing students to pursue honors work in their own field. Students can readily switch from the Biological Science major to any of the other biologically-based majors within CAS – botany, biochemistry, environmental science, zoology, psychology – or to a BA in biology.

II. Rationale for the revision of an existing academic unit, curriculum, research, or service endeavor:

A. Philosophic goal statements which are divergent from present ones:

This new major will help to clarify and make more efficient the biology offerings at UVM. Students are often confused and uncertain as to which major (biology in CAS or CALS) best suits their needs and long-term goals. Also there has been the perception that some courses offered to the two majors are redundant and thus are not the best way to utilize a talented group of faculty in the life sciences at UVM. The goal of both the new and existing majors is to offer an outstanding program that will attract highly motivated, academically strong students, many of whom will be seeking to enter graduate school or pursue professional careers in the life sciences.

B. General and specific objectives of the revision:

The primary goal of the new major is to utilize the strength of faculty and courses across the College of Agriculture & Life Sciences, the College of Arts & Sciences, and other campus units (COM, SNR) to produce an outstanding program that will attract highly motivated, academically strong students, many of whom will be seeking to enter graduate school or pursue professional careers in the life sciences.

The new major replaces the existing Bachelor of Science major in Biology offered through the College of Arts and Sciences, and the Bachelor of Science in Biological Sciences major offered through CALS. The new major will be in Biological Science offered through an integrated program between the College of Agriculture and Life Sciences and the College of Arts and Sciences. Those interested in a Bachelor of Science degree in Biological Science may enroll in either College depending on their interests and career choices.

Students in biology will choose from two majors, a Bachelor of Arts in Biology or a Bachelor of Science in Biological Science. The Bachelor of Arts degree requires fewer courses in the major at the upper level as compared to the Bachelor of Science degree, and also requires a minor. The current Bachelor of Arts in Biology remains unchanged by this proposal. It is designed for students who wish to sample offerings broadly in both the arts and the sciences, and is distinct from a Bachelor of Science degree. Here, we focus only on the new B.S. in Biological Science. Students in the new major will begin their studies with courses that provide a strong base in chemistry, mathematics, and introductory biology. They will go on to take an intermediate core of courses which includes genetics, ecology and evolution, and cell and molecular biology, as well as physics. Introductory and intermediate courses that make up this core sequence (“Biocore”) have been developed by relevant faculty, some of whom teach in existing courses that will be used by the new major. Existing courses with significant overlap with the new core courses have been identified and will be eliminated when the new BioCore courses become available.

III. Changes in the relationship of this proposed revision to current missions and long-range plans of:

A. The University:

The new Biological Science major will address the goals of the President and Provost in strengthening the life sciences across the UVM campus and in forging collaborations between CALS, CAS, and COM. Therefore, an interdisciplinary undergraduate degree program in Biological Science would fit well into the long-range plans of the university and UVM's mission.

B. Participating college(s), school(s), department(s) and program(s).

The mission of each of the colleges and departments involved in the new integrated BS in Biological Science is to provide an excellent and high-quality major for our students, and to attract highly motivated and talented undergraduates into the major(s). That does not change with this proposed new major.

IV. Relationship of revisions to other academic units, curricula, research, or service endeavors currently being offered.

The closest major to that being proposed is the BA in Biology. However, the BA is dramatically different in that students take only 9 credit hours of upper-level, advanced electives to fulfill the major for a total of 32 credit hours in Biology or approved, out-of-college electives, while BS students currently take 23 credit hours (in CAS) and 23 to 25 credit hours (in CALS for the BS in Biological Sciences). Students in the new major will take 26 credit hours of upper-level, advanced electives and these can be taken from an approved list of courses drawn from all life sciences at UVM.

For students in this new major from the College of Arts and Sciences, the maximum number of out-of-college courses that may be counted towards the degree is 36 hours. Minors in the College of Arts & Sciences and the College of Agriculture & Life Sciences will be made available to all students in this new major in accordance with College minor requirements. However, the following minors will be unavailable to CALS students due to resource limitations:

Art
English

V. Provide evidence of communication with academic units likely to be involved in or affected by the revised program, and indicate its effect (cost, enrollment).

We have solicited letters from all academic units likely to be affected by the new major. Please see Section XII (beginning on page 21) for evidence of communication. We project little impact on these units over the next five years as a result of implementation of the proposal.

VI. Evidence of demand or need for revision:

A. Explain education, personnel needs, and social needs that exist-refer to specific authorities or studies consulted;

Currently, there are two Bachelor of Science degrees offered for students seeking a BS in biology: one is the BS in Biology in CAS, the other is the BS in Biological Sciences in CALS. On careful scrutiny, the majors are quite different. However, students are often confused and uncertain as to which major best suits their needs and long-term goals. In addition, there has been the perception that some courses offered to the two majors are redundant and thus are not the best way to utilize a talented group of faculty in the life sciences at UVM. Therefore, in November 2001, Provost John Bramley appointed the Biology Implementation Team to develop a proposal for an integrated, cross-college biology major for undergraduate students at UVM. The current proposal builds on the teams' final report.

B. Indicate how this revised program will meet local and regional needs:

A significant percentage of the incoming students to any college or university are comprised of students seeking a degree that will allow them to go on to medical school, veterinary school, dental school and/or a graduate program in the biological sciences. The existing BA major and this new BS major provides the background and qualifications for students to go on in their studies, or to end their studies with a 4-year degree.

C. Discuss projections for continued need over the next five years.

Currently about 140 students enter UVM each year as declared biology (BA and BS, CAS) or biological sciences (BS, CALS). Every indication is that degrees in biology will be as popular in five years as they are now. Also, we plan on the new major attracting additional students and growing over the next five years.

VII. If proposed revision is a program, indicate effects on:

A. Students

1. Evidence of change in source of candidates: None.

2. Change in requirements for admission and retention: None.

3. Any change in selection process: None.

4. Financial support available through the department and college or other UVM sources:

None other than what already exists.

5. Change in mechanism of advising:

Advisors will be drawn from the faculty of this new cross-college major, but students will be assigned to advisors within their own units. The Steering Committee will match students with academic advisors in the units in which they are earning their degree. Note that initially there should be no increase in the number of advisees over the current commitment since the expected number of entering students (approximately 40) represents the combination of the average number of entering students in the BS major of Biology in CAS and the BS major in Biological Sciences in CALS. In addition, the Co-Directors and Steering Committee will meet with all faculty participating in the new major to provide direction and advice that is uniform across the major.

6. Prospects for employment or opportunities for further education of graduates.

In 1997 a survey of UVM graduates with a BS in Biological Sciences was conducted by the UVM Center for Rural Studies. Ninety-five graduates from each of the classes from 1970 to 1996 responded. Fifty-two percent of the graduates had obtained an advanced degree, and 68% were currently using their biological training in their work. These results suggest excellent prospects for future employment and further education of the graduates of this new major.

B. Program of study:

1. Indicate all courses, classes, research, field work, and independent study to be included in the revision.

a. list existing courses envisioned as part of the revised program

NOTE: This is a common curriculum; the same requirements apply to students in either CALS or CAS. However, beyond the requirements for the major, each college has its unique distribution requirements for which each student is responsible.

	Credits
Introductory Biology Courses, BCOR 11,12 (redesigned and replaces existing Biol 11 and Biol 12)	8
Core Courses—100 Level (redesigned and replaces existing Biol 101, Biol 102, Biol 103, Bot 132, Bot 160 and MMG 102)	
Genetics, BCOR 101	3
Ecology and Evolution, BCOR 102	4
Molecular & Cell Biology, BCOR 103	4

Other requirements	
Chemistry 31 and 32, 141 and 142	16
Physics 11 and 12 or 31 and 42 (with labs 21 and 22)	10
Math 19 and 20 or 21 and 22	6
Statistics 141 or 211	3
Advanced-Level Elective credits	26
Total required life-science credits for major	45
Total of all required credits for major	80

From the advanced-level electives, students must complete the following credit requirements:

* Courses with a statistical component	12
* Courses that stress oral communication	3
* Courses that stress written communication	3

(* The Steering Committee will identify courses that fulfill these requirements and will provide a list for advising.)

Up to 6 credits of undergraduate research in any biological discipline may be applied toward the 26 credits of advanced electives, at least three of which must be taken at the 200-level.

Within the advanced-level elective courses students must complete a minimum of 18 credits at the 200-level, and excluding the BioCore courses, no more than 8 credits at the 100-level may be applied to the major. With permission of the advisor, biologically relevant 300-level courses may be applied towards the 200-level course requirement. A preliminary list of advanced-level elective courses is provided in Appendix 1. The list comprises courses teaching fundamental biological principles that are broadly applicable within and across taxa and levels of biological organization, and includes courses that are both basic and applied for which biology is the major, underlying focus. These courses all require introductory courses in chemistry, biology or other appropriate life science disciplines and meet the standards of rigor for the proposed BS major. The Steering Committee will be charged with determining these standards.

Students should emphasize an area of biology by choosing advanced level courses in consultation with their academic advisor. In year 2, all students are expected to meet with their advisor to map a plan of study for completing their higher-level courses. The plan will be signed by both the advisor and student and will become a part of the student's record. Life science faculty from across the campus will provide research opportunities to students in this major.

The list of existing courses that students may use for advanced electives beyond the core, first- and second-year courses is quite extensive (over 100 courses). Therefore, they are included as Appendix 1.

b. list newly established courses required of the student as part of the revised program.

Biocore Courses (BCOR)

BCOR 11 & BCOR 12: Introductory Biology (lecture and lab, 4 credits)

(Fall) (Spring)

Exploring Biology (BCOR 11 and 12) is a two-semester lecture and lab course designed to provide the students with basic knowledge and key concepts that will help them understand the nature of life. The hierarchy from cells to organisms is used as the underlying theme for examining the complexity of life. The course begins with a discussion of the scientific method, providing students the tools for critical thinking and hypothesis testing. From that platform, the origins of life through the development of organic complexity are explored. After completing the course, the students should have a strong foundation in basic cell biology, genetics (Mendelian and molecular), organism structure and function, diversity of life, ecology and evolution. The laboratory component of the course is investigatory in nature, requiring students to develop hypotheses, design experiments, analyze data, and present their results orally and in writing. During lecture, we require the students to be engaged and participate in active learning, and current advances in biological science are discussed. In addition to lecture presentations, we provide students with information about undergraduate research opportunities, internships, and careers in biology.

Prerequisites: Biology BA, Biological Science BS, MMG, Zoology, Environmental Science and Botany majors. Other majors will be accommodated by permission as resources permit. Concurrent enrollment or credit in Chemistry 31 or 32. Credit not given for both Biol 1 and BCOR 11 or for both Biol 2 and BioCore 12. Each course is four credit hours.

BCOR 101: Genetics (lecture only, 3 credits)

(Fall and Spring offerings)

Genetics has become an indispensable component of almost all research in modern biology and medicine. The investigation of any biological process, from the molecular to the population level, may employ the "genetic approach" to gain understanding of that process. Thus, no student of the life sciences can afford to be ignorant of the science of genetics.

Genetics has risen to a position of prominence in human affairs. Special types of plants, animals and microbes have been developed for human foods, drugs, and a myriad of other uses. Molecular genetics is the central foundation of the burgeoning biotechnology industry. At the philosophical level, genetics has presented humans with a large number of ethical dilemmas, which regularly surface in the media. Some examples are genetically modified foods, eugenics, privacy of genetic information about individuals, and loss of genetic diversity in nature. Students must be knowledgeable about genetics in order to understand these issues and make informed decisions about them.

BCOR101 melds classical and molecular approaches to understanding genetics. Together, these approaches provide a unique viewpoint and will provide students the ability to form an integrated view of genetic principles.

Prerequisites: Biol 1,2 or Biol 11,12 or BCOR 11,12; Chem 31, 32; (Organic chemistry recommended).

BCOR 102: Ecology and Evolution (lecture and lab, 4 credits)
(Fall and Spring offerings)

This course explores the interaction of organisms with their environment, including other organisms, and the process of evolutionary change. The theory of ecology and evolutionary biology is tested with sample data on field and laboratory populations. The first half of the semester is devoted to topics in ecology including population growth, demography, life histories, competition, predation, diversity, and behavioral. The second half will cover evolutionary topics --- Mendelian and population genetics, evolutionary mechanisms, natural selection, phylogeny, speciation, and the evolution of sex and behavior. The accompanying laboratory for this course will reinforce the student's understanding of these topics by providing hands-on experience in both the field and laboratory. Students will develop skills in observation, data organization, statistical analysis, and hypothesis testing.

Prerequisites: include Biol 1,2 or Biol 11,12 or BCOR 11,12; Math 19 or 21

BCOR 103: Molecular & Cell Biology (lecture and lab, 4 credits)
(Fall and Spring offerings)

Cell Biology is a multidisciplinary endeavor that draws from biochemistry, genetics, physics, microbiology, and other specialties. It is a science that asks questions about the most basic properties of life using the most sophisticated technology available. At its core, Cell Biology is engaged in uncovering the fundamental processes of life. The implications of cell biology research are far-ranging, from human health to bioremediation. BCOR 103 will provide students a solid, broad understanding of the basic molecular properties of cells that account for their many similarities and at the same time, for their unique properties. The course will reflect the breadth in experimental approaches that define the field and reflect the impact of cell biology research on the generation of basic and applied knowledge. BCOR 103 will expose students to the dynamic and experimental nature of cell biology, and the rapid and significant advances that are being made by cell biologists. The course will inspire students with the excitement of scientific discovery. These goals will be realized through lectures that are complemented with laboratory activities that provide students with first hand experience of cell biology. Laboratories will allow opportunities for hands-on experimentation, modeling and development of theoretical approaches, and improvement of critical thinking and communications skills.

Prerequisites: Biol 1,2 or Biol 11,12 or BCOR 11,12; Chem 31, 32; Chem 141, (Biol 101 or BCOR 101 recommended).

2. Submit representative samples of student's program of study or otherwise illustrate the selection of courses, course load and research time distribution.

**Sample Student Schedule
College of Arts and Sciences
Bachelor of Science in Biological Science**

	Fall Semester	Spring Semester
Year 1	BCOR 11 (4) CHEM 31 (w/lab) (4) Math 19 or 21 (3,4) TAP (3) Physical Ed (1) 15 CREDITS	BCOR 12 (4) CHEM 32 (w/lab) (4) Math 20 or 22 (3,4) Race Relations (3) Physical Ed (1) 15 CREDITS
Year 2	BCOR 102 (4) STAT 141 or 211 (3) CHEM 141 (w/lab)(4) Distribution (3) 14 CREDITS	BCOR 101 (3) BCOR 103 (4) Chem 142 (w/lab)(4) Distribution (3) 15 CREDITS
Year 3	PHYS 11 or 31 +21(5) Advanced Elective (3) Distribution (3) Distribution (3) Distribution (3) 17 CREDITS	PHYS 12 or 42 +22(5) Advanced Elective (3) Distribution (3) Elective (3) 14 CREDITS
Year 4	Advanced Elective (4) Advanced Elective (3) Elective (3) Elective (3) Senior Research (3) 16 CREDITS	Advanced Elective(4) Advanced Elective (3) Elective (3) Elective (3) Senior Research (3) 16 CREDITS

(n) = credits

Advanced Electives = Required 26 credits of advanced life science courses

Electives = Any other course

Senior Research counts toward required Advanced Electives

Sample Student Schedule
College of Agriculture and Life Sciences
Bachelor of Science in Biological Science

	Fall Semester	Spring Semester
Year 1	BCOR 11 (4) CHEM 31 (w/lab) (4) Math 19 or 21 (3,4) Foundations (3) Race and Culture (1) 15 CREDITS	BCOR 12 (4) CHEM 32 (w/lab) (4) Math 20 or 22 (3,4) Foundations (3) Physical Ed (1) 15 CREDITS
Year 2	BCOR 102 (4) STAT 141or 211 (3) CHEM 141 (w/lab)(4) Core competency (3) 14 CREDITS	BCOR 101 (3) BCOR 103 (4) Chem 142 (w/lab)(4) Core competency (3) 15 CREDITS
Year 3	PHYS 11 or 31 +21(5) Advanced Elective (3) Core competency (3) Core competency (3) Physical Ed (1) 15 CREDITS	PHYS 12 or 42 +22(5) Advanced Elective (3) Core competency (3) Elective (3) Elective (3) 17 CREDITS
Year 4	Advanced Elective (4) Advanced Elective (3) Elective (3) Elective (3) Senior Research (3) 16 CREDITS	Advanced Elective(4) Advanced Elective (3) Elective (3) Elective (3) Senior Research (3) 16 CREDITS

(n) = credits

Advanced Electives = Required 26 credits of advanced life-science courses

Electives = Any other course

Senior Research counts toward required Advanced Electives

C. Faculty changes:

1. Provide biographies of present faculty who will participate. Include name, degrees, experience, publications, and present teaching commitments:

See Appendix 2 which includes the biographies of faculty who will participate in the core set of courses (BCOR 11, 12, 101, 102 and 103). In addition, a large number of other faculty across the life sciences at UVM currently offer advanced-level electives.

2. Describe effect on and adjustment in present assignments as result of proposed revision;

The proposed Biological Science major will involve faculty in three academic units, CALS, CAS, and COM. Several faculty in both CAS and CALS now teach courses that will be redesigned and replaced to create the new BCOR courses (see Appendix 3, Table A, page 95). At launch, Drs. Delay and Brody (Biology), and Vogelmann and Barrington (Botany) will be teaching BCOR 11/12; Drs. Tierney (Botany) and Van Houten (Biology) will teach BCOR 101; Drs. Gotelli (Biology) and Hoffmann (Botany) will teach BCOR 102; and Drs. Vigoreaux (Biology), and Gilmartin, Johnson, and Ward (MMG, COM) and will teach BCOR 103.

The new major will be supported by new staff or an increased commitment of time by existing staff. See Appendix 3 for tables of resource needs that the Provost has committed to (Section XII E, page 37).

3. List new positions to be added and qualifications to be met:

Lecturers: Upon launch of the new major, the equivalent of 1.75 senior lecturer positions are needed (1.0 for the Botany department and 0.75 for the Biology Department) to make it possible for these departments to contribute teaching to BioCore while maintaining their other teaching commitments. By year three, with the incorporation of other life science majors and growth of the student body within the major, an additional 0.25 lecturers are needed by each department.

Lab Coordinators: To provide coordination and support for 15 laboratory sections of BioCore 11, and 12 laboratory sections for BioCore 12, a full-time Technician IV will be needed. Currently, a 0.5 FTE, 9 month Technician is dedicated to Biol 11 & 12. The current appointment should be increased to 12 months since a Technician will need this time to develop new laboratories for BioCore 11 & 12. New resources will also be needed for a 1.0 FTE Technician IV to support BioCore 102 & 103. Currently, neither Biol 102 or Biol 103 has a lab coordinator and the upgrades and development of new, investigatory laboratories for BioCore 102 & 103 make the lack of a coordinator untenable. These laboratories will be capped at 12 students/section. The skill level required to run these labs makes finding a capable and qualified person below the level of Technician IV highly unlikely.

GTAs: The reduced class size of Biology 11 and 12 in both lectures and laboratories has been the hallmark of the success of those courses. Although ideal, we recognize that neither College nor the University has the resources to drastically reduce the size of the lecture sections of the 100-level courses for the new major. Therefore, we must provide small, well-designed and well-

supported laboratories and discussion sections for BioCore 101, 102 and 103. BioCore 103 will require two GTAs per section. In addition, the discussion sections of BioCore 101 should be limited to no more than 15 students/section. Currently, Biol 101 and Bot 132 average 26 students/discussion section.

Thus, additional GTAs will be needed for the BioCore courses. GTAs will come from a combination of departmental GTAs who are already teaching in the courses to be replaced, and new GTAs that must be provided by the Provost (see Appendix 3, pages 96 and 98-102). The Provost has provided resources for 3.25 GTAs in the launch year, rising to 6 by FY08. However, there is still a shortfall of 1 GTA in Year 1, and a potential shortfall of up to 4 GTAs by Year 4 depending on enrollments. We will collaborate with the Central Administration to address the potential shortfall. However, we and the Provost (see XII E, page 37) are optimistic that additional GTAs will become available in the life sciences.

Secretarial Support: The equivalent of a 0.50 FTE Staff I will be needed for administrative support of the new major and for Webpage design and maintenance of all BioCore course webpages. In addition, this person will assist with maintaining the budgets for the BioCore courses. Funds have been included to provide supplementary assistance in the Botany and Biology offices where the majority of the courses will be housed and in which departments the two Co-Directors are located.

a. Director, if any;

Currently, two Co-Directors, one from each college, have been appointed by the Provost after consultation with the respective deans. Future Co-Directors should be recommended by the deans of each college, after soliciting the input of the faculty from their respective unit. Formal appointment will be by the Provost. Each Co-Director will serve a five-year term with one being replaced or reappointed on a staggered schedule. The Steering Committee will be comprised of the two Co-Directors and one representative from each of the following units:

Biology Department, CAS
Biological Science Faculty, CALS
Microbiology & Molecular Genetics, CALS/COM

Deans will nominate faculty from their colleges for these positions. These will be faculty who are not serving as Chairs or other administrative roles. Formal appointment will be by the Provost. These Steering Committee members will serve three-year terms, with one member being replaced or reappointed each year. The Steering Committee is charged with maintaining the excellence of the major, and will be involved in various aspects of its administration and governance.

The Steering Committee will be responsible for the oversight of course budgets, periodic review of the core courses and list of advanced-level electives, providing advisor training, and soliciting advice and involvement of life-science faculty across campus. The Steering Committee can nominate, solicit and consider requests of life-science faculty to become a faculty member of this new major. The Steering Committee can initiate proposals for making changes to the major.

Proposed changes will be considered and voted on by the faculty of the new major, and will be subject to full curricular review in both colleges.

Prior to the arrival of the first students to enter the new major, the Steering Committee will determine the criteria for approval of courses to be used toward the advanced electives requirement. The Steering Committee may use criteria suggested by national organizations that study university curricula in science, or may organize criteria specific to the new major. Criteria to be incorporated should include a central conceptual overview that emphasizes hypothesis testing, quantitative methods including data organization, graphing, statistical analysis, oral and/or written expression, and critical thinking.

b. Other positions: None

c. Indication of appointment prospects: None

4. Interdepartmental and interinstitutional cooperation planned.

The new major is by nature a highly collaborative endeavor between individual Colleges and the University (see previous sections for details).

D. Exact wording of degree as it has been, and as it is being proposed

Currently: Bachelor of Science in Biology (CAS), Bachelor of Science in Biological Sciences
Proposed: Bachelor of Science in Biological Science

VIII. Resources to support revision:

To build and maintain morale, excitement and cross-college participation, it is our firm conviction that resources be distributed equitably across colleges and departments for launching and continuing support of the new major.

A. Library: indicate additional demands to be made with an estimate of dollar cost - None

B. Course operating and equipment needs and plans to meet them

Currently, the Biology department invests heavily in instructional resources in Biology 11, 12, 101, 102, and 103. Recognizing that the new BCOR courses will continue to serve the CAS BA biology students, we have partitioned the allotment of resources as follows. The Biology department will continue to contribute what it now invests in these courses. Although not equal to the Biology department's level of input, the other department's whose courses are being eliminated will contribute the funds previously allotted to the eliminated courses. In addition to departmental funds, new funds are needed to operate the new BCOR courses. Several, entirely new laboratory investigations have been designed that will provide students with a state-of-the-art scientific experience. In the base budget for operating funds for each course, we have allotted \$6.00/student/laboratory and increased the per year allotment by 5% to account for inflation. In

addition, where state-of-the-art laboratories require more supplies and expendables (BCOR 12 and BCOR 103) these have been included in the operating funds.

Furthermore, one-time money for equipment and new items will be needed. In addition to one-time equipment purchases, each BCOR course will require an annual \$1000 budget for equipment maintenance and replacement. One-thousand dollars per course per year is included in the operating budget. See Appendix 3, Table C, page 97 for a summary of the human, equipment, and operating resources needed for these five new courses at launch. See Appendix 3 (page 93) for a list of equipment needs for the new BCOR courses, and See Section XII E (page 37) for the Provost's letter of commitment to provide these resources.

C. Physical space needs and plans to meet them (classroom, conference space, laboratory, research and field experience space, office space)

Classrooms within the Marsh Life Science building are required for in-class demonstrations utilizing live specimens and other materials that would be difficult to transport across campus to other locations. In addition, all of the BioCore courses make use of state-of-the-art advanced audio-visual equipment. Therefore, the new major will require rooms that are contiguous to Marsh Life Science and the UVM Greenhouse. Specifically, rooms 105 and 235 MLS and 101 Stafford will be needed for the BioCore courses and recitations.

Several of the courses to be eliminated currently utilize laboratories in the MLS and Hills building and will be available for the new BioCore courses. However, additional laboratory rooms are needed from the onset of the new major. Also, the new coordinator for BioCore 102 and 103 will require office and additional space for laboratory preparation. These space needs have been identified and the Deans of the College of Agriculture & Life Sciences and the College of Arts & Sciences have committed to providing the necessary space (see Section XII C, page 34).

D. Administrative needs and plans to meet them (personnel, office supplies, printing, etc.)

Although the Provost's commitment to this new major includes the creation of a 0.50 FTE Staff I position, we failed to request the necessary resources for a computer, printer, phone, internet and office supplies to support the staff person. We estimate an initial outlay for office equipment of \$2100 and a yearly operating budget of \$1000 per year.

IX. Cost estimate for the changes:

Approximately 40 students are expected to enter this new BS major each year. Initially, these students and others majoring in biology (BA), botany, environmental science, microbiology, molecular genetics, and zoology will enroll in BCOR 11 & 12, however all life-science majors with the appropriate pre- and co-requisites can enroll in BCOR 11 and 12 by the third year. The 100-level BCOR courses will remain open to all students who meet the necessary pre- and co-requisites from the onset of this new major.

A. First-year cost in addition to current budget

The movement of students from Biol 1 & 2 to BCOR 11 & 12 will allow for some reallocation of resources (see Appendix 3, pages 98-102 for a detailed explanation and total cost estimates).

B. Total costs for first four years in addition to current budget

See Appendix 3, pages 100 and 102 for a detailed explanation and total cost estimates.

C. Anticipated non-University support, if any - None

D. Contingency plan if no new money is available

The Deans of CAS and CALS and the Provost have committed to providing the necessary resources for this new major (see XII C and E, pages 34 and 37). However, if those promised resources were not forthcoming then it would not be possible to implement this program.

X. Schedule for enactment of revision:

A. Proposed starting date - Fall 2004 (FY 2005)

B. Time to be offered (calendar year, academic year, summer, part-time) - Academic year

XI. Evaluation:

A. What criteria for evaluation will be applied

The criteria for evaluation of the program will be three-fold. First, trends of student interest in the program will be determined by tracking applications and internal transfers through the Office of Institutional Studies and by performing exit interviews of graduating majors. Second, the quality of the students in the major will be regularly reviewed through examination of GPAs, which will be compared to comparable life sciences programs at UVM. Third, the success of graduates of the program will be tracked to identify successes in employment and post-graduate education.

B. How and by whom will the evaluation be performed

Internal evaluation of the above three criteria will be performed by the Co- Directors and Steering Committee. In addition, all courses and instructors will be routinely reviewed by students through course evaluation procedures already in place in CAS and CALS. Results from these surveys will be examined by the Steering Committee and relayed to instructors for recommendations or action, as needed. Advisors within the program will also be routinely reviewed by majors through existing academic advising evaluation tools. An internal review of the program in line with the current Academic Review Program through the Faculty Senate Academic Affairs Committee will also be periodically performed. This review process will employ external evaluation of the program by directors/chairs of Biological Science programs.

XII. Space for endorsements of proposal should be allowed for:

A. Departments and programs



DEPARTMENT OF COMMUNITY DEVELOPMENT
AND APPLIED ECONOMICS

Date: 11/17/03

To: Alison K. Brody and James P. Hoffmann

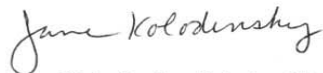
From: Jane Kolodinsky, Interim Chair, PSS

Re: Cross-College BS Biological Science Major

Dear Alison and Jim,

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. We will work with you to handle any glitches that arise due to changes in the Biology curriculum that affect PSS students. The one concern PSS has is the change to BOT 160. PSS students currently do not have a year of biology and the math required is Math 10 or higher. Faculty are examining how the addition of a year of biology would effect our majors. Discussions are underway with the School of Natural Resources. Currently students can also take NR 103 for their ecology requirement, but space is limited in that course. So while we are supportive of the new cross-college major, we want to ensure the PSS students needs are met in the near and distance future as we grow our major.

Sincerely,



Jane Kolodinsky, Interim Chair, PSS

College of Agriculture & Life Sciences, Morrill Hall, 146 University Place, Burlington, VT 05405-0106
Telephone (802) 656-2001, Fax (802) 656-1423, <http://www.uvm.edu/~cdac/dept/>

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The
UNIVERSITY
of **VERMONT**

COLLEGE OF AGRICULTURE AND LIFE SCIENCES
PROGRAM IN BIOLOGICAL SCIENCES

November 11, 2003

Dear Alison and Jim:

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. I do not foresee any immediate problems of implementation of the new major with regard to my Program.

Yours truly,

Robert C. Ullrich

Professor Emeritus of Botany and Agricultural Biochemistry
Director, The Program in Biological Sciences, College of
Agriculture and Life Sciences

108 Morrill Hall, Burlington, VT 05405-0106
Telephone (802) 656-2981, Fax (802) 656-0290

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The University of Vermont

Date: November 17, 2003

COLLEGE OF AGRICULTURE AND LIFE SCIENCES
DEPARTMENT OF PLANT AND SOIL SCIENCE
HILLS BUILDING, BURLINGTON, VERMONT 05405-0082
PHONE (802) 656-2630
FAX (802) 656-4656



To: Alison K. Brody and James P. Hoffmann

From: Don Ross, Coordinator in CALS for the Environmental Science major

Re: Cross-College BS Biological Science Major

Dear Alison and Jim,

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. I do not foresee any immediate problems of implementation of the new major with regard to Environmental Science (ENSC) in CALS. The inclusion of ENSC majors in BCOR 11 and 12 will strengthen our current program. Environmental Science students in CALS have been required to take BOT 160, Plant Ecology. The deletion of this course creates some concern but my understanding is that BCOR 102 will include the material covered in BOT 160 and will be available to ENSC students. Good luck with the new major and thanks for all the time and effort involved.

Sincerely,

A handwritten signature in black ink, appearing to read "Don Ross".

The University of Vermont

DEPARTMENT OF BIOLOGY
MARSH LIFE SCIENCE BUILDING
BURLINGTON, VERMONT 05405-0086 U.S.A.
(802) 656-2922
FAX (802) 656-2914
biology@uvm.edu
www.uvm.edu/~biology



November 7, 2003

Alison K. Brody and James Hoffmann,
Co-Directors of Proposed Biological Science BS Major
Marsh Life Science Building
Burlington, VT 05405

Dear Alison and Jim:

On October 29, 2003, the Biology Department faculty discussed the revised proposal for the Biological Science BS major. The entire faculty was very positive in its outlook on the new major, and voted unanimously in favor.

While the Department is supportive of the major, and thanks the Provost for his pledge of financial resources, two issues remain to be resolved. Long term space for some of the teaching laboratories has not yet been identified, but we are confident that this problem will shortly be resolved. Second, other resources potentially fall short of those outlined in the report that you sent to the Provost in May, 2003. However, we are committed to working with you, the Deans, and the Provost to resolve the shortfall if it should arise.

The new major will certainly garner a great deal of interest from prospective students, and we anticipate that the major will grow steadily over time. Once students arrive into the new major they will profit from a coherent curriculum that emphasizes critical thinking, statistical analysis, hypothesis development, data analysis and written expression and values independent research. These qualities characterize our current courses and frankly we were worried that these would not be sustained in the new major. Our worries have been assuaged. The students will enjoy a diverse series of modern life science courses taught by a faculty who have already demonstrated enthusiasm for the cross-college major. Our department is determined to be a leader in this first-ever effort at UVM. Best of all, and most important, the students will receive a world-class education in biology.

Thank you for all the hard work you have put into the effort of organizing this proposal.

Sincerely,

A handwritten signature in cursive script that reads "Judith Van Houten".

Judith Van Houten, PhD
Chair, Department of Biology
George H. Perkins Professor

JVH/wc



DEPARTMENT OF BOTANY & AGRICULTURAL BIOCHEMISTRY

October 23, 2003

Alison Brody and James Hoffmann,
Co-Directors of Proposed Biological Sciences BS Major
Marsh Life Science Building

Dear Alison and Jim,

The Department of Botany and Agricultural Biochemistry met Thursday, October 23 to discuss the proposed new major in Biological Science. The faculty felt that the proposed new integrated major in Biological Science presents a unique and significant opportunity for development of a high quality major at UVM and they voted unanimously in favor of the proposal. No doubt, there will be issues that will arise once the major is launched but we are confident that they will be resolved by the steering committee, department chairs and deans, all of which have pledged to work together to make this integrated major an educational hallmark of UVM.

This is a new beginning for biology at this university. All students in this major will pass through key core courses that give them the basic fundamentals. These courses will have strength, rigor and they will be taught by our best faculty. Following completion of the core courses, students will have a rich menu of upper division courses to choose from, and the diverse topics represent the dynamic nature of biology itself. I anticipate that this major will be immensely successful and that it will thrive and grow. One of the best investments that we can make at the university is to provide students with the kind of high quality educational experience that you worked so hard to produce in this proposed major. Many thanks for your dedication, hard work, and patience and I look forward to working with you in this exciting new venture.

Best Regards,

Tom Vogelmann
Professor and Chair

Marsh Life Science Building • Burlington, VT 05405-0086 U.S.A.
Telephone: (802) 656-2930 • Fax: (802) 656-0440

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COLLEGE OF AGRICULTURE AND LIFE SCIENCES
DEPARTMENT OF ANIMAL SCIENCES

Date: 11/11/2003

To: Alison K. Brody and James P. Hoffmann

From: Karen Plaut, Chair, Dep't of Animal Science

Re: Cross-College BS Biological Science Major

Dear Alison and Jim,

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science and want to commend you on trying to build a strong Integrated Biological Science program for the future. I do not foresee any immediate problems of implementation of the new major with regard to my Program or Department and I look forward to the point in time when Animal Science students can also take advantage of the wonderful opportunities that you have put together through the introductory biology sequence. Thank you for all the hard work that you have put in to strengthen the basic life sciences at the University of Vermont.

The University of Vermont

COLLEGE OF ENGINEERING AND MATHEMATICS
DEPARTMENT OF MATHEMATICS AND STATISTICS
16 COLCHESTER AVENUE
BURLINGTON, VERMONT 05401-1455
TEL: (802) 656-2940
FAX: (802) 656-2552



Date: 11/18/03

To: Alison K. Brody and James P. Hoffmann

From: Jeff Dinitz, Chair, Department of Mathematics and Statistics

Re: Cross-College BS Biological Science Major

Dear Alison and Jim,

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. I do not foresee any immediate problems of implementation of the new major with regard to my Program or Department. I think that this combined program is long overdue and I am happy to see its imminent approval.

Sincerely,


Jeff Dinitz

The University of Vermont

COLLEGE OF AGRICULTURE AND LIFE SCIENCES
DEPARTMENT OF PLANT AND SOIL SCIENCE
HILLS BUILDING, BURLINGTON, VERMONT 05405-0082
PHONE (802) 656-2630
FAX (802) 656-4656



Date: November 18, 2003

To: Alison K. Brody and James P. Hoffmann

From: Mark C. Starrett

Re: Cross-College BS Biological Science Major

Dear Alison and Jim,

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. I do not foresee any immediate problems of implementation of the new major with regard to my Program or Department. We look forward to being a part of this program.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark Starrett", written over a horizontal line.

Mark C. Starrett
Associate Professor of Horticulture and
Coordinator of Academic Programs



DEPARTMENT OF CHEMISTRY

DWIGHT E. MATTHEWS, Ph.D.
PROFESSOR AND CHAIRMAN OF CHEMISTRY
PROFESSOR OF MEDICINE

e-mail: Dwight.Matthews@uvm.edu
<http://www.uvm.edu/~chem/>
<http://www.uvm.edu/~dmatthew/>

Date: November 18, 2003

To: Alison K. Brody and James P. Hoffmann
Biological Science Program Co-Directors

Re: Cross-College BS Biological Science Major

Dear Alison and Jim,

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. I do not foresee any immediate problems of implementation of the new major with regard to our programs in chemistry or to the Chemistry Department.

Sincerely,

Dwight E. Matthews, Ph.D.

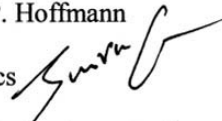
The University of Vermont

Department of Physics
405 Cook Physical Science Building
Burlington, Vermont 05405-0125
Tel: 802-656-8357
Fax: 802-656-0817
Jun-Ru.Wu@UVM.EDU



MEMO

Date : November 18, 2003

To: Alison K. Brody and James P. Hoffmann
From: Junru Wu, Chair of Physics 
Re: Cross-College BS Biological Science Major

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. I do not foresee any immediate problems of implementation of the new major with regard to my Program or Department.



The
UNIVERSITY
of VERMONT

DEPARTMENT OF MICROBIOLOGY AND MOLECULAR GENETICS
THE MARKEY CENTER FOR MOLECULAR GENETICS

November 19, 2003

Drs. Alison K. Brody and James P. Hoffmann
Departments of Biology and Botany
Marsh Life Sciences Building
University of Vermont
Burlington, Vermont 05405

Re: Cross-College BS Biological Science Major

Dear Alison and Jim:

At the outset I would like to express my appreciation and that of the MMG faculty for the enormous amount of work that you and Alison have done to put this proposal together. It is certainly a major accomplishment and is long overdue at the University. Having said that, I still feel there are a number of flaws in the proposed program, most importantly, it is not truly integrated: Botany will teach its genetics course, Biology will teach its genetics course, Biology will teach its cell biology course, MMG will teach its cell biology course... I hope that in the future we can work towards true integration with each course being taught perhaps by a faculty member from each department and possibly taught only once a year, depending on student demand. Having said that, I and my Department Faculty feel strongly that this is an important step in the right direction and one upon which we should be able to build major bridges in the future.

With respect to the specific obligations of MMG, as I understand from the document and my discussions with you, Jim, MMG will be responsible for BIO Core 103 to be taught in the Spring semester. This is something that we expected from the outset and it is perfectly agreeable with the faculty in the Department. It is important that Bio Core 103 be taught in the Spring semester because it is a requirement for our majors who must take the MMG 101 prerequisite in the Fall semester. Also, as agreed, there is a real possibility that the departmental Curriculum Committee will determine that we will want to teach a separate laboratory course, presumably still named MMG 102, to serve the needs of our majors. With respect to the laboratory component of BIO Core 103 in the Spring semester when it is under the aegis of MMG, we would expect that MMG graduate teaching assistants will be functioning in that course, and that these would be new graduate teaching assistants to be provided by the Provost.

Having said all this, I have reviewed the proposal, and I do not foresee any immediate problems to its implementation with respect to my Department.

Sincerely,

Susan S. Wallace, Ph.D.
Professor and Chair

College of Medicine and College of Agriculture and Life Sciences
Stafford Hall, 95 Carrigan Drive, Burlington, Vermont 05405-0084
Telephone: (802) 656-2164, Fax: (802) 656-8749, Website: <http://www.uvm.edu/microbiology>


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The
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SCHOOL OF NATURAL RESOURCES

Memo

To: Alison K. Brody and James P. Hoffmann
From: Carl Newton 
Associate Dean
Date: November 18, 2003
Subject: Cross-College BS Biological Science Major

Dear Alison and Jim,

I have reviewed the proposal for a new, cross-college Bachelor of Science major in Biological Science. I do not foresee any immediate problems of implementation of the new major with regard to the programs in the School of Natural Resources.

B. School and college curriculum committees

C. School and College deans



The
UNIVERSITY
of VERMONT

OFFICE OF THE DEAN
COLLEGE OF AGRICULTURE AND LIFE SCIENCES

November 6, 2003

MEMORANDUM

To: Alison Brody, Associate Professor of Biology and Co-Director
→ James Hoffmann, Associate Professor of Botany and Co-Director
Integrated Biological Science BS Degree Program

Judith Van Houten, Professor and Chairperson of Biology
Thomas Vogelmann, Professor and Chairperson of Botany

From: Rachel K. Johnson, Dean, College of Agriculture and Life Sciences
Joan M. Smith, Dean, College of Arts and Sciences

Re: Teaching Space for the BioCore courses of the Cross-College Integrated Biological
Science BS Major

We are very pleased with the excellent cross-college program proposal prepared with leadership from Drs. Brody and Hoffmann. In recognition of the need for adequate teaching laboratory space for the proposed courses, we will work together to ensure that adequate laboratory space is available and commit to the following plan .

Immediate (about 5 years) teaching laboratory space needs for BioCore 11, 12 and 103 can be met using several existing laboratories. We support the proposal to teach most of BioCore 11, 12 in Rm 007 MLS. Because of the high number of sections taught, it will be necessary to move one to two sections of this course to Rm 21 Hills and share laboratory space with BioCore 103. The BioCore 11, 12 labs will be taught either at the beginning or end of the week to cause the least disruption and changes of set-up for the coordinators and teaching assistants.

The four laboratory sections per week of BioCore 103 will be taught in Rm 21 Hills during both semesters and share space for some BioCore 11, 12 sections as described above.

BioCore 102 will need laboratory space for five laboratory sections per week each semester, which may expand to six sections in year three. The fall semester laboratories can not be taught in space currently assigned to either of the departments of Biology or Botany and Agricultural Biochemistry. Consequently the Department of Microbiology and Molecular Genetics (MMG) has agreed to share space in their teaching laboratories located in Stafford. Laboratory room 102 Stafford is available on Monday, Wednesday and Friday for classes and offers the greatest flexibility for scheduling. In addition Stafford rooms 103 and 104 may have some limited class

108 Morrill Hall, 146 University Place, Burlington, VT 05405-0106
Telephone (802) 656-0137, Fax (802) 656-0290
Website: <http://www.uvm.edu/cals/>

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pg 2.

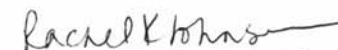
Teaching Space, Brody, Hoffmann

hours available if needed. Brenda Tessmann will meet with the course instructor in the spring semester, at least two weeks prior to the course scheduling deadline, to discuss available laboratory section times for the BioCore 102 laboratories. The department of Microbiology and Molecular Genetics requests that people who use their laboratory facilities follow established laboratory safety procedures and leave the laboratory clean and organized. The spring semester laboratories for BioCore 102 will be taught in space currently assigned to the Biology Department in the basement of Torrey Hall.

In the third year of the new cross-college program, it is planned that the BioCore courses will be opened to students in other life science majors in the University. It is anticipated that this program expansion will increase course enrollment which may require additional laboratory sections for the BioCore courses. We will work together to provide additional teaching laboratories to meet the needs of increased enrollment. However it should be understood that any increase in the number of teaching laboratories assigned to the Integrated Program will be very difficult in the short term, and may actually limit enrollment of students outside of the major until after year five or six.

Finally, we understand that our commitment to meet immediate teaching laboratory space requirements is not a permanent solution. Consequently, after the initial five/six year period, the Deans of CALS and CAS commit to provide the necessary long term laboratory space to meet the teaching requirements of our Integrated Biological Science Program. We understand that the additional laboratory space needs to be contiguous with the Marsh Life Sciences building and the CALS Greenhouse, and that the projected space need is for three teaching laboratories. The exact number of laboratories required will be determined based on course enrollment history of the Integrated Biological Science Program.

Sincerely,



Rachel K. Johnson, Dean
College of Agriculture and Life Sciences



Joan M. Smith, Dean
College of Arts and Sciences

cc: John Bramley
Lauck Park
Susan Wallace

D. Academic Affairs Committee

E. Provost



OFFICE OF THE PROVOST

TO: Rachel Johnson, Dean
College of Agriculture and Life Sciences
108 Morrill Hall

Joan Smith, Dean
College of Arts & Sciences
300 Waterman Bldg.

FROM: A. John Bramley
Senior Vice President and Provost

DATE: October 16, 2003

RE: Integrated Biology Program

I am writing to reiterate my overwhelming support for the Integrated Cross-College Biology Program. As you are aware, I have long been a strong proponent and advocate of this program and believe strongly that it will benefit the University in many ways. I want to restate the University's commitment to this program in the form of one time and base budget support to the Departments of Biology and Botany:

- \$155,000 in one time funds for equipment purchases in FY05
- \$274,000 in base funding in FY05
- \$288,020 in base funding in FY06
- \$334,823 in base funding in FY07
- \$374,098 in base funding in FY08

These funds are contingent on requisite curricular approval occurring in a sufficiently timely manner for the integrated program to be launched in fall of 2004.

Ensuring that we adequately and fairly resource the integrated biology program is an institutional priority and I have unequivocally demonstrated my commitment by providing substantial additional resources. However, I am unwilling to make an additional commitment around the GTFs at this time. Vice President Carr has begun a major planning activity related to graduate education as part of the larger university

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Telephone (802) 656-4400 Fax (802) 656-1363

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growth model. While undergraduate teaching support will be a feature of this assessment it will consider the allocation of resources to graduate education more holistically and programmatically as we go forward. There are also several new initiatives around graduate life science programs that might positively impact undergraduate teaching support. Thus, while I am confident that the anticipated growth in graduate education, particularly at the doctoral level, will mean more graduate students and fellowships in the life sciences I am not prepared to undermine that planning process of Vice President Carr by making long term commitments to particular departments independent of that planning activity.

However, I will confirm that, assuming we continue curricular progress towards approval, that the Provost office will continue its support for the 4 Biology GTFs in the FY05 budget year.

If I can provide additional support on behalf of the proposal, please feel free to contact me.

Cc: Lauck Parke
Alison Brody, Associate Professor
James Hoffmann, Associate Professor /
FAB

F. President

G. Trustees

Appendices

APPENDIX 1. List of advanced life-science electives

NOTE: This is a preliminary list that will require regular updating by the Steering Committee. Also note that any category below is not totally exclusive of the other categories – many courses integrate all three levels into their syllabi.

Cellular	Organismal	Communities and Ecosystems
100 Level	100 Level	100 Level
	ASCI 110: Animal Nutrition, Metabolism and Feeding	ENSC 101: Pollutant Movement Through Air, Land, and Water
200 Level	ASCI 117: Horse Health and Disease	NR 103: Ecology, Ecosystems and Environment
AGBI 201: General Biochemistry	ASCI 118: Applied Animal Health	PSS 152: Agroecology
AGBI 201: General Biochemistry Lab	ASCI 141: Anatomy and Physiology of Domestic Animals	PSS 161: Fundamentals of Soil Science
AGBI 250: Plant Biochemistry	ASCI 161: Laboratory Animal Health and Disease	200 level
ANNB 202: Neuroanatomy	BIOL 104: Comparative Animal Physiology	BIOL 264: Community Ecology
ASCI 216: Endocrinology	BOT 104: Physiology of the Plant Body	BIOL 295: Conservation Biology
BIOC 205: Biochemistry I	BOT 108: Morphology & Evolution of Vascular Plants	BOT 213: Plant Communities
BIOC 212: Biochemistry of Human Disease	BOT 109: Systematics and Phylogeny	BOT 223: Fundamentals of Field Science
Biol 205: Advanced Genetics Laboratory	FOR 133 (PSS 107): Forest Entomology	BOT 232: Botany Field Trip
Biol 212: Comparative Histology	MMG 101: Biology of Microorganisms	BOT 234: Ecology of Freshwater Algae
BIOL 223: Developmental Biology	NFS 143: Nutrition in the Lifecycle	ENSC 201: Pollution Ecology
Biol 255: Developmental Molecular Genetics	PATH 101: Introduction to Human Disease	ENSC 222: Advanced Silviculture
BIOL 261: Neurobiology	PSS 106: Entomology and Pest Management	FOR 223: Multiresource Silviculture
BIOL 263: Genetics of Cell Cycle Regulation	PSS 117: Plant Pathology	FOR 231: Integrated Forest Protection
BIOL 295: Molecular Ecology	PSS 138: Commercial Plant Propagation	FOR 234: Forest Pathology
BMT 242/244: Immunology	PSYC 121: Biopsychology	MATH 268: Mathematical Biology and Ecology

Cellular	Organismal	Communities and Ecosystems
BOT 257: Plant Cell Physiology	WFB 131: Field Ornithology	NR 278: Principles of Aquatic Systems
BOT 256: Adv Plant Genetics	WFB 130: Ornithology	NR 250/251: Limnology
CHEM 205: Biochemistry I	WFB 150: Wildlife Habitat and Population Measurements	NR 280: Stream Ecology
CHEM 207: Biochemistry Lab	WFB 161: Fisheries Biology and Management	WFB 279: Marine Ecology
MLS 231: Pathophysiology of Blood Cells	WFB 174: Principles of Wildlife Management	
MLS 262: Advanced Immunohematology	200 Level	
MLS 255: Advanced Clinical Microbiology	ASCI 215: Physiology of Reproduction	
MMG 201: Molecular Cloning Lab	ASCI 220: Lactation Physiology	
MMG 203: Mammalian Cell Culture in Molecular Biology	BIOL 202: Quantitative Biology	
MMG 211: Prokaryotic Molecular Genetics	BIOL 206: Immature Insects	
MMG 220: Environmental Microbiology	BIOL 212: Comparative Histology	
MMG 222: Clinical Microbiology	BIOL 217: Mammalogy	
MMG 223: Immunology	BIOL 219: Comparative and Functional Vertebrate Anatomy	
MMG 225: Eukaryotic Virology	BIOL 223: Developmental Biology	
MMG 231: Bioinformatics	BIOL 225: Physiological Ecology	
MMG 240: Introduction to Macromolecular Structure	BIOL 238 Winter Ecology	
NFS 203: Food Microbiology	BIOL 246: Ecological Parasitology	
NFS 263: Nutritional Biochemistry	BIOL 254: Population Genetics	
PHRM 272: Toxicology	BIOL 255: Comparative Physiology	
PHRM 290: Topics in molecular and cellular pharmacology	BIOL 265: Developmental Molecular Genetics	
PHRM 272: Toxicology	BIOL 267: Molecular Endocrinology	

Cellular	Organismal	Communities and Ecosystems
PHRM 290: Topics in Molecular and Cellular Pharmacology	BIOL 268: Medical Entomology	
	BIOL 269: Plant-Animal Interactions	
	BIOL 270: Speciation and Phylogeny	
	BIOL 296: Evolutionary Biology	
	BIOL 276: Behavioral Ecology	
	BOT 205: Mineral Nutrition of Plants	
	BOT 209: Biology of Ferns	
	BOT 229: Water Relations of Plants	
	BOT 241: Tropical Plant Systematics	
	BOT 260: Plant Population Biology	
	BOT 261: Plant Growth & Development	
	PSYC 220: Animal Behavior	
	PSYC 221: Physiological Psychology 1	
	PSYC 222: Behavioral Neuroscience	
	PSYC 223: Psychopharmacology	
	WFB 232: Ichthyology	
	WFB 271/272: Wetlands Wildlife	
	WFB 273/274: Terrestrial Wildlife	
	WFB 275: Wildlife Behavior	

APPENDIX 2. Faculty biographies

CURRICULUM VITAE

David S. Barrington

Present Address
Pringle Herbarium, Department of Botany
University of Vermont, Burlington, VT 05405
S.S. No. 022-34-2876
Phone: (802)656-0431, 656-3221
Fax: (802)656-0440
E-Mail: David.Barrington@uvm.edu

EDUCATIONAL BACKGROUND

Ph.D. in Biology, specializing in plant systematics and evolution - Harvard University, 1975
B.S. in Biology -- Bates College, 1970

EMPLOYMENT HISTORY

University of Vermont, Burlington, Vermont 05405-0086

Professor of Botany: 1988 - present
Chair, Dept. of Botany & Agricultural Biochemistry, 1995 - 2002
Chair, Dept. of Botany, 1991 - 1995
Interim Chair, Dept. of Agricultural Biochemistry, 1992 - present
Curator, Pringle Herbarium, 1974 - present.
Associate Professor of Botany: 1983 - 1988
Assistant Professor of Botany: 1978 - 1983
Teaching Associate: 1974 - 1977

TEACHING EXPERIENCE

Introductory Biology

Lecturer: Biology 1,2 Principles of Biology: 1978-present
Laboratory Coordinator: Biology 1, 1975-1983

Undergraduate Botany Courses

Morphology & Evolution of Vascular Plants: 1978-1991 except 1983, 1985
Field Botany: 1978-present

Graduate Courses in Botany

Biology of Ferns: 1979-1994, alternate years
Tropical Plant Systematics: 1980-present, alternate years
Botany Field Trip to Costa Rica: 1979 -present, alternate years

AWARDS AND HONORS

- Wherry Award (for the best contributed paper, Pteridological Section, Botanical Society of America). 2002.
- Kroepsch-Maurice Outstanding Teacher Award, 1987
- Joseph E. Carrigan Award for Excellence in Undergraduate Teaching, 1982

RESEARCH ACTIVITIES

Publications in Refereed Journals and Books

- Barrington, David S. in press. Helechos de los páramos costarricenses. contributed chapter to "Páramos de Costa Rica", editada por Maarten Kappelle, Sally P. Horn & Adelaida Chaverri.
- Schmitz, S. and D.S. Barrington. in press. Genetic and morphological variation and the infraspecific taxonomy of *Lathyrus japonicus* (Leguminosae). *Rhodora*.
- Barrington, D.S. 2003. *Polystichum lilianae* sp. nov. (Dryopteridaceae) and its relationships to *P. fournieri* and *P. turrialbae*. *Brittonia* 55:in press.
- Driscoll, H.E., D.S. Barrington, and A.V. Gilman. 2003. A re-examination of the apogamous tetraploid *Phegopteris* (Thelypteridaceae) from northeastern North America. *Rhodora* 105: in press.
- Little, Damon P. and David S. Barrington. 2003. Major evolutionary events in the origin and diversification of the fern genus *Polystichum* (Dryopteridaceae). *Am. J. Bot.* 90: 508-514
- Churchill, H.W., R.M. Tryon, and D.S. Barrington. 1998. Development of the sorus in tree ferns: Dicksoniaceae. *Canadian Journal of Botany* 76: 1245-1252.
- Paler, M. H. and D.S. Barrington. 1995. The hybrid *Cystopteris fragilis* x *C. tenuis* (Dryopteridaceae) and the relationship between its tetraploid progenitors. *Syst. Bot.* 20: 528-545.
- Barrington, D.S. 1995. *Polystichum*. In: R.C. Moran and R.Riba N. eds., *Flora Mesoamericana*. v. 1, Pteridophyta. British Museum, London.
- _____. 1993. Ecological and historical factors in fern biogeography. *J. Biogeogr.* 20:275-280.
- _____. and M. Kato. 1993. Changing concepts in the biogeography of pteridophytes, the biogeography symposium at the 1990 Progress in Pteridology Conference--Ann Arbor, Michigan. *J. Biogeogr.* 20:253-254.
- _____. 1992. Climate and the disjunct distribution of *Polystichum alfariei* (Christ) Barr. in Mesoamerica. *Rhodora* 94:327-339.
- _____. 1990. A festschrift in honor of Alice Faber Tryon and Rolla M. Tryon, Jr. *Ann. Missouri Bot. Gard.* 77:225-227.
- _____. 1990. Hybridization and allopolyploidy in Central American *Polystichum*: cytological and isozyme documentation. *Ann. Missouri Bot. Gard.* 77: 297-305.
- Paris, C.A. and D.S. Barrington. 1990. William Jackson Hooker and the generic classification of ferns. *Ann. Missouri Bot. Gard.* 77:228-238.

- Stein, D.B. and D.S. Barrington. 1990. Recurring hybrid formation in population of *Polystichum X potteri*: evidence from chloroplast DNA comparisons. *Ann. Missouri Bot. Gard.* 77:334-339.
- Barrington, D. S. 1989. New species and combinations in tropical American *Polystichum* (Dryopteridaceae). *Ann. Missouri Bot. Gard.* 76:365-373.
- _____, C.H. Haufler, and C.R. Werth. 1989. Hybridization, reticulation, and species concepts in the ferns. *Amer. Fern J.* 79:55-64.
- _____, C.A. Paris, and T.A. Ranker. 1986. Systematic inferences from spore and stomate size in the ferns. *Amer. Fern J.* 76:149-159.
- _____. 1986. The morphology and cytology of *Polystichum X potteri* hybr. nov. *Rhodora* 88:297-313.
- _____. 1985. The morphology and origin of a new *Polystichum* hybrid from Costa Rica. *Syst. Bot.* 10:199-204.
- _____. 1985. Hybridisation in Costa Rican *Polystichum*. *Proc. Roy. Soc. Edinburgh* 86B:335-340.
- _____. 1985. The present evolutionary and taxonomic status of the fern genus *Polystichum*: The 1984 Botanical Society of America Pteridophyte Section Symposium. *Amer. Fern J.* 75:22-28.
- _____. 1983. *Cibotium oregonense*: an Eocene tree-fern stem and petioles with internal structure. *Amer. J. Bot.* 70:1118-1124.
- _____. 1978. A revision of the genus *Trichipteris*. *Contr. Gray Herb. Harvard* 208:3-98.
- _____. 1976. New taxa and nomenclatural changes in the genus *Trichipteris*. *Rhodora* 78:1-5.

Published Abstracts and Presentations at Meetings

- Little, Damon P. and David S. Barrington. 2000. Major evolutionary events in the origin and diversification of the fern genus *Polystichum* (Dryopteridaceae). Poster at Botanical Society of America Meetings, Portland, Oregon.
- Howard, B. A., C. A. Paris, and D.S. Barrington. 1994. Electrophoretic evidence for allopolyploidy in the *Asplenium trichomanes* complex in eastern North America. *American Journal of Botany* 81:130.
- Paler, M., and D.S. Barrington. 1994. The hybrid *Cystopteris fragilis X C. tenuis* and the relationship between its allotetraploid progenitors. *American Journal of Botany* 81:131.
- Barrington, D.S. 1992. The plot thickens: *Polystichum fournieri* includes at least four species from Mexico to Costa Rica. New England Fern Conference. May 1992.

Research Grants

- The genetics and geography of new polyploid species origin in nature. CSREES: Hatch funds 2003-2006. \$43,000.
- Genetic variation in *Lathyrus maritimus* Bigel.; a wild legume with significant agronomic potential (with C. Paris). CSREES: Hatch funds 1999-2000. \$6,867
- Genetic variation in *Lathyrus maritimus* Bigel.; a wild legume with significant agronomic potential (with C. Paris). USDA: CSREES: Hatch funds 1998-1999. \$2,000
- A direct test of the relation between cell size and cold hardiness in a polyploid herb. Hatch Project. (\$11200)

Population Genetics and Hybrid Evolution of Central American Tree Ferns. Univ. of Vermont Institutional Grant, 1990 (\$3000)

Evolutionary genetics of the *Adiantum pedatum* complex: phylogeny and biogeography. National Science Foundation Doctoral Dissertation Improvement Grant with Cathy A. Paris, Ph.D. candidate, 1988 (\$11,370)

Genetic and Structural Variation in Five Species of Tree Ferns from Puerto Rico. Univ. of Vermont Institutional Grant, 1987 (\$5420)

Morphometric and allozymic documentation of hybridization and polyploidization in the fern genus *Polystichum*. Univ. of Vermont Institutional Grant, 1985 (\$3850)

Symposia Organized

The Ecological and Historical Determinants of Pteridophyte Distribution (with Masahiro Kato, Tokyo Botanical Gardens). International Association of Pteridologists Conference, Ann Arbor, Michigan - 1990

A Festschrift in Honor of Alice F. and Rolla M. Tryon, Jr. *Annals of the Missouri Botanical Garden* 77(2):225-339. 1990.

Invited Papers at Professional Meetings

The Ecological and Historical Influences on the Distribution of Pteridophytes. International Workshop on Chinese Pteridophytes, Beijing, China, May 2001.

Addressing the Speciation Process in the Montane Tropics: an Example from the Genus *Polystichum* (Dryopteridaceae), Smithsonian Conference on Biosystematics of Tropical Pteridophytes, April, 1995

Tropical American Montane Habitats as Biogeographic Islands. American Institute of Biological Sciences symposium at Honolulu, HI, August 1992

Hybridization, polyploidy, and species concepts in ferns. American Institute of Biological Sciences symposium at Columbus, OH - August 1987

Systematics of the Fern Genus *Polystichum* in southern Central America and the northern Andes, American Institute of Biological Sciences symposium at Fort Collins, CO - August, 1984.

Hybridization and speciation in Central American *Polystichum*, International Biology of Pteridophytes Symposium at Edinburgh, Scotland - September, 1983.

Theses & Dissertations Directed

Heather Driscoll, M.S. in progress.

Julie Dragon, Ph.D. in progress.

Julie Dragon, M.S. 2002 – Phylogeny and species delimitation in the *Carex acuta* complex.

Sonja Schmitz, Ph.D. 2002 - in progress - Systematics of the circumboreal seabeach legume *Lathyrus maritimus*.

Elizabeth Perkins, M.S. 1994 - A comparison of genetic diversity estimates of central and peripheral populations of jack pine (*Pinus banksiana* Lamb.).

Beth Ann Howard, M.S. 1992 - Evolutionary Relationships of Cytotypes in the fern *Asplenium trichomanes* in eastern North America.

- MaryBeth Deller, M.S. 1992 - An Analysis of Morphology, Habitat, and Reproductive Isolation in the *Cypripedium calceolus* Complex in Vermont.
- Cathy A. Paris, Ph.D. 1991. - Biosystematic Revision of the *Adiantum pedatum* Complex (ex officio advisor only).
- Bruce Howlett, M.S. 1990. - The Genetic Structure and Colonizing Strategy of Autopolyploid Fireweed.
- Peter T. Hope, M.S. 1987. - Morphological variation in Three Populations of the Triploid Hybrid *Dryopteris filix-mas* X *D. marginalis*.
- Cathy A. Paris, M.S. 1986. - A Biosystematic Investigation of the *Adiantum pedatum* Complex in Eastern North America.
- Roger Stern, M.S. 1982. - Morphometric and Phenologic Variability in *Ammophila breviligulata* Fernald.
- W. Donald Hudson, M.S. 1980. - The Reproductive Biology of *Saxifraga stellaris* var. *comosa*.
- Jerrold I Davis, M.S. 1978. Systematics and geography of *Phytolacca* from Chiapas, Mexico.

Undergraduate Research Projects Directed

- Heather Driscoll, B.S. 2002. Is the hybrid between *Phegopteris connectilis* and *P. hexagonoptera* really a hybrid?
- Damon Little, B.S. 1998 - A preliminary molecular phylogeny of the fern genus *Polystichum*.
- Bryan Connolly, B.S. 1996 - The question of multiple periglacial origins of the northern, apogamous races of the ground-nut (*Apios americana*).
- Michael Paler, B.S. 1993 - Genetic, ecological, and biogeographic dimensions of the boundary between the allotetraploids *Cystopteris fragilis*. and *C. tenuis* in Vermont.
- Karen Lanoue, B.S. 1990. - Hardiness and its contribution to fitness in polyploid races of *Polystichum* species.
- Edward Davis, B.S. 1990. - Genetic characterization and evolutionary origin of the Central American fern *Polystichum fournieri*.
- Gregory Adams, B.S. 1990. - Comparative Morphogenesis of the Hypanthium in Three Genera of Onagraceae.
- Josephine W. Ewing, B.S. 1979. - The Origin of the White Trillium in Nebraska Notch.
- Amy W. Pool, B.S. 1979. - *Carex paupercula* in North America: A Taxonomic Reassessment of the Varieties.
- James C. Kelley, B.S. 1978. Phenology of the Flora of Job's Pond Cliffs.

OTHER PROFESSIONAL ACTIVITIES

University of Vermont Committee Experience

- Faculty Standards Committee, College of Agriculture and Life Sciences. 2002-present. (Chair)
- Review Committee for Jill Tarule, Dean College of Arts & Sciences, 2000-2001
- Ad Hoc Committee on a Core Curriculum, CALS. 1997-8 (Chair)
- Review Committee for Howard Ball, Dean College of Arts & Sciences, 1994-5 (Chair)
- College of Agriculture & Life Sciences Hatch Funds Reorganization Committee, 1991-1992
- College of Agriculture & Life Sciences International Committee, 1996-

College of Agriculture & Life Sciences Teaching Evaluation Committee, 1991-1993
College of Agriculture & Life Sciences Committee on Farms and Forests, 1991-1992
College of Arts and Sciences Curriculum Committee 1988-1991. Chair, 1990-1
President's Task Force on Undergraduate Education 1991
Geneticist Search Committee, Botany Dept., 1987-1988
College of Agriculture and Life Sciences Honors Committee 1987-1988
University Press of New England Advisory Committee 1985-present
University of Vermont Greenhouse Committee 1982-94
Botany Dept. Curriculum Committee 1980-present (Chair,1983-1991)
University Committee on Research and Scholarship 1982-1985
University of Vermont Premedical Committee 1980-1984 (Chair 1983-1984)

Service to Community and State

Moderator, Town of Jericho, 1999-present.
Member, Scientific Advisory Group on Flora, Vermont Endangered Species Committee 1985-present; Secretary, 1991-1995
Member, Town of Jericho Planning Commission, 1988-1996
Member, Town of Jericho Natural Resources Advisory Committee, 1988-1989
Moderator, Town of Jericho, 1999-present

Service to Societies and Organizations

President, New England Botanical Club 1990-1992
Vice President, New England Botanical Club 1988-1990
Councillor, New England Botanical Club 1981-1986
Associate Editor, Rhodora (Journal of the New England Botanical Club) 1984-present
Records Treasurer, American Fern Society 1984-1991
Manuscript and Proposal Reviewer: American Association for the Advancement of Science, American Fern Society, American Society of Plant Taxonomists, Botanical Society of America, New England Botanical Club, Missouri Botanical Garden, National Science Foundation, Journal of Biogeography

Memberships in Professional Societies

American Fern Society
American Society of Plant Taxonomists
Botanical Society of America
New England Botanical Club

3.30.03

BIOGRAPHICAL SKETCH

ALISON K. BRODY

Institution Address: Biology Department
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Home Address: 99 Schillhammer Rd.
Jericho, VT 05465
(802) 899-1742

Electronic Mail Address: akbrody@zoo.uvm.edu

ACADEMIC HISTORY

1976 -1980 B.S. Zoology, Michigan State University, E. Lansing, MI
1981 -1984 M.A. Department of Systematics and Ecology; Behavioral Ecology, University of Kansas, Lawrence, KS
1986 -1991 Ph.D. Department of Entomology; Focus on Plant-Animal Interactions, University of California, Davis, CA

1992 - 1993 Visiting Assistant Professor, Albertson College of Idaho, Caldwell, ID
1993 - 1994 Post-doctoral Research Associate, Stanford University, Stanford, CA
1995 - 2000 Assistant Professor, University of Vermont, Burlington, VT
2001 - Associate Professor, University of Vermont, Burlington, VT

RESEARCH INTERESTS

Ecological and evolutionary consequences of multiple species interactions. Specifically, among plants, pollinators, pre-dispersal seed predators, herbivores and nectar robbers. Understanding the links between pollination intensity, long-term fitness, and population dynamics in sub-alpine plants. Effects of termites on plant populations and communities in semi-arid grasslands of east Africa.

UNIVERSITY TEACHING EXPERIENCE (courses denoted with an asterisk indicate current teaching assignments)

- 1995-present **Associate Professor**; Principles of Biology, Exploring Biology*, Theories of Population Regulation, Plant-Animal Interactions*, Scientific Integrity*; **Guest Lecturer** in Community Ecology, Environmental Biology, Plant Ecology, Genetics; University of Vermont
- 1992-1993 **Visiting Assistant Professor**; Biological Principles, Ecology, Zoology; Albertson College of Idaho, Caldwell, ID
- 1989 **Instructor**; Terrestrial Field Ecology; University of California, Davis, CA
- 1987-1988 **Teaching Assistant**; Insect Ecology, Terrestrial Field Ecology; University of California, Davis, CA

PUBLICATIONS (within the last five years)

- Albright, H.R. and **A.K. Brody**. Ecotypic variation in susceptibility to herbivores: developmental stage is a better predictor than secondary chemistry. *Ecology, in review*.
- Irwin, R.E., L. Adler and **A.K. Brody**. 2003. The dual role of floral traits: pollinator attraction and plant defense. *Ecology, in press*.
- Freeman, R.S., **A.K. Brody** and C.D. Neefus. 2003. Flowering phenology and compensation for herbivory in *Ipomopsis aggregata*. *Oecologia* 136: 394-401.
- Cariveau, D., R.E. Irwin, **A.K. Brody**, L.S. Garcia-Mayeya, and A. von der Ohe. 2003. Direct and indirect effects of pollinators and seed predators to selection on plant and floral traits. *Oikos* 102, *in press*.
- Campbell, D.R., M. Crawford, **A.K. Brody** and T.A. Forbis. 2002. Resistance to pre-dispersal seed predators in a natural hybrid zone. *Oecologia* 131:436-443.
- Irwin, R.E., **A. K. Brody** and N.M. Waser. 2001. The impact of floral larceny on individuals, populations and communities. *Oecologia* 129:161-168.
- Brody, A.K.** and S. Morita. 2000. A positive association between oviposition and fruit set: female choice or manipulation? *Oecologia* 124:418-425.
- Irwin, R.E. and **A.K. Brody**. 2000. Nectar robbing bumblebees disrupt a plant-pollinator mutualism. *Ecology* 81:2637-2643.
- Irwin, R.E. and **A.K. Brody**. 1999. Nectar robbing bumblebees reduce the fitness of *Ipomopsis aggregata* (Polemoniaceae). *Ecology* 80:1703-1712.
- Irwin, R.E. and **A.K. Brody**. 1998. Nectar robbing in *Ipomopsis aggregata*: effects on pollinator behavior and plant fitness. *Oecologia* 116:519-527.
- Zimmerman, M. and **A.K. Brody**. 1998. Choices and consequences of oviposition in *Hylemya (Delia)* sp. (Diptera: Anthomyiidae). *Journal of Insect Behavior* 11:371-381.

Personal Information:

Name: **Rona J. Delay**
S.S. # 539 50 1517

Teaching At UVM

Bio 296 Neurobiology techniques spring 2000, 2001,2002, 2003
Bio 11A,B,C Exploring Biology fall, 2000, 2001, 2002, 2003

Professional Experience:

1999- present	Assistant Professor, University of Vermont
1998-1999	Research Instructor, University of Colorado Health Sciences Center
1997-1998	Research Associate, University of Colorado Health Sciences Center
1994-1997	Research Associate, Boston University Marine Program
1993-1994	Research Associate, Colorado State University
1986-1993	Researcher IV, Colorado State University

Education:

1993 Ph.D. Anatomy, Department of Anatomy & Neurobiology, CSU

Professional Societies:

Association for Chemoreception Sciences
Mountain State Society for Electron Microscopy/Microbeam Society
Vermont Society for Neuroscience Chapter
Society for Neuroscience
Society of General Physiologists

Publications:

Zhang, W and R. Delay (2003) Modulation of the TTX sensitive voltage-activated Na⁺ current in *Necturus* olfactory Neurons. In preparation.

Lefkowitz, J and R. Delay (2003) Two second messenger pathways mediate odor transduction of the amino acid, taurine, in olfactory neurons. In preparation

Delay, R. And D. Restrepo (2003) Odorant Responses of Dual Polarity are Mediated by cAMP in Mouse Olfactory Sensory Neurons. Submitted

Delay, R.and V. Dionne (2003) Coupling between sensory neurons in the olfactory epithelium. Submitted Chemical Senses

- Delay, R. and V. Dionne (2002) Two Second Messengers Mediate Amino Acid Responses in Olfactory Sensory Neurons of the Mudpuppy, *Necturus maculosus* Chem. Senses 27:673-680.
- Eisthen, H., R. Delay, C. Wirsig-Wiechmann and V. Dionne (2000) Neuromodulatory Effects of Gonadotropin Releasing Hormone on Olfactory Receptor Neurons. J Neurosci.20:3947-3955.
- Nagai, T. D., R. J. Delay, J. Welton and S. D. Roper (1998) Uptake and release of neurotransmitter candidates, 3H-serotonin, 3H-glutamate and 3H-g-aminobutyric acid, in taste buds of the mudpuppy, *Necturus maculosus*. J. Comp. Neurol. 392:199-208.
- Delay, R., A. Dubin and V. Dionne (1997) A cyclic nucleotide-gated chloride conductance in olfactory receptor neurons. J. Membrane Biol. 159:53-60
- Delay, R.J., S.C. Kinnamon and S.D. Roper (1997) Serotonin modulates voltage-activated calcium currents in *Necturus* taste receptor cells. J. Neurophysiol. 77:2515-2524.
- Bigiani, A., R.J. Delay, N. Chaudhari, S.C. Kinnamon, and S.D. Roper (1997) Responses to glutamate in rat taste cells. J. Neurophysiol. 77:3048-59.
- Nagai, T., D. J. Kim, R.J. Delay and S.D. Roper (1996) Neuromodulation of transduction and signal processing in the end organs of taste. Chem. Senses 21:353-365.
- MacKay-Sim, A., R. J. Delay, S. D. Roper and S. C. Kinnamon (1996) Development of voltage-dependent currents in taste receptor cells. J. Comp. Neurol. 365:278-288.
- Delay, R.J., A. MacKay-Sim and S. D. Roper (1994) Membrane properties of two types of basal cells in *Necturus* taste buds. J. Neurosci. 14:6132-6143.
- Delay, R. J. (1993) A role for the Merkel-like Basal cell in *Necturus* taste buds (PhD thesis). Ft. Collins, CO, Colorado State University.
- Delay, R.J., R. S. Taylor and S. D. Roper (1993) Merkel-like basal cells in *Necturus* taste buds contain serotonin. J. Comp. Neurol. 335:606-613.
- Chaudhari, N., R. Delay and K.G. Beam (1989) Restoration of normal function in genetically defective myotubes by spontaneous fusion with fibroblasts. Nature 341:445-447.
- Delay, R.J., and S.D. Roper (1988) Ultrastructure of taste cells and synapses in the mudpuppy, *Necturus maculosus*. J. Comp. Neurol. 277:268-280.
- Cummings, T., R.J. Delay and S. D. Roper (1987) The ultrastructure of apical specializations of taste cells in the mudpuppy, *Necturus maculosus*. J. Comp. Neurol. 261:604-615.
- Cummings, T., R.J. Delay and S.D. Roper (1986) Scanning and high voltage electron microscopy of taste cells. In: From reception to perception. (eds. S. Roper and J. Atema), NY Acad. Sci.

Delay, R.J., J.C. Kinnamon and S.D. Roper (1986) Ultrastructure of mouse vallate taste buds: II. Cell Types and Cell Lineage. *J Comp. Neurol.* 253:242-252.

Kinnamon, J.C., B.J. Taylor, R.J. Delay and S.D. Roper (1985) Ultrastructure of mouse vallate taste buds: I. Taste cells and their associated synapses. *J Comp. Neurol.* 235:48-60.

Kinnamon, J.C., G. Wray and R. Delay (1984) The preparation of biological specimens for HVEM serial reconstructions. In: *Science of biological specimen preparation for Microscopy and Microanalysis*. J.P. Revel, T. Barnard, G.W. Haggis (eds.) AMF O'Hare IL, SEM Inc., pp.39-44.

Abstracts and Presentations:

Cusick M, Delay R, Van Houten J. (2003) Characterization of the plasma membrane Ca^{2+} ATPases in mouse olfactory and VNO epithelia. *Chem. Senses* in press.

Delay R, Verret T (2003) Optical imaging of intracellular Cl^- in mouse olfactory neurons, dynamic changes with odor stimulation. *Chem. Senses* in press.

Zhang W, Delay R (2003) Gonadotropin releasing hormone modulates the voltage-activated sodium current in *Necturus* olfactory neurons. *Chem. Senses* in press.

Delay, R.J. (2001) Chloride Homeostasis in *Necturus* Olfactory Neurons, *Soc. Neurosci. Abst.*; 27:62.7.

H.L. Eisthen, R.J. Delay, and C.R. Wirsig-Wiechmann (2001) Terminal-nerve-derived peptides modulate excitability of olfactory receptor neurons. Second International Symposium on Gonadotropin-Releasing Hormone, Penang Malaysia, June 2001

Wirsig-Wiechmann, C.R., Wiechmann A.F and R.J. Delay (2000) GNRH Modulates Rodent Chemosensory Neuron Responses To Odors. *Soc. Neurosci.* 26:2199.

Delay, R and D. Restrepo (1999) Odor transduction in normal mice and mice deficient in subunit 1 of the olfactory CNG channel. *Chem Senses* 24:523.

Delay, R., T. Ogura and V. Dionne (1998) Amino Acids elicit increases and decreases in intracellular calcium in *Necturus* olfactory receptor neurons. *Chem. Senses* 23:621

Delay, R., T. Ogura and V. Dionne (1997) Calcium Changes in *Necturus* Olfactory Receptor Neurons Elicited by Amino Acids. *Chem. Senses* 22:668.

Delay, R., A. Dubin and V. Dionne (1996) A Cyclic Nucleotide-Gated Chloride Conductance in Olfactory Receptor Neurons. *Chem. Senses* 21:594.

Eisthen, H., R. Delay and V. Dionne (1996) Gonadotropin Releasing Hormone Modulates Outward Currents in Olfactory Receptor Neurons from Mudpuppies, *Necturus maculosus*. Chem. Senses 21: 598.

Delay, R. and V. Dionne (1995) Voltage-activated Ca-dependent currents of olfactory neurons in a semi-intact slice preparation. Soc. Neurosci. 21:132.

Eisthen, H.L., R.J. Delay and V.E. Dionne (1995) Physiological properties of vomeronasal receptor cells in aquatic salamanders (*ambystoma*). Soc. Neurosci 21:1181.

Delay, R. and V. Dionne (1995) Patch clamp analysis of *Necturus* olfactory receptor neurons in a semi-intact slice preparation. Chem. Senses 20:682.

Eisthen, H.L., R.J. Delay and V.E. Dionne (1995) Characterization of inward currents in vomeronasal receptor cells of neotenic salamanders (*ambystoma*). Chem. Senses 20:689.

Delay, R., S. Kinnamon, and S.D. Roper (1993) Serotonin modulates voltage-activated calcium currents in *Necturus* taste receptor cells. Biophys J. 64:A390.

Delay, R., S. Kinnamon and S. Roper (1992) Membrane properties and transmitter sensitivity of merkel-like basal cells in *Necturus* taste buds. Chem. Senses 17:610.

Taylor, R., R. Delay and S. Roper (1992) Are basal cells in taste buds identical to cutaneous Merkel cells? Chem. Senses 17:706.

Mackay-Sim, A., R. Delay, S. Kinnamon and S. Roper (1991) Voltage-dependent currents in developing and mature taste cells in mudpuppy (*Necturus maculosus*). Soc. Neurosci. 17:230.

Delay, R., C. Ruiz, S. Kinnamon and S. Roper (1990) Determination of cell type in acutely isolated taste cells using quinacrine fluorescence. Soc. Neurosci. 16:878.

Delay, R., S. Kinnamon and S. Roper (1989) Cell lineage in the mudpuppy, *Necturus maculosus*. Chem. Senses 14:694.

Invited speaker (1988) Boulder workshop on HVEM and Neurobiology.

Invited speaker (1987) Mountain States Society of Electron Microscopists meeting.

Delay, R.J., J. Yang and S.D. Roper (1987) Cell types and intracellular connectivity of dye-injected taste cells of *Necturus maculosus*. Soc. Neurosci. 13:1405.

Delay, R.J. and S.D. Roper (1987) Basal cells and synaptic connectivity in taste buds of *Necturus maculosus*. Chem. Senses 12:127.

Delay, R.J., J.C. Kinnamon and S.D. Roper (1985) Cell lineage in the mouse vallate taste bud. Assoc. Chem. Senses 10:443.

Gregory Gilmartin

Degree:

Ph.D., University of Virginia, 1983

Position:

Associate Professor

Pubs:

Brown, K.M. and Gilmartin, G.M. (2003) A mechanism for the regulation of pre-mRNA 3' processing by human cleavage factor Im. *Molecular Cell*, in press.

Harakall, S.A., C.A. Brandenburg, G.M. Gilmartin, V. May, and K.M.Brass. (1998). Induction of multiple pituitary adenylate cyclase activating polypeptide (PACAP) transcripts through alternative cleavage and polyadenylation of proPACAP precursor mRNA. *Annals N.Y. Acad. Sci.* 865, 367-374.

Gilmartin, G.M. (1997). In vitro analysis of mammalian cell mRNA 3' processing, p.79-98. In J.D. Richter (ed.), *mRNA Formation and function*. Academic Press, New York.

Flaherty, S.M., P. Fortes, E. Izaurralde, I. Mattaj, and G.M. Gilmartin. (1997) Participation of the nuclear cap binding complex in pre-mRNA 3' processing. *Proc. Natl. Acad. Sci. USA* 94, 11893-11898.

Graveley, B.R., E.S. Fleming and G.M. Gilmartin. (1996). RNA structure is a critical determinant of poly(A) site recognition by cleavage and polyadenylation specificity factor. *Mol. Cell. Biol.* 16, 4942-4951.

Graveley, B.R., E.S. Fleming and G.M. Gilmartin. (1996) Restoration of both structure and function to a defective poly(A) site by in vitro selection. *J. Biol. Chem.* 27, 33654-33663.

Graveley, B.R., E.S. Fleming and G.M. Gilmartin. (1996) Enhancement of 3' processing at the Equine infectious anemia virus core poly(A) site by U3 sequences. *J. Virology* 70, 1612-1617.

Gilmartin, G.M., S.-L. Hung, J.D. DeZazzo, E.S. Fleming and M.J. Imperiale. (1996). Poly(A) site selection in a complex transcription unit mediated by the interaction of constitutive processing factors. *J. Virology* 70, 1775-1783.

Gilmartin, G.M., E.S. Fleming, J. Oetjen and B.R. Graveley. (1995). CPSF recognition of an HIV-1 mRNA 3'-processing enhancer: multiple sequence contacts involved in poly(A) site definition. *Genes Dev.* 9, 72-83.

Current teaching:

MMG 332

MMG102

MMG225

CURRICULUM VITAE

Nicholas J. Gotelli

PERSONAL INFORMATION

Department of Biology
University of Vermont
Burlington, Vermont 05405-0086

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(802) 656-0451 (Lab)
(802) 656-2914 (FAX)
ngotelli@zoo.uvm.edu

(802) 656-2922 (Department)
(802) 863-7810 (Home)

EDUCATION

Florida State University, 1982 - 1985; Ph.D., December 1985 Advisor: D. Simberloff
Florida State University 1980 - 1982; M.S. June 1982 Advisor: L.G. Abele
University of California, Berkeley, 1976 - 1980; B.A. 1980 Phi Beta Kappa

POST-GRADUATE APPOINTMENTS

2000- present. Full Professor, Department of Biology, University of Vermont
1995 - 2000. Associate Professor, Department of Biology, University of Vermont
1992-1994. Assistant Professor, Department of Biology, University of Vermont
1988 - 1992. Assistant Professor, Department of Zoology, University of Oklahoma
1987 - 1988. Post-doctoral Associate, Department of Biology, Colorado State
University
1985 - 1987. Lecturer, Department of Organismic and Evolutionary Biology, Harvard
University

TEACHING EXPERIENCE (UVM)

Biology 102 Environmental Biology
Biology 264 Community Ecology
Biology 395 Biometry
Biology 395 Scientific Integrity
Biology 395 Scientific Speaking
Biology 395 Scientific Writing

TEACHING AWARD

Dean's Lecturer 1997

PUBLICATIONS

- Colwell, R.K. Rahbek, C., and N.J. Gotelli. The mid-domain effect and species richness patterns: what have we learned so far? **The American Naturalist**, in press.
- Arnett, A.E. and N.J. Gotelli. 2003. Bergmann's Rule in larval ant lions: testing the starvation resistance hypothesis. **Ecological Entomology** 28, in press.
- Gotelli, N.J. A taxonomic wish-list for community ecology. **Proceedings of the Royal Society of London B**, in press.
- McCabe, D.J. & N.J. Gotelli. 2003. Caddisfly diapause aggregations facilitate benthic invertebrate colonization. **Journal of Animal Ecology** 72: 1015–1026.
- Gotelli, N.J. and Entsminger, G.L. 2003. Swap algorithms in null model analysis. **Ecology** 84: 532-535.
- Sanders, N.J., N.J. Gotelli, N.E. Heller, and D.M. Gordon. 2003. Community disassembly by an invasive species. **Proceedings of the National Academy of Sciences, U.S.A.** 100: 532-535.
- Ellison, A. M., N. J. Gotelli, J. S. Brewer, J. Kniitel, T. E. Miller, L. Cochran-Stafira, A. C. Worley, & R. Zamora. 2003. Carnivorous plants as model ecological systems. **Advances in Ecological Research** 33: 1-74.
- Gotelli, N.J., & K. Rohde. 2002. Co-occurrence of ectoparasites of marine fishes: A null model analysis. **Ecology Letters** 5: 86-94.
- Gotelli, N.J., & A.M. Ellison. 2002. Nitrogen deposition and extinction risk in the northern pitcher plant *Sarracenia purpurea*. **Ecology** 83: 2758-2765.
- Gotelli, N.J., & A.M. Ellison. 2002. Assembly rules for New England ant assemblages. **Oikos** 99: 591-599
- Gotelli, N.J., & D.J. McCabe. 2002. Species co-occurrence: A meta-analysis of J. M. Diamond's assembly rules model. **Ecology** 83: 2091-2096.
- Gotelli, N.J., & A.M. Ellison. 2002. Biogeography at a regional scale: determinants of ant species density in bogs and forests of New England. **Ecology** 83: 1604-1609.
- Ellison, A.M., & N.J. Gotelli. 2002. Nitrogen availability alters the expression of carnivory in the northern pitcher plant *Sarracenia purpurea*. **Proceedings of the National Academy of Sciences, USA** 99: 4409-4412.
- Ellison, A.M., E.J. Farnsworth, and N.J. Gotelli. 2002. Ant diversity in pitcher-plant bogs of Massachusetts. **Northeastern Naturalist** 9: 267-284.

- Gotelli, N.J. and G.L. Entsminger. 2001. Swap and fill algorithms in null model analysis: rethinking the Knight's Tour. **Oecologia** 129:281–291.
- Ellison, A.M. and N.J. Gotelli. 2001. Evolutionary ecology of carnivorous plants. **Trends in Ecology and Evolution** 16: 623-629.
- Gotelli, N.J. 2001. Research frontiers in null model analysis. **Global Ecology and Biogeography** 10: 337-343.
- Gotelli, N.J. and R.K. Colwell. 2001. Quantifying biodiversity: procedures and pitfalls in the measurement and comparison of species richness. **Ecology Letters** 4: 379-391.
- Arnett, A.E. and N.J. Gotelli. 2001. Pit-building decisions of larval ant lions: effects of larval age, temperature, food, and population source. **Journal of Insect Behavior** 14: 89-97.
- Albrecht, M. and N.J. Gotelli. 2001. Spatial and temporal niche partitioning in grassland ants. **Oecologia** 126: 134-141.
- Gotelli, N.J. and A.E. Arnett. 2000. Biogeographic effects of red fire ant invasion. **Ecology Letters** 3: 257-261.
- Gotelli, N.J. 2000. Null model analysis of species co-occurrence patterns. **Ecology** 81: 2606-2621
- McCabe, D.C. and N.J. Gotelli. 2000. Effects of disturbance frequency, intensity, and area on stream macroinvertebrate communities. **Oecologia** 124: 270-279.
- Arnett, A.E. and N.J. Gotelli. 2000. Geographic variation in body size of the ant lion *Myrmeleon immaculatus*: evolutionary implications of Bergmann's Rule. **Evolution** 53: 1180-1188.
- Gotelli, N.J. and C.M. Taylor. 1999. Testing metapopulation models with stream-fish assemblages. **Evolutionary Ecology Research** 1: 835-845.
- Gotelli, N.J. and C.M. Taylor. 1999. Testing macroecology models with stream-fish assemblages. **Evolutionary Ecology Research** 1: 847-858.
- Arnett, A.E. and N.J. Gotelli. 1999. Geographic variation in ant lion body size and heterozygosity. **Journal of Biogeography** 26: 275-284.
- Gotelli, N.J. 1997. Competition and coexistence of larval ant lions. **Ecology** 78: 1761-1773.

- Gotelli, N.J., N.J. Buckley, and J.A. Wiens. 1997. Co-occurrence of Australian land birds: Diamond's assembly rules revisited. **Oikos** 80: 311-324.
- Moore, J. and N.J. Gotelli. 1996. Evolutionary patterns of altered behavior and susceptibility in parasitized hosts. **Evolution** 50: 807-819.
- Gotelli, N.J. 1996. Ant community structure: effects of predatory ant lions. **Ecology** 77: 630-638.
- Taylor, C.M. and N.J. Gotelli. 1994. The macroecology of *Cyprinella*: correlates of phylogeny, body size, and geographic range. **The American Naturalist** 144: 549-569.
- Moore, J., M. Freehling, and N.J. Gotelli. 1994. Altered behaviour in two blattid cockroaches infected with *Moniliformis moniliformis* (Acanthocephala). **Journal of Parasitology** 80: 220-223.
- Gotelli, N.J. and W.G. Kelley. 1993. A general model of metapopulation dynamics. **Oikos** 68: 36-44.
- Gotelli, N.J. 1993. Antlion zones: causes of high-density predator aggregations. **Ecology** 74: 226-237.
- Graves, G.R. and N.J. Gotelli. 1993. Assembly of avian mixed species flocks in Amazonia. **Proceedings of the National Academy of Sciences, U.S.A.** 90: 1388-1391.
- Gotelli, N.J. and H.R. Spivey. 1992. Male parasitism and intrasexual competition in a burrowing barnacle. **Oecologia** 91: 474-480.
- Gotelli, N.J. and J. Moore. 1992. Altered host behaviour in a cockroach-acanthocephalan association. **Animal Behaviour** 43: 949-959.
- Allely, Z., J. Moore, and N.J. Gotelli. 1992. *Moniliformis moniliformis* has no effect on some behaviors of the cockroach *Diploptera punctata*. **Journal of Parasitology** 78: 524-526.
- Moore, J. and N.J. Gotelli. 1992. *Moniliformis moniliformis* increases cryptic behaviors in the cockroach host *Supella longipalpa*. **Journal of Parasitology** 78: 49-53.
- Gotelli, N.J. 1991. Metapopulation models: the propagule rain, the rescue effect, and the core-satellite hypothesis. **The American Naturalist** 138: 768-776.
- Gotelli, N.J. 1991. Demographic models for *Leptogorgia virgulata*, a shallow-water gorgonian. **Ecology** 72: 457-467.

- Gotelli, N.J. and W.H. Bossert. 1991. Ecological character displacement in a variable environment. **Theoretical Population Biology** 39: 49-62.
- Gotelli, N.J. and M. Pyron. 1991. Life history variation in North American freshwater minnows: effects of latitude and phylogeny. **Oikos** 62: 30-40.
- Gotelli, N.J. 1990. Stochastic models of gregarious larval settlement. **Ophelia** 32: 95-108.
- Gotelli, N.J. and G.R. Graves. 1990. Body size and the occurrence of avian species on land-bridge islands. **Journal of Biogeography** 17: 315-325.
- Moore, J.K. and N.J. Gotelli. 1990. A phylogenetic perspective on the evolution of altered host behaviours: a critical look at the manipulation hypothesis. pp. 193-233 in: **Parasitism And Host Behaviour**. C.J. Barnard and J.M. Behnke (eds.). Taylor and Francis, Limited.
- Gotelli, N.J. 1988. Determinants of recruitment, juvenile growth and spatial distribution of a shallow-water gorgonian. **Ecology** 69: 157-166.
- Young, C.M. and N.J. Gotelli. 1988. Larval predation by barnacles: effects on patch colonization in a shallow subtidal community. **Ecology** 69: 624-634.
- Gotelli, N.J. and D. Simberloff. 1987. The distribution and abundance of tallgrass prairie plants: a test of the core-satellite hypothesis. **The American Naturalist** 130: 18-35.
- Gotelli, N.J. 1987. Spatial and temporal patterns of reproduction, larval settlement, and recruitment of the compound ascidian *Aplidium stellatum*. **Marine Biology** 94: 45-51.
- Gotelli, N.J., F.G. Lewis, and C.M. Young. 1987. Body-size differences in a colonizing amphipod-mollusc assemblage. **Oecologia** 72: 104-108.
- Gotelli, N.J., S.L. Gilchrist, and L.G. Abele. 1985. The population biology of *Trapezia* spp. and other coral-associated decapods. **Marine Ecology Progress Series** 21: 89-98.
- Simberloff, D. and N. Gotelli. 1984. Effects of insularization on plant species richness in the prairie-forest ecotone. **Biological Conservation** 29: 63-80.
- Boecklen, W.J. and N.J. Gotelli. 1984. Island biogeographic theory and conservation practice: species-area or specious-area relationships? **Biological Conservation** 29: 90-111.

- Graves, G.R. and N.J. Gotelli. 1983. Neotropical land-bridge avifaunas: new approaches to null hypotheses in biogeography. **Oikos** 41: 322-333.
- Simberloff, D. and N. Gotelli. 1983. Refuge design and ecological theory: lessons for prairie and forest conservation. pp. 66-71 in: **Proceedings of the Eighth International Prairie Conference**. R. Brewer (ed). Western Michigan University.
- Gotelli, N.J. and L.G. Abele. 1983. Community patterns of coral-associated decapods. **Marine Ecology Progress Series** 13: 131-139.
- Gotelli, N.J. and L.G. Abele. 1982. Statistical distributions of West Indian land bird families. **Journal of Biogeography** 9: 421-435.

AUTHORED BOOKS AND SOFTWARE

- Gotelli, N.J. and A.M. Ellison. **A Primer of Ecological Statistics**. Sinauer Associates, Inc., Under contract.
- Gotelli, N.J. 1995, 1998. 2001. **A Primer of Ecology**. Sinauer Associates, Inc., Sunderland, MA. Third edition.
- Gotelli, N.J. and G.R. Graves. 1996. **Null Models in Ecology**. Smithsonian Institution Press, Washington, D.C.
- Gotelli, N.J. and G.L. Entsminger. 2000. **EcoSim. Null Models Software for Ecology**. Acquired Intelligence, Inc., Kesey-Bear.

BOOK REVIEWS & COMMENTARIES

- Gotelli, N.J. 2002. Biodiversity in the scales. **Nature** 419: 575-576
- Weiher, E. and P. Keddy. 1999. How do communities come together. Review of: Ecological Assembly Rules. **Science** 286: 1684-1685.
- Resetarits, W.J., Jr., and J. Bernardo. 1999. Experimental ecology: Issues and perspectives. **Bioscience** 49: 829-830.
- den Boer, P.J. and J. Reddingius. 1998. Regulation and stabilization paradigms in population ecology. **Ecology** 79: 354-355.
- Iversen, E.S. 1997. Living Marine Resources: their utilization and management. **Quarterly Review of Biology** 72: 91.
- Grenfell, B.T. and A.P. Dobson. 1996. Ecology of infectious diseases in natural populations. Cambridge University Press. **Quarterly Review of Biology** 71: 436.

Brown, J.H. 1996. Macroecology. University of Chicago Press. **The Condor** 98: 669-670.

P.J. Edwards, R.M. May, N.R. Webb (eds). 1994. Large-Scale Ecology and Conservation Biology. Blackwell. **Conservation Biology** 9: 468-469.

Power, D.M. 1993. Current ornithology, volume 10. **Ecology** 75: 1194.

Perrins, C.M., J.-D. Lebreton, and G.J.M. Hirons (eds). 1991. Bird Population Studies: Relevance to Conservation and Management. Oxford University Press. **Ecology** 73: 1931-1932.

Bakus, G. 1990. Quantitative Ecology and Marine Biology. A.A. Balkema. **Quarterly Review of Biology** 67: 382.

JAMES PAUL HOFFMANN

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University of Vermont
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1605 Porters Point Road
Colchester, Vermont 05446
Telephone: (802) 865-9582
James.Hoffmann@uvm.edu

EDUCATION

Ph.D., 1981, University of Wisconsin, Madison
Major - Botany; Minor - Statistics/Water Chemistry
Advisor - Dr. Linda E. Graham
Thesis title: The role of vitamins in the growth and ecology
of Cladophora glomerata (Chlorophyta).

B.Sc., 1969, Cornell University, Ithaca, New York
Major - Marine Biology/Microbiology; Minor - Chemistry

Honors: IBM Invention Achievement Award
(US Patent# 6,314,390 B1, November 6, 2001)
Nominated for Carrigan Undergraduate Teaching Award, 1994
Davis Graduate Fellowship, 1975
New York State Regents Scholarship, 1965

PROFESSIONAL AFFILIATIONS

International Society of Genetic and Evolutionary Computation
American Society of Limnology and Oceanography
North American Benthological Society
Phycological Society of America

PROFESSIONAL EXPERIENCE

University of Vermont, Burlington, Vermont

Department of Botany and Agricultural Biochemistry (Primary Appointment)

Lecturer and Research Assistant Professor - 1983 -1990

Assistant Professor - 1990 - 1996

Associate Professor - 1996 to present. Teach courses on aquatic botany, phycology and plant ecology. Conduct research on the ecology of algae, and the development of simulation models of aquatic ecosystems. Supervise M.S. and Ph.D. candidates.

Sabbatical Leave - 1998

- IBM Advanced Technology Division, Essex Junction, Vermont: developed evolutionary algorithms for optimizing simulation models.
- Université d'Auvergne and Université Blaise Pascal, Clermont-Ferrand, France: learned object-oriented programming for ecosystem simulation models incorporating 3D visualization.

Department of Computer Science (Secondary Appointment)

Associate Professor – 2002 to present. Conduct research on evolutionary computation applied to modeling complex biological systems.

University of Wisconsin, Madison, Wisconsin

Department of Plant Pathology, 1981-1983

Postdoctoral Research Associate - directed a research team investigating the effect of temperature, light and nutrient stress in the susceptibility of the nuisance aquatic macrophyte, Myriophyllum spicatum to disease.

Institute for Environmental Studies, Summer 1980

Lecturer - conducted a graduate workshop on lake management techniques.

Department of Botany, 1974-1979

Teaching Assistant - taught laboratory and discussion sections on general botany and phycology; received rating of excellent on 91% of student evaluations.

Research Assistant - wrote grant and secured funding from the Department of Interior for a study of the role of vitamins and epiphytic bacteria in the nutritional ecology of Cladophora.

Department of Bacteriology, 1972-1974

Laboratory Assistant - conducted radioisotope studies on thermophilic bacteria, lichen photosynthesis as a function of water potential, and the effect of power plant thermal effluent on algal community photosynthesis.

Institute for Health Planning, Madison, Wisconsin, 1981

Computer Programmer - wrote data base management programs in FORTRAN and BASIC on a UNIVAC 1180.

University of Michigan, Ann Arbor, Michigan

College of Engineering, 1979-1980

Consultant - designed and directed a controlled-environment photosynthesis study of the nuisance alga Cladophora as a function of temperature and light. This project was part of an E.P.A. study entitled, "Ecological Studies and Mathematical Modeling for the Control of Cladophora in the Great Lakes."

1967-1972. Employed at several oceanographic institutions.

Laboratory Assistant - conducted research on macro and micro algal ecology and physiology. Duties included: operation of small boats; SCUBA diving; water sampling; oceanographic cruises; chemical analyses, algal culturing and data analysis.

RESEARCH INTERESTS

Modeling biotic systems; evolutionary computation; aquatic ecosystems; physiological ecology of stream algae, especially photosynthesis and production as affected by the interactions among physicochemical factors; competition theory; production and use of algal biomass.

PUBLICATIONS

PEER REVIEW (Last 5 years)

- Hoffmann, J.P.**, Ellingwood, C.D., Bonsu, O.M. and Benteil, D.E. 2003. Ecological model selection via evolutionary computation and information theory. Invited paper for special issue on biological applications of evolutionary computation. *Journal of Genetic Programming and Evolvable Machines* 4(4) In Press
- Benteil, D.E., Ellingwood, C.D., Osei, M.B. and **Hoffmann, J.P.** 2003. On a unified model for growth based upon Schulte's postulates. Submitted to *Mathematical Biosciences*.
- Benteil, D. E., Bonsu O. M., Ellingwood, C. D. **Hoffmann, J. P.** (2003). Deterministic Uncertainty in Population Growth. 4th IEEE International Symposium on Uncertainty Modeling and Analysis (ISUMA). IEEE Computer Society Press, Los Alamitos, CA. pp 274 - 278
- Hoffmann, J.P.**, Ellingwood, C.D., Bonsu, O.M. and Benteil, D.E. 2002. Turning genes off and on: Using genetic algorithms with complexity-based fitness for model selection in ecology. . Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2002) – Workshop Special Session on Biological Applications of Evolutionary Computation, pp 38-40.
- Gustina, G.W. and **Hoffmann, J.P.** 2000. Periphyton dynamics in a mountain stream during winter. Artic, Antarctic and Alpine Research. 32(2): 127-134.
- Wang, D., Levine, S., Meals, D.W., **Hoffmann, J.P.**, Drake, J.C. and Cassell, E.A. 1999. Importance of in-stream nutrient storage to P export from a rural, eutrophic river in Vermont, U.S.A. *In* T. Manley [Ed.] *Lake Champlain in Transition: From Research Toward Restoration*. American Geophysical Union. Water Science and Application 1:205-223.
- Meals, D.W., **Hoffmann, J.P.**, Levine, S.N., Cassell, E.A., Wang, D., Drake, J.C., Pelton, D.K., Galarneau, H.M. and Brown, A.B. 1999. Retention of spike additions of soluble phosphorus in a northern eutrophic stream. J. N. Am. Benthol. Soc. 18:185-198.
- Watts, J., Bittner, C., Heaberlin, D. and **J. Hoffmann**. 1999. Extraction of compact model parameters for ULSI MOSFETs using a genetic algorithm. *Modeling and Simulation of Microsystems*, Technical Proceedings of the Second International Conference, San Juan, Puerto Rico, pp 176-179.
- Hoffmann, J. P.** 1998. Wastewater treatment with suspended and non-suspended algae - a review. J. Phycol. 34(5): 757-763.
- Cassell, E.A., Dorioz, J.M., Kort, R.L., **Hoffmann, J.P.** Meals, D.W., Kirschtel, D. and Braun, D.C. 1998. Watershed Modeling: Dynamics of phosphorus storage, cycling, transport and export. J. Environ. Qual. 27:293-298.

TEACHING EXPERIENCE

Courses

BIOLOGY 1,2 **Principles of Biology**. (Fall: 550 students, Spring: 400 students).

Lecture, lab - 4 credits.

Course coordinator for teaching staff of 20 with 24 laboratories per week (1983 to 1991).

BIOLOGY 2. **Principles of Biology**. (Spring 1986 to 1994: 400 students).

Lecture, lab - 4 credits

Present lectures on chemistry, enzymes, thermodynamics, origin of life, cytology, membranes, respiration and photosynthesis.

BOTANY 6. **The Green World**.

(Spring 1984, 1985, Fall 1986, 1988, 1990-1994, 2000-2003: 250 to 300 students).

Lecture - 3 credits

Course on ethnobotany for non-science majors.

BOTANY 160. **Plant Ecology**. (Fall 1985, 1987, 1989, 1991-1997, 1999, 2002: 20 students).

Lecture, lab - 4 credits

Course on plant ecology for biology majors.

BOTANY 197, 198. **Undergraduate Independent Research**.

(1988-1990, 1994-1995: 1996-1997: 5 students).

Supervised student research projects for variable credit hours.

BOTANY 213 - **Plant Communities**. (Spring 1992: 12 students)

Lecture, lab - 3 credits

Course on plant community ecology for upper-level undergraduates and graduate students.

BOTANY 234 - **Freshwater Algal Ecology**. (Spring 1996, 1999: 8 students)

Lecture, lab - 3 credits

Course on algal ecology for upper-level undergraduates and graduate students.

BOTANY 295. Special Topics – **Evolutionary Computation**. (Fall 2000: 15 participants).

Graduate colloquium - 1 credit

BOTANY 295 - Special Topics - **Aquatic Plants of the Lake Champlain Basin**.

(Summer 1992-1997, 1999: 15 students).

Lecture, lab and field - 3 credits.

Course on the ecology of aquatic plants and algae of lakes and streams in the Champlain Valley.

BOTANY 295. Special Topics - **Phosphorus Dynamics in Rivers**. (Spring 1994: 4 students).

Graduate colloquium - 1 credit

BOTANY 295. Special Topics - **Theoretical Plant Ecology**. (Fall 1989: 5 students).

Graduate colloquium - 1 credit.

BOTANY 295. Special Topics - **Ecological Models**. (Spring 1995: 5 students).

Graduate colloquium - 1 credit

BOTANY 295- Special Topics - **Plant Biology for Middle and High School Teachers**
(Summer 1999, 2000: 11 students) - 3 credits (Team taught)

BOTANY 298A. Special Topics - **Phycology**. (Spring 1987: 3 students)
Lecture, lab - 3 credits.

BOTANY 298B. Special Topics - **Phycology Field Trip**. (Summer 1987: 3 students).
1 credit.
Continuation of BOTANY 298A at ocean field site.

Undergraduate Research Supervision: 19 students, Spring 1985 to present.

Internship Supervision

Emilie Breugnot, graduate, University of Paris – Summer 2001
Adam Dow, undergraduate, SUNY Potsdam – Summer 2002

Dissertation Committees: 31 M.S. and 9 Ph.D., Fall 1984 to present

Thesis Supervision

Laurie Gordon	M.S.	completed 1987
Alan Quackenbush	M.S.	completed 1990
Mark Borchardt	Ph.D.	completed 1991
Matt St.John	B.S.	completed 1992
Gregory Gustina	M.S.	completed 1996
Joseph Woerner	B.S.	completed 1997
David Kirschtel	Ph.D.	completed 1999
Bonsu Osei *	Ph.D.	commenced 2000

* (co-advising with Dr. Bentil in Mathematics)

Douglas I. Johnson, PhD

Professor

Background Dr. Johnson received his Ph.D. degree in 1983 from Purdue University under the direction of Dr. Ronald Somerville. After further postdoctoral research at Purdue University and with Dr. John Pringle at the University of Michigan, he joined the faculty in the Department of Microbiology and Molecular Genetics in 1988.

Research Interests

It is becoming increasingly clear that **cell-cycle dependent signal-transduction mechanisms** are highly conserved among eukaryotic organisms. In order to study these mechanisms, bring to bear the full arsenal of experimental approaches, including **genetic, molecular genetic, biochemical, immunological, and cell biological approaches**. Experimentally, we study Cdc42-dependent signal transduction pathways that regulate cell polarity in the budding yeast *S. cerevisiae* and the pathogenic yeast *C. albicans*. The types of experiments we will be performing over the next five years include: (1) *determining the role Cdc42-dependent signaling pathways play in the virulence of C. albicans*; (2) *determining how Cdc42p regulate multiple signal-transduction pathways during the cell cycle by characterizing the cell-cycle specific interactions between Cdc42p, its GEF Cdc24p, and downstream effectors using biochemical assays and site-specific mutagenesis protocols*; and (3) *studying the differential subcellular localization of Cdc42p, Cdc24p, and downstream effectors using fusion proteins to the **Green Fluorescent Protein (GFP)** and its variants (i.e., CFP, YFP, RFP)*.

Cytoskeletal elements, such as microtubules and actin-based microfilaments, are intimately associated with the generation of cell polarity and many cellular and developmental processes, including the partitioning of cellular constituents during cell division, the generation of polarity and cell shape in early embryogenesis, axon migration and neurite outgrowth in early development, the intracellular movement of organelles and proteins in polarized epithelial cells, and the stimulated secretion of neurotransmitters. Switches in cellular morphogenesis are critical for fungal pathogenicity, especially that of the polymorphic yeast *Candida albicans*, and there is a causal relationship between the disruption of normal morphogenesis and **cancer**.

In *S. cerevisiae* and *C. albicans*, genetic and biochemical studies have identified numerous components of signal-transduction pathways regulating cell polarity, but the mechanistic links within these pathways are not understood and the regulatory mechanisms that control the synthesis, modification, and subcellular localization of these proteins have yet to be studied in depth. We have focused on the functions of the **Cdc42p GTPase** and its guanine-nucleotide exchange factor (GEF) **Cdc24p**. Cdc42p is a member of the Rac/Rho subfamily of the Ras superfamily of GTPases that act as molecular switches in the control of a variety of eukaryotic processes (for review, see Johnson, 1999 below). Our analyses of the morphological phenotypes of *S. cerevisiae* *cdc42* mutant alleles indicated that Cdc42p functions in multiple stages of the cell cycle, including bud-site selection process, the organization of the presumptive bud site, the subsequent actin-based polarized cell growth, the G2/M morphogenetic switch, and cytokinesis. Cdc24p has amino-acid sequence similarity with the **Dbl onco-protein**, which acts as a GEF for human Cdc42p.

Selected Publications

Johnson, D.I. Cdc42: An essential Rho-type GTPase controlling eukaryotic cell polarity. *Microbiol. Mol. Biol. Rev.* 1999 Mar;63(1):54-105.

Toenjes, K.A., Sawyer, M.M., **Johnson, D.I.** The guanine-nucleotide-exchange factor Cdc24p is targeted to the nucleus and polarized growth sites. *Curr. Biol.* 1999 Oct 21;9(20):1183-1186.

Richman, T.J., **Johnson, D.I.** *Saccharomyces cerevisiae* cdc42p GTPase is involved in preventing the recurrence of bud emergence during the cell cycle. *Mol. Cell. Biol.* 2000 Nov;20(22):8548-8559.

Muller, O., **Johnson, D.I.**, Mayer, A. Cdc42p functions at the docking stage of yeast vacuole membrane fusion. *EMBO J.* 2001 Oct 15;20(20):5657-5665.

Richman, T.J., Sawyer, M.M., **Johnson, D.I.** *Saccharomyces cerevisiae* Cdc42p localizes to cellular membranes and clusters at sites of polarized growth. *Eukaryot. Cell.* 2002 Jun;1(3):458-468.

Recent Teaching

BSCI 195
MMG 101
MMG 102
MMG 312

Mary L. Tierney

Address

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Marsh Life Science Building
University of Vermont
Burlington, VT 05405
(802)656-0434
mtierney@zoo.uvm.edu

Education

B.S., Biology, 1976 Marywood College, Scranton, PA
Ph.D., Genetics, 1983 Michigan State University, E. Lansing, MI

Professional experience

1995 - present Associate Professor - Department of Botany and Agricultural
Biochemistry and Department of Microbiology and Molecular Genetics,
University of Vermont

1994 - 1995 Assistant Professor - Department of Microbiology and Molecular Genetics,
University of Vermont

1993 - 1995 Assistant Professor - Department of Botany and Agricultural
Biochemistry, University of Vermont

1987 - 1993 Assistant Professor - Biotechnology Center, Department of
Agronomy and Ohio Agricultural Research Development Center, Ohio State
University

1983-1987 Research Associate, Department of Biology, Washington University;
Laboratories of Drs. Roger Beachy and Joseph Varner

Professional organizations

Member, American Society of Plant Biologists
Member, American Society for the Advancement of Science
Member, American Society of Cell Biology

Refereed publications

1. Carpita N, **ML Tierney**, M Campbell (2001) Molecular biology of the plant cell wall: searching for the genes that define structure, architecture and dynamics. *Plant Mol Biol.* 47: 1-5.
2. Bernhardt, C., **ML Tierney** (2000) Expression of AtPRP3, a proline-rich structural cell wall protein from *Arabidopsis thaliana*, is regulated by cell-type specific developmental pathways involved in root hair formation. *Plant Physiol.* 122: 705-714.
3. Fowler, T.J., C. Bernhardt, **ML Tierney** (1999) *Arabidopsis* PRPs Derive From Two Distinct Subsets of Proline-rich Cell Wall Protein Genes Encoding Multiple-domain Proteins. *Plant Physiol.* 121: 1081-1091.
4. Suzuki, H., T. Wagner, **ML Tierney**. 1993. Differential expression of two soybean PRP genes after wounding. *Plant Physiol.* 101:1283-1287.
5. Suzuki, H., T.J. Fowler, **ML Tierney**. 1993. Deletion analysis and localization of SbPRP1, a soybean cell wall protein gene, in roots of transgenic tobacco and cowpea. *Plant Mol. Biol.* 21: 109-119.
6. Ebener, W., T.J. Fowler, H. Suzuki, J. Shaver, **ML Tierney**. 1993. The expression of DcPRP1 is linked to carrot storage root formation and is induced by wounding and auxin treatment. *Plant Physiol.* 101:259-265.
7. Creelman, R.A., **ML Tierney**, J.E. Mullet. 1992. Jasmonic acid/methyl jasmonate accumulate in wounded soybean hypocotyls and modulate wound gene expression. *Proc. Natl. Acad. Sci. USA.* 89: 4938-4941.
8. Kleis-San Francisco, S., **ML Tierney**. 1990. Isolation and characterization of a proline-rich 30 kD cell wall protein from soybean seedlings. *Plant Physiol.* 94:1897-1902.
9. **Tierney, ML.**, J. Weichert, D. Pluymers. 1988. Analysis of the expression of extensin and p33-related cell wall proteins in carrot and soybean. *Mol. Gen. Genet.* 211:393-399.
10. **Tierney, ML** and J.E. Varner. 1987. The Extensins. *Plant Physiol.* 84: 1-2.
11. Lawton, M.A., **ML Tierney**, I. Nakamura, E. Anderson, Y. Komeda, P. Dube, N. Hoffman, R.T. Fraley, R.N. Beachy. 1987. Expression of a soybean β -conglycinin gene under the control of the Cauliflower Mosaic Virus 35S and 19S promoters in transformed petunia tissues. *Plant Mol. Biol.* 9: 315-324.
12. Ladin, B.F., **ML Tierney**, D.W. Meinke, M. Veith, R.N. Beachy. 1987. Developmental regulation of β -conglycinin in soybean axes and cotyledons. *Plant Physiol.* 84: 35-41.

13. **Tierney, ML** E.A. Bray, J.L. Slightom, Y. Ma., R. Klassy, R. Drong and R.N. Beachy. 1987. Isolation and characterization of a genomic clone encoding the β -subunit of β -conglycinin from *Glycine max*. *Planta*. 172: 356-363.
14. **Tierney, ML** and K.R. Schubert. 1985. Isolation and characterization of RNA polymerase from vegetative and symbiotic forms of *Rhizobium japonicum*. *J. Gen. Microbiol.* 131: 2387-2398.

Teaching experience

Courses taught

University of Vermont

Botany 132: Principles of Genetics: 1993 - 2002
Biology 2: Principles of biology: 1995, 1996, 1997
Micro & Mol Genetics 332: Critical Reading: 1996, 1998, 1999, 2000
Botany 381: Selected Problems in Modern Botany: 2001 (taught with Jeanne Harris)
Botany 197 & 198: Undergraduate Research, 2000, 2001
Botany 6: The green world (Guest lecture), 2002
Micro & Mol Genetics 320: Molecular Pathogenesis (Guest lecture), 2002

Ohio State University

Plant Biology 634: Plant Physiology Laboratory: 1988
Biotechnology DNA Workshop: 1989, 1990, 1992
Agronomy 894: Molecular Basis of Plant Development: 1990 (taught with Roger Hangarter)
Agronomy 200: Crop Science: 1991(Wi), 1991 (Au)
Agronomy 694: Mechanisms of Plant Development: 1992

Student and postdoctoral training

Postdoctoral associates

Dr. Susan Kleis-SanFrancisco: 1987 – 1989; currently director of the biotechnology core facility at Texas Tech University

Dr. Hideki Suzuki: 1990 - 1992

Dr. Elizabeth Lee: 1993 – 1996; currently assistant professor, Plant Agriculture, University of Guelph,

Dr. Christine Bernhardt: 1996 – 1999; currently research fellow, Biology Department, University of Michigan

Graduate students

Thomas J. Fowler, Agronomy Department, Ph.D.: 1993; currently research faculty, Dept. of Micro & Mol Genetics, University of Vermont

Jianhong Hu, Botany and Agricultural Biochemistry, Ph.D. program: 1997 – present
(will defend Spring, 2003)

Tim Trott, Cell and Molecular Biology, Ph.D. program: 1998 – present
(will defend Spring, 2003)

Xu Zhang, Botany and Agricultural Biochemistry, Ph.D. program: 1999 – present

Undergraduate students (Laboratory Research)

June Traicoff, Microbiology: 1990

Jonathan Shaver, Agronomy: 1990

Tejinder Rakhra, Microbiology and Molecular Genetics: 1993 - 1995

Tara Crawford, Biology: 1994

Giovanni David, Biology: 1995 - 1996

Daniel Pederson, Biochemistry: 1995 - 1999

Brad Young, Biology: 1997 –1998

Morgan Burns, Plant and Soil Sciences: 2000 – 2001; awarded SUGR/FAME grant

Justin Landis, Biological Sciences: 2000

Nathan Boggs, Plant and Soil Science: 2002; awarded Helix research grant

Graduate student committees

Completed:

Francisco Diaz-deLeon, Horticulture, Ph.D.: 1991

Emmanuel Liscum, Plant Biology, Ph.D.: 1992

Janet Sullivan, Horticulture, M.S.: 1992

Fernando Finger, Horticulture, Ph.D., 1992

Junjie Chen, Cell and Molecular Biology, Ph.D., 1993.

Sarah Folta, Cell and Molecular Biology Program, M.S., 1995.

Carmen Hernandez, Biology, Ph.D., 1997.

Tim Lynch, Botany and Agricultural Biochemistry, Ph.D., 1997.

Peter Miller, Microbiology and Molecular Genetics, Ph.D., 1997.

Jeremy Pike, Cell and Molecular Biology Program, M.S., 1998.

William White, Microbiology and Molecular Genetics, M.S., 1997.

Peter Walker, Botany and Agricultural Biochemistry, M.S., 1997.

Rodney Camire, Biochemistry, Ph.D., 1998.

Tammy Richman, Microbiology and Molecular Genetics, Ph.D., 2000.

Janet Murray, Microbiology and Molecular Genetics, Ph.D., 2000

Elizabeth Carter, Animal Science, M.S., 2001

Joyce Oetjen, Microbiology and Molecular Genetics, Ph.D., 2002

Heidi Albright, Biology, M.S., 2001

Caroline Donahue, Microbiology and Molecular Genetics, Ph.D., 2002

Current:

Chenguang Zhao, Biochemistry, Ph.D.

Stacey Gilk, Microbiology and Molecular Genetics, Ph.D.
Mike Wichroski, Microbiology and Molecular Genetics, Ph.D.
Lynn Leach, Microbiology and Molecular Genetics, Ph.D.
Yan Liang, Botany and Agricultural Biochemistry, Ph.D.

Undergraduate student committees

Jonathan Shaver, Agronomy, Honors Committee, 1989 – 1990.
Heidi Albright, Biology, Honors Thesis Committee, 1998-1999.

Van Houten, Judith L.

BIOGRAPHICAL SKETCH

NAME Judith Van Houten		POSITION TITLE Professor	
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Pacific Lutheran University, Tacoma, WA	B.S.	1972	Biology
University of California, Santa Barbara, CA	Ph.D.	1976	Genetics/Molec. Biology
University of British Columbia, Vancouver, BC	Postdoctoral	1977-79	Electrophysiology

A. Experience and employment:

Co-Director, Vermont Genetics Network, 9/01 – present, funded by NIH NCRR; Assoc. Dir. For Research Vermont EPSCoR, 1990-1996; Assoc. Project Dir. Vermont EPSCoR, 1996 - present

Professor, Dept. of Biology, University of Vermont - continuing research on chemoreception in Paramecium, using biochemical, genetic and electrophysiological techniques; promoted from assistant professor, 7/86; promoted from associate professor 7/92; supported continuously 9/1/80 - present by NIH or NSF, also by Institutional awards and Whitehall Foundation.

Assistant Professor, Dept. of Zoology, University of Iowa, temporary position carrying out research on chemoreception in Paramecium, supported by grant GM26231 as individual investigator and as an individual investigator on Program Project Grant NS 15350; 1/1/79-8/31/80.

Postdoctoral Fellow, Dept. Pharmacology, University of British Columbia, advisor David Quastel, 1/1/77-12/31/78; supported by PHS individual fellowship to learn electrophysiology of Paramecium and test membrane hypothesis of chemoreception.

Graduate Student, Dept. of Biological Sciences, University of California, Santa Barbara, 9/1/72-12/31/76; Ching Kung and Eduardo Orias, advisors; studying genetics of chemoreception behavior of Paramecium.

Honors:

George H. Perkins Professor, 1997-2002, reappointed 2002-2007; Manheimer Award for Career Achievements in the Chemosensory Sciences, 1996; University Scholar 1991-92; Claude Pepper Award 1990-1997; Graduated summa cum laude Pacific Lutheran University, 1972; PHS individual postdoctoral fellowship 1978-80; elected President Vermont Chapter of Society for Neuroscience; elected to Membership Chair, Assoc. for Chemoreception Sciences 1988-90; Director Cell Biology Program 1988-1994; editorial board for Chemical Senses and NeuroReport; Program Chair, Assoc. for Chemoreception Sciences, 1993-94; President-elect, Assoc. for Chemoreception Sciences, 1994-95, President 1995-96; Chair, CMS Study Section, 1996-98; Board of Editors, J. Euk. Microbiol. Reappointed 7/03

B. Publications (Last Five Years):

- Davis, D., Fiekers, J., and J.L. Van Houten. 1998. Intracellular pH and chemoresponse to NH₄ + Paramecium. *Cell Motil. and the Cytoskeleton*. 40: 107-118.
- Fraga, D., Yano, J., Reed, M., Chuang, R., Bell, W.E., Van Houten, J.L. and Hinrichsen, R. 1998. Introducing Antisense Oligonucleotides into Paramecium via electroporation. *J. Euk. Microbiol.* 45: 582-588.
- Van Houten, J.L. 1998. Chemosensory Transduction in Paramecium. *Eur. J. Protistol.* 34: 301-307.
- Bell, W.E., W. Karstens, Y. Sun, J.L. Van Houten. 1998. Biotin chemoresponse in *Paramecium*. *J.Comp. Physiol.*183: 361-366.
- Symington, Steven B., Zhang, A., Karsten, W., Van Houten, J. L., and Clark, J. M. 1999. Characterization of Pyrethroid Action on Ciliary Calcium Channels in *Paramecium tetraurelia*. *Pesticide Biochemistry and Physiology*. 65: 181-193.
- Van Houten, J. L. and Bergeron, A. 2000. Glutamate chemosensory signal transduction in *Paramecium*. *J. Nutr.* 130: 946s-949s.
- Van Houten, J.L. 2000. Chemoreception in Microorganisms. In: *Neurobiology of Taste and Smell*, 2nd ed. Finger, Restrepo and Silver, eds. (J. Wiley), pp. 11-40.
- Paquette, C.A., V. Rakochy, A. Bush, and J.L. Van Houten. 2001. GPI anchored proteins in *Paramecium tetraurelia*: Possible role in chemo response. *J. Exp. Biol.*204: 2899-2910.
- Dessen, P., Zagulski, M., Gromadka, R., Plattner, H., Kissmehl, R., Meyer, E., Betermier, M., Schultz, J.E., Linder, J.U., Pearlman, R.E., Kung, C., Forney, J., Satir, B.H., Van Houten, J.L., Keller, A-M., Froissard, M., Sperling, L., and Cohen, J. (2001) Paramecium genome survey: a pilot project. *Trends in Genetics* 17:306-308.
- Yano, J., Rakochy, V., and Van Houten, J.L. (2003) Studies of GPI anchored proteins in chemosensory signaling using antisense manipulation of the *Paramecium PIG-A* gene expression. In press *Eukaryotic Cell*.
- de Ondarza, J., Symington, S.B., Van Houten, J.L. and Clark, J. M. (2003) G-Protein Modulators Alter the Swimming Behavior and Calcium Influx of *Paramecium tetraurelia* (in press *J. Euk. Microbiol.*)

Current Course Assignments:

- Bio 101 Genetics 1980- present
- Bio 263 Genetics of Cell Cycle Genetics (alternates with Bio 265 Developmental Molecular Genetics)
- Bio 205 Advanced Genetics Lab
- Bio 296 Self Design Genetics Laboratory

Other Courses Taught:

- Bio 371 Graduate Colloquia on Lipid Rafts, GPI anchored proteins, Signal Transduction
- Bio 295 Genetics and Privacy

Curriculum vitae
Jim O. Vigoreaux

Associate Professor
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email: jvigorea@zoo.uvm.edu
website: <http://www.uvm.edu/~biology/Faculty/Vigoreaux>

PERSONAL DATA

Born: 7/1/1960, San Juan, Puerto Rico
Citizenship: USA
SSN: 582-21-3690

EDUCATION

Ph.D., 1987, University of Oklahoma School of Medicine, Oklahoma City; major in Biochemistry and Molecular Biology.
B.S., *Magna cum laude*, 1981, University of Puerto Rico, Rio Piedras; major in Mathematics.

APPOINTMENTS

Director, Ronald E. McNair Postbaccalaureate Achievement Program, University of Vermont, Burlington, VT, 2003-present
Adjunct Associate Professor, Department of Molecular Physiology and Biophysics. University of Vermont, Burlington, VT, 2002- present
Director of Proteomics, Heart Failure Research Group, University of Vermont College of Medicine, Burlington, VT, 2001 – present
Senior Research Advisor, MyoSite Diagnostics, Inc, Burlington, VT, 2000-present
Associate Professor, Department of Biology, University of Vermont, Burlington, VT, 1997-present.
Assistant Professor, Department of Biology, University of Vermont, Burlington, VT, 1991-1997.
Member, Cell and Molecular Biology Program, University of Vermont, Burlington, VT, 1991-present
Postdoctoral Fellow with Mary Lou Pardue, Ph.D., Department of Biology, Massachusetts Institute of Technology, Cambridge, MA, 1987-1991.
Teaching Assistant, Department of Biochemistry and Molecular Biology, University of Oklahoma Health Sciences Center, Oklahoma City, 1984-1987.
Research Assistant with Graciela Candelas, Ph.D., Department of Biology, University of Puerto Rico, Rio Piedras, 1981.
Vigoreaux
Research Assistant with Carlos H. Ramirez-Ronda, M.D., Infectious Disease Laboratory, Veteran's Administration Hospital and University of Puerto Rico School of Medicine, 1980-1981.

HONORS AND FELLOWSHIPS

Co-Chair, Muscle Mechanics and Ultrastructure, Biophysical Society Meeting, 2000
Postdoctoral Fellowship, American Cancer Society, Inc., 1989-1990.
Graduate College Research Award, 1986, University of Oklahoma, Norman.
Dean's Award for Basic Research, 1985, University of Oklahoma Health Sciences Center, Oklahoma City.
Academic Fellowship, 1981-1984, Graduate and Professional Opportunities Program, U.S. Department of Education and University of Oklahoma Health Sciences Center, Oklahoma City.
Dean's Award for Academic Excellence, 1981, University of Puerto Rico, Rio Piedras.
Research Fellowship, 1980, Support University Biomedical Education Program (SUBE), University of Puerto Rico, Rio Piedras.
College of Natural Sciences Honors' Roll, 1980, University of Puerto Rico, Rio Piedras.
Dean's List, 1977-1981, University of Puerto Rico, Rio Piedras.

TEACHING EXPERIENCE

Coordinator and Principal Lecturer (all courses at The University of Vermont unless otherwise indicated)

Undergraduate courses

Principles of Biology (Biol 002), (4 credits with lab; 1992-1994)
Cell Structure and Function (Biol 103), (4 credits with lab; 1992-present).
Science as a Way of Knowing (Biol 009), (3 credits with lab; 1997-present)

Graduate courses

Cell Biology (Biol 301), (3 credits; 1995-1997)
Molecular Mechanochemistry (Biol 381), (3 credits; 1995-1997)
Molecular Architecture (Biol 373), (1 credit; 1991)
Molecular Diversity of Muscle Design (Biol 375), (1 credit; 1993)
Nanotechnology (Biol 375), (1 credit; 1997)
Functional Genomics and Proteomics (Biol 371), (1 credit; 2000)
Homeotic Genes in Development (Biol 381), (3 credits; 2000)
Muscle Development (Biol 371), (1 credit, 2002)

Lecturer

Undergraduate courses

Cell Motility and the Cytoskeleton (Biol 233), (1991)
Genetics of Cell Cycle Regulation (Biol 263), (1991)
Principles of Biology (Biol 001), (1992)
Genetics (Biol 101), (1996)

-2- *Vigoreaux*

Graduate courses

Cell Biology (CB 301), (1993)
Specialized Cells and Cell Processes (CB 302), (1992 to 1994)
Patterns in Biology: An Integrative Approach to the Organism. One week section on Proteomics and Integrative Biology. Department of Biology, University of Puerto Rico, Rio Piedras (2002)

Undergraduate Honors Research

Marcia Lux (1993)
Sean Brown (1994)
Todd Sweberg (1995)
Michael Ulich (1996)
Adriane Cross (1997)
Eugene Valsky (1998)
Rachel Humphrey (2003)

Other Related Experience

Coordinator, Research experience for undergraduate students, University of Vermont, 1992-1994
Mentor, University of Vermont Summer Research VISIT Program, 1993, 1994
Mentor, University of Vermont Summer Research Apprentice Program (RAP), 1995, 1996
Mentor, MIT Minority Summer Science Research Program, 1990.
Teaching Assistant, 1984-1987, Department of Biochemistry and Molecular Biology, University of Oklahoma Health Sciences Center, Oklahoma City.
Laboratory Instructor, 1983, Department of Biochemistry and Molecular Biology, University of Oklahoma Health Sciences Center, Oklahoma City.

PUBLICATIONS (Last Five Years)

Moore, J., Vigoreaux, J. O. and Maughan, D.W. (1998) Removal of the 44 amino acid N-terminal extension of the Drosophila myosin regulatory light chain has no effect on stretch activation of indirect flight muscles. *Biophys. J.* 74: A335
Moore, J., Hernandez, C., Ayer, G., Maughan, D.W. and Vigoreaux, J.O. (1998) The effect of a genetic deficiency that spans the flightin gene of Drosophila melanogaster. *Biophys J.* 74: A156
Mohan-Ram, V., Moore, J., Haeberle, J., Vigoreaux, J. and Maughan, D. (1999) The Drosophila regulatory light chain extension may play a role in thin filament cooperativity. *Biophys J.* 76:A37
Moore, J., Irving, T., Vigoreaux, J. and Maughan, D. (1999) N-terminal truncation of the Drosophila myosin regulatory light chain reduces indirect flight muscle dynamic stiffness and alters myofilament spacing and alignment in vivo. *Biophys. J.* 76:A33.
Nongthomba, U., Cummins, M., Vigoreaux, J. O. and Sparrow, J. C. (1999) Suppression of muscle hypercontraction phenotypes in Drosophila melanogaster.
Vigoreaux, J. O., Nongthomba, U., Cummins, M. and Sparrow, J. C. (1999) Genetic analysis of flight muscle hypercontraction in Drosophila. *Mol. Biol. Cell* 10S; 246a.
Vigoreaux, J. O., Cox, A. , and Reedy, M. C. (1999) Flightin is essential for thick filament length regulation and normal contractile function of Drosophila flight muscle. *Mol. Biol. Cell* 10S;
Vigoreaux, J. O., Cox, A., Barnes, W. D., Reedy, M. C., and Maughan, D. W. (2000) A knockout mutation of Drosophila flightin affects oscillatory work and thick filament length and stability in flight muscle fibers. *Biophys. J.* 78: 135A.
Henkin, J., Cox, A., Barnes, W., Maughan, D. W., and Vigoreaux, J. (2001) Reduction in muscle stiffness and loss of power output in Drosophila flight muscles that lack flightin. *Biophys. J.* 80: 510a

- Vigoreaux, J.O., Henkin, J. A., and Maughan, D. W. (2001) Analysis of functional protein interactions in *Drosophila* flight muscles through the study of mutant proteomes. Fifth International Conference on Muscle Energetics, Burlington, VT
- Ayer, G. A. and Vigoreaux, J. O. (2001) *Drosophila* flightin is a myosin rod binding protein. *Mol. Biol. Cell* 12: 159a
- Henkin, J. A., Maughan, D. and Vigoreaux, J. (2002) Discovering protein interactions in *Drosophila* flight muscle through combined techniques of genetics and proteomics. *FASEB J.* 16: A881.
- Lemus, J. and Vigoreaux, J. O. (2002) Proteome analysis of *Drosophila* muscle mutants in myosin and flightin. 2002 SACNAS National Conference, Anaheim, CA.
- Cajigas, I., Valsky, E. Gorrochategui, M. and Vigoreaux, J. O. (2002) Phylogenetic analysis of *Drosophila* flightin reveals a hybrid protein with conserved and rapidly evolving sequences. *Mol. Biol. Cell*, 13S: 40a.
- Vishnudas, V., Maughan, D. and Vigoreaux, J. O. (2002) Molecular adaptations to meet metabolic demands in fast contracting muscles. *Mol. Biol. Cell*, 13S: 320a.
- Barton, B., Ayer, G., Cajigas, I., Maughan, D., and Vigoreaux, J. (2002) Defects in flight muscle ultrastructure and function in transgenic *Drosophila* with mutations of phosphorylation sites in flightin. *Mol. Biol. Cell*, 13S: 319a.
- Henkin, J., Jennings, M. E., Matthews, D. E., Maughan, D. W. and Vigoreaux, J.O. (2003) Mass processing²: an improved technique for protein identification with MS data. State of Vermont DOE EPSCoR Initiative in Structural Biology and Computational Biology/Bioinformatics Annual Retreat, Burlington VT.
- Lemus, J. and Vigoreaux, J. O. (2003) Proteome analysis of *Drosophila* muscle mutants in myosin and flightin. State of Vermont DOE EPSCoR Initiative in Structural Biology and Computational Biology/Bioinformatics Annual Retreat, Burlington VT.
- Compton, D., Henkin, J., Maughan, D. W. and Vigoreaux, J. O. (2003) Loss-of-function myosin and actin mutants have broad effects on the flight muscle proteome of *Drosophila*. State of Vermont DOE EPSCoR Initiative in Structural Biology and Computational Biology/Bioinformatics Annual Retreat, Burlington VT.

CURRICULUM VITAE

Thomas C. Vogelmann

Degrees

- 1984 Docent, Plant Physiology, University of Lund, Lund, Sweden
- 1980 Ph.D. in Biology (Plant Development), Syracuse University, Syracuse, NY
- 1977 Master of Science in Botany, Washington State University, Pullman, WA
- 1974 Bachelor of Science in Biological Sciences, University of Vermont and State Agricultural College, Burlington, VT

Positions

- 2002- Chair, Dept. of Botany and Agricultural Biochemistry, University of Vermont, Burlington, VT
- 2000-01 Interim Chair, Botany Department, University of Wyoming, Laramie, WY
- 2000 Visiting Research Fellow, Research School of Biological Sciences, Australian National University, Canberra, Australia
- 1996- Professor, Botany Department, University of Wyoming, Laramie, WY
- 1990-96 Associate Professor, Botany Department, University of Wyoming, Laramie, WY
- 1990-91 Visiting Professor, University of Lund, Lund, Sweden
- 1984-90 Assistant Professor, Botany Department, University of Wyoming, Laramie, WY
- 1981-84 Postdoctoral Fellow, U.S. National Science Foundation and Swedish Natural Sciences Research Council, Institute of Plant Physiology, University of Lund, Lund, Sweden

Courses Taught

Cell Biology
General Biology
Plant Growth and Differentiation
Plant Physiology
Plant Biochemistry
Plants and Civilization
Regulation of Plant Morphogenesis

Current teaching commitments

Plant Physiology (BOT 104)
Graduate seminar (BOT 195)

Honors and awards

- 2000 Robertson Lecture (for outstanding contributions to plant physiology), Australian and New Zealand Societies for Plant Physiology
- 1999 UW Presidential Award for outstanding research, University of Wyoming
- 1999 Art & Sciences Award for outstanding research, University of Wyoming

- 1999 UW Outstanding Dissertation Award in the Biological Sciences (PhD advisor for Tao Han)
- 1993 Elbogen Award for outstanding teaching, University of Wyoming (highest award for teaching at UW)
- 1992 Art & Sciences award for outstanding research, University of Wyoming
- (70) Gorton, H.L., Herbert, S.K. Vogelmann T.C. 2003. Photoacoustic analysis indicates that chloroplast movement does not alter liquid-phase CO₂ diffusion in leaves of *Alocasia brisbanensis*. *Plant Physiology* 132: 1-11.
- (69) William E. Williams, W.E., Gorton, H.L., Vogelmann, T.C. 2003. Surface Gas-Exchange Processes of Snow Algae. *Proceedings of the National Academy of Science* 100: 562-566.
- (68) Evans, J.R., Vogelmann, T.C. 2003. Profiles of ¹⁴C fixation through spinach leaves in relation to light absorption and photosynthetic capacity. *Plant, Cell & Environment* 26: 547-560.
- (67) Gould, K.S., Neill, S.O., Vogelmann, T.C. 2002. A unified explanation for anthocyanins in leaves? *Advances in Botanical Research* 37: 167-192.
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PATENTS

- Buttry, D.A., Vogelmann, T.C., Chen, G., Goodwin, R. Optical fiber waist refractometer. U.S. patent 5,600,433. Issue date Feb. 4, 1997.

GARY E. WARD

Ph.D., 1985, University of California at San Diego

Associate Professor, MMG

TEACHING

Graduate students supervised:

Carolyn Donahue (Ph.D student, 1996-2002) – currently a postdoctoral fellow at University of California, San Francisco
Michael Wichroski (Ph.D student, 1997-2003) – currently a postdoctoral fellow at University of Massachusetts Medical School, Worcester
Kimberly Carey (Ph.D student, 1998-present)
Stacey Gilk (Ph.D student, 1998-present)
Jeffrey Mital (PhD student, 2001-present)
Aoife Heaslip (PhD student, 2003-present)

Undergraduate students supervised:

Zachary Fieger (Biological Sciences; 2003)
David Mitchell (Plant and Soil Sciences; 2001)

Undergraduate advisees

Kevin Plourde (Biological Sciences; 2002-2003)
Jessica Randall (Biological Sciences; 2002)
Danielle Bordeau (MMG; 2001-present)

Courses taught (current commitments underlined):

MMG 102, “Molecular Genetics” (Spring 2001-2003). Undergraduate eukaryotic genetics/cell biology course. 18-25 students, primarily from MMG. 9 hours lecture out of 39 total.

MMG 101, “Biology of Microorganisms” (Fall 1999-2003). Undergraduate introductory microbiology course. 65-70 students, primarily from MMG, Animal Sciences, and Biological Sciences. 3 hours lecture out of 38 total.

MMG 332, *Critical Reading*” (Fall 1996, 1999, 2000, 2001, 2003). Graduate level class aimed at developing students’ critical reading skills. 7-10 students, from MMG and CMB. 1.5 hours class time out of 21 total.

MMG 320, “Cellular Microbiology” (formerly MMG 296 - *Microbial Pathogenesis*; Spring, 1999, 2002). **Course co-director.** 4-credit graduate level course on the pathogenic mechanisms of viruses, bacteria and parasitic protozoa. 13-18 students, from MMG, CMB, and Biology. 16 hours lecture/journal clubs out of 54 total.

- MMG 310, “Cellular and Molecular Mechanisms of Human Disease” (Fall 1998).
Course director. Graduate level seminar course on the cellular and molecular mechanisms of human disease; strong emphasis on developing students’ presentation skills. 10 students, from MMG and CMB. 15 hours class time out of 15 total.
- Cell and Molecular Biology Course, Vermont Integrated Medical Curriculum (Fall 2003). **Steering Committee Member.** Foundations level survey course for medical students on the fundamentals of cell and molecular biology. 90 students. 7.5 hours lecture (out of 55 total), co-leader of one small group discussion, and co-developer of 3 on-line learning modules.
- BPH 212 (Harvard School of Public Health, 2002) “*Molecular and Cellular Parasitology*”. Graduate level course on molecular/cellular parasitology directed by Barbara Burleigh and Ali Sultan. 10 students. 2 hour guest lecture.
- M/I 148 (Dartmouth Medical School, 2001, 2003) “*Molecular Pathogenesis*” Graduate level course on the mechanisms of microbial pathogenesis, directed by David Bzik and Ambrose Cheung. 8 students. 3 hour guest lecture/discussion session.
- BI 330 (Middlebury College; 1998) “*Mechanisms of Microbial Pathogenesis*”. Upper level undergraduate course on the mechanisms of microbial pathogenesis, directed by Dr. Grace Spatafora. 12 students. 1.5 hour guest lecture.
- “*Biology of Parasitism*” (Summer Course, Marine Biological Laboratory, Woods Hole MA; 1997, 2001, 2003). Graduate level course on the molecular and cellular

PUBLICATIONS - REFEREED JOURNALS

- Wichroski, M.J. and **Ward, G.E.** (2003) *Biosynthesis of Glycosylphosphatidylinositol is Essential to the Survival of the Protozoan Parasite Toxoplasma gondii.* Euk. Cell, in press.
- Ward, G.E.**, Carey, K.L. and Westwood, N.J. (2002) Using Small Molecules to Study Big Questions in Cellular Microbiology. Cell. Microbiol. 4, 471-482.
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- Carey, K.L. and **Ward, G.E.** (1999) 96-well Plates Providing High Optical Resolution for High-throughput Immunofluorescence-based Screening of Monoclonal Antibodies against *Toxoplasma gondii*. J. Immunol. Meth. **230**, 11-18.
- Orfeo, T., Chen, L, Huang, W., **Ward, G.** and Bateman, E. (1999) Distamycin A Selectively Inhibits *Acanthamoeba* RNA Synthesis and Differentiation Biochem. Biophys Acta **1446**, 273-285.
- Mattei, D., **Ward, G.E.**, Langsley, G. and Lingelbach, K. (1999). Novel Secretory Pathways in *Plasmodium*? Parasitology Today **15**, 235-237.
- Tardieux, I., Baines, I., Mossakowska, M. and **Ward, G.E.** (1998) Actin-binding Proteins of Invasive Malaria Parasites: Regulation of Actin Polymerization by a Complex of 32/34-kDa Proteins Associated with Heat Shock Protein-70kDa. Mol. Biochem. Parasitol. **93**, 295-308.
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- de Castro, F. A., **Ward, G.E.**, Jambou, R., Attal, G., Jaureguiberry, G., Chakarabarti, D., Braun-Breton, C., and Langsley, G. (1996). A Family of Rab G-proteins in *Plasmodium falciparum* and a Detailed Characterisation of PfRab6. Mol. Biochem. Parasitol. **80**, 77-88.
- Suss-Toby, E., Zimmerberg, J., and **Ward, G.E.** (1996) *Toxoplasma* Invasion: The Parasitophorous Vacuole is Formed from Host Cell Plasma Membrane and Pinches Off via a Fission Pore. Proc. Nat. Acad. Sci. USA **93**, 8413-8418.
- Ward, G. E.** , Fujioka, H., Aikawa, M. and Miller, L. H. (1994). Staurosporine Inhibits Invasion of Erythrocytes by Malarial Merozoites. Exp. Parasitol., **79**, 480-487.
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MANUSCRIPTS SUBMITTED OR IN PREPARATION

- DeVore, N., Mann, T., Gilk, S.D., **Ward, G.E.** and Beckers, C.J. TgMADP Anchors Myosin-A in the Plasma Membrane of *Toxoplasma gondii*. In preparation.
- Westwood, N.J, Carey, K.L, Mitchison, T.J. and **Ward, G.E.** A Small Molecule Approach to Studying Host-pathogen Interaction: Identification of Novel Effectors of Host Cell Invasion by *Toxoplasma gondii* using High-throughput, Phenotype-based Small Molecule Screening. In preparation.
- Gilk, S.D., Raviv, Y., Beckers, C.J., and **Ward, G.E.** Identification of Transmembrane Proteins of the *T. gondii* Pellice using ¹²⁵I-iodonaphthalenazide. In preparation.

APPENDIX 3. Resource data tables

Itemized Equipment and Supplies Needs for the BCOR Courses

BCOR 11: Introductory Biology

Equipment	Number & individual price	Price
spectrophotometers	6 @ \$1695	\$9835
microscopes	4 @ \$1405	\$5600
Dissecting scopes	5 @ \$1300	\$5200
370 incubator	1 @ \$1471	\$1471

Total needed for equipment: \$22,126

BCOR 12: Introductory Biology

Equipment	Number & individual price	Price
Computers	15 @ \$1200	\$18000
PCR machines	2 @ \$3000	\$6000
Centrifuges	2 @ \$1000	\$2000
Mini-gel rigs	8 @ \$ 200	\$1600
-80C freezer	1 @ \$3000	\$3000
Analysis Software	1 @ \$2000	\$2000

Total needed for equipment: \$32,600

BCOR 101: Genetics

Several advanced genetics laboratory already exist among the departments participating in the new major. Therefore, there is no laboratory portion of BCOR 101 and students meet in weekly recitation sections to work through genetics problems with a GTA.

BCOR 102: Ecology and Evolution

Equipment	Number & individual price	Price
Field Guides	10@ 20	\$200
DBH Tapes	10 @ 60	\$600
Data Collection	10@ 105	\$1050
MicroBalance	1@ 1000	\$1000
Kick Nets	10 @ \$200	\$2000
Light Rack	1@\$1000	\$1000
Spectrophotometer	1 @ \$1695	\$1695

Total needed for equipment: \$7,545

BCOR 103: Molecular and Cell Biology

Workstations with high speed access	6 @ \$6000	\$36,000
Molecular Modeling Software (multi-user license)	1 @ \$18500	\$18,500
Gel Analysis software (multi-user license)	1 @ \$22500	\$22,500
Virtual Biology Lab manual	1 @ \$15000	\$15,000

Total needed for equipment: \$92,000

Table A: Faculty Resources existing and needed at launch FY05, Fall 2004

Current Course	Section	Current Faculty*	New Course	Section (enrollment)	Total Required Faculty
Biol 11	A	CAS Faculty ¹	BCOR 11	A (45)	CAS Faculty
	B	<i>CAS Faculty</i>		B (45)	CAS Faculty
	C	<i>CAS Faculty</i>		C (45)	CAS Faculty
				D (45)	CALS Faculty
				E (45)	CALS Faculty
Biol 12	A	CAS Faculty	BCOR 12	A (45)	CAS Faculty
	B	<i>CAS Faculty</i>		B (45)	CAS Faculty
				C (45)	CALS Faculty
				D (45)	CALS Faculty
Biol 101	A	CAS Faculty	BCOR 101	A (100)	CAS Faculty
Bot 132	A	CALS Faculty	BCOR 101	B (100)	CALS Faculty
Biol 102	A	CAS Faculty	BCOR 102	A (60)	CAS Faculty
Bot 160	A	CALS Faculty	BCOR 102	B (60)	CALS Faculty
Biol 103	A	CAS Faculty	BCOR 103	A (48)	CAS Faculty
MMG 102	A	CALS Faculty	BCOR 103	B (48)	CALS Faculty

Italics* denote faculty lines currently supported by one-time funds, e.g. sabbatical replacements or course release money, and **bold denotes those needing permanent central funding.

¹ Biology Department faculty

Student enrollment data were provided by UVM's Institutional Studies Office.

Table B. GTA Allotments -- Existing and Needed at Launch, Fall 2004, FY05

Fall Semester				Spring Semester				Acad. Year GTA's
Course	Current GTAs	New Course	BioCore GTAs	Current Course	Current GTAs	New Course	BioCore GTAs	
Biol 11	4	BioCore11	7.5	Biol 12	3	BioCore 12	6	
Botany 132	1	BioCore 101	2.5	Biol 101	2	BioCore 101	2.5	
Biol 102	4	BioCore 102	2.5	Botany 160	1	BioCore 102	2.5	
Biol 103	4	BioCore 103	4	MMG 102	2	BioCore 103	4	
Totals Current	13				8			10.50
Total Future			16.5				15	15.75
Future Unmet Need			3.5				7.0	5.25
Year-long GTAs needed								5.25*

*** Additional 5.25 GTAs required:**

- 3.25 from Provost
- 1 temporary GTA from Biology Department

Table C. Summary of resource requirements for launch of new major in FY05

Course	Human Resources				Equipment		Operating	
	Faculty/Lecturers		Staff		Current ^g	Needed	Current	Additional Needed ^g
	Current	Additional Needed	Current	Additional Needed				
BioCore 11	3 ^a	2	0.5 Coord.	0.5 ^f Coord.		\$22,126	\$2000 (Biology)	\$16,100
BioCore 12	2 ^b	2	0.5 Coord.	0.5 Coord.		\$32,600	\$1100 (Biology)	\$37,700
BioCore 101	2 ^c	0	0	0			\$40 (Biology) \$40 (Botany)	0
BioCore 102	2 ^d	0	0	1.0 ^f		\$7,545	\$780 (Biol 102) \$600 (Botany 160)	\$6,820
BioCore 103	4 ^e	0	0	1.0 ^f		\$92,500	\$740 (Biol 103) \$700 (MMG 102)	\$5,500
^{a,b} Three faculty equivalents from the Biology department currently teach in Biol 11 and two in Biol 12								
^c One faculty from Biology and one from Botany currently teach in Biol 101 and Botany 132								
^d One faculty from Biology and one from Botany currently teach in Biol 102 and Botany 160								
^e One faculty from Biology and three from MMG currently teach in Biol 103 and MMG 102								
^f See Resource requirements; the current coordinator for Biol 11 & 12 will be required to serve full time. To launch new laboratories in BioCore 12, the coordinator will need an additional 3 mos salary for the summer of 2004. A full time coordinator will serve both BioCore 102 and BioCore 103.								
^g See Resource requirements; Although it is impossible to put dollar amounts on the used existing equipment, equipment that is currently used in the Biology and Botany courses to be combined will carry over to the new BioCore courses. Operating is based on \$6.00/person/lab with a 5%/yr increase for inflation. An additional \$1000 per course is included in needed operating funds for equipment maintenance and replacement. See following page for itemized equipment needs and details of specific courses.								

RESOURCE ISSUES ASSOCIATED WITH BIOLOGY 1,2 AND THE PROPOSED CROSS-COLLEGE INTEGRATED BIOLOGY MAJOR

The prospect of revamping the curriculum for biology majors at the University of Vermont presents a unique opportunity to design a modern rigorous curriculum that will establish a long term foundation for students of biology and the life sciences. The purpose of this narrative is to describe the flow of resources allocated for current courses taught in the departments of Biology and Botany & Agricultural Biochemistry into the proposed BCOR courses and to identify requests for additional resources needed to establish and maintain high quality instruction in these courses.

Adoption of the proposed biology curriculum will make BCOR 11,12 the introductory course for biology majors. Student enrollment of the concurrently taught introductory course, Biology 1, 2 will decrease as majors of biology and other life science disciplines move from this course to BCOR 11,12. The impact of the increased enrollment as related to increased demand for teaching and material resources in BCOR 11,12 will be discussed shortly. An immediate issue is the ultimate fate of Biol 1,2 and the extent to which resources could be freed for transfer to BCOR 11,12. Currently, discussions are underway between the chairs of Biology and BAB to determine the fate of Biol 1,2. Regardless of the ultimate fate of this course, after transfer of biology and allied majors to BCOR 11,12 there will still be a significant student constituency for Biol 1,2. Between 1998 and 2002, an average of 200 nonscience majors enrolled per semester in Biology 1,2 and we expect this to be a baseline enrollment figure for Biol 1,2 or its successor. Given the importance of a course in biology for majors outside of the life sciences and the sizable student constituency, this places a cap on the amount of resources that can be reallocated to BCOR 11,12.

Table 1 below shows allocation of resources from Biol 1,2 to BCOR 11/12 upon launch of the cross-college, integrated biology major. Maintenance of Biol 1,2 or establishment of a new survey course for nonscience majors will require retention of most of the resources currently allocated to this course (see columns 1 and 2). Upon launch of the new major in FY 05 some students will transfer into BCOR 11/12 thereby reducing demands upon labs and freeing 2 graduate teaching assistants (col. 3) for transfer to BCOR 11/12.

Table 1. Allocation of resources from Bio1,2 to BCOR 11/12 at launch FY 05

FY 05 Launch Year Only and Assumes Bio 1,2 is restructured by FY 07

8/29/2003
 1 2 3
 RESOURCES REALLOCATED FROM Bio B to BioCore 11/12

	Existing Bio 1,2 Resources		Resources Remaining with Bio 1,2		Reallocated from Bio 1,2 to 11/12	
	Biology	Botany	Biology	Botany	Biology	Botany
Faculty (salary given as lecturer salary)	2	2	2	2	0	0
Secretarial Support	0	0	0	0	0	0
Lab Technicians	0.25	0	0.25	0	0	0
Fringe Benefits @ 38%					0	0
Graduate Teaching Assts. GTA #'s	4	4	3	3	1	1
Course Operating Funds	\$3,000	0	\$3,000	0	0	0
Totals						

Note In FY 05 Biology and Botany will transfer 1 each GTA to BCOR 11,12. These 2 GTAs reduce the request for Provost support in FY05 and FY06 by 2 GTAs.

Note In FY07, Biology and Botany will each transfer an additional 1 GTA from Biol 1,2 (B) to BCOR 11,12, assuming that the restructuring for Biol 1,2 is accepted and that these GTAs are not needed in Biol 1,2. If these GTAs are still available to Biology and BAB, this transfer in FY07 would reduce by 2 GTAs the funds needed from the Provost for BCOR 11,12 in FY07.

Resources associated with BCOR 11/12 and expressed on a monetary basis are shown in Table 2. A similar cost breakdown for BCOR 101-103 is provided in Table 3. Note that the cost equivalents associated with transfer of 2 graduate teaching assistants to BCOR 11/12 from Biol 1,2 are listed in column 2 (Tab. 2).

Table 2. Current and projected resource needs for BCOR 11/12 at launch FY05

RESOURCE ANALYSIS FOR BIOCORE 11/12										
4= 1 - (2+3)										
	1		2		3		4			
	Total Costs New BioCore 11/12		Reallocated From from Bio 1,2		Current devoted base Budget Resources		Resources Requested from Provost			
	Biology	Botany	Biology	Botany	Biology	Botany	Biology	Botany		
Faculty (salary given as lecturer salary)	\$24,033	\$32,044							\$24,033	\$32,044
	0.75 FTE	1.0 FTE								
Secretarial Support*	\$12,245								\$12,245	
	0.5 FTE									
Lab Technicians**	\$32,600				\$13,750				\$18,850	
	1.0 FTE									
Fringe Benefits @ 38%	\$26,174	\$12,177			\$5,225				\$20,949	\$12,177
Graduate Teaching Assts. GTA# ave. 2 semesters	\$67,804	\$21,499	\$13,230	\$13,230	\$46,305			\$8,269	\$8,269	
	5.125	1.625	1	1	3.5	0		0.625	0.625	
Course Operating Funds	\$56,900	\$0	\$0	0	\$3,100	0		\$26,900	\$26,900	
Totals								\$ 111,246	\$79,390	
Grant Total									\$ 190,636	

Table 3. Current and projected resource needs for BCOR 101-103 at launch FY05

RESOURCE ANALYSIS FOR BIOCORE 101-103									
	1		2		3		4		
	Total Costs New BioCore 101-103		Reallocated From Bio 1,2		Current devoted base Budget Resources		Resources Requested from Provost		
	Biology	Botany	Biology	Botany	Biology	Botany	Biology	Botany	
Faculty (salary given as lecturer salary)									
Secretarial Support									
Lab Technicians	\$32,600	0			\$0	0	\$32,600	0	
	1.0 FTE								
Fringe Benefits @ 38%	\$12,388	0						\$12,388	
Graduate Teaching Assts. GTA #'s ave 2 semesters	\$79,380	\$39,690			\$66,150	\$26,460	\$13,230	\$13,230	
	6	3			5	2	1	1	
Course Operating Funds	\$7,680	\$7,500			\$1,560	\$1,380	\$6,160	\$6,160	
Totals							\$ 64,379	\$19,391	
Grand Total								\$ 83,770	
Total for all BioCore with fringe									\$274,406

Footnotes to Tables 2 and 3:

*Secretarial Support is for the entire BioCore

** Current lab Tech is Tech II. Funds requested are for a 12 mo. Tech IV as was appropriate for the tech. Support for the new Biochemistry major. Note that the partial salary provided by Biology covers 0.5 FTE for a 9 month Tech II.

In FY05 Botany and Biology will each transfer 1 GTA from Biol 1,2 to BCOR 11/12. In FY07 they will transfer an additional 1 GTA each (total 2) because it is anticipated that the new Biol 1,2 will be launched and the qualified students from Biol 1,2 will have moved to BCOR 11,12. The new configuration of Biol 1,2 will require the remaining 4 GTAs (2 each from Biology and Botany) that were once assigned to Biol 1,2B. This distribution of GTAs between Biol 1,2 and BCOR will require no additional GTAs from the Provost to launch Biol 1,2 in FY07. If the move of students from Biol 1,2 to BCOR 11,12 occurs in FY06, the transfer of GTAs can occur a year earlier.

Commitment of funds for faculty and staff lines at launch of the cross-college integrated biology major will necessitate similar funding commitments for ensuing years to maintain the major. Table 4 shows anticipated costs for the initial three years following launch of the major. Revisions have been made to accommodate the revamped salary structure at UVM and there is a modest increase in the projected budget through time, mostly due to salary increases for the faculty and staff lines. The total cost estimates for all of the BCOR courses are shown on the bottom line of Table 4 (below). Also, in the future, when GTA stipends are significantly increased, the GTA compensation in the above tables would have to be reconsidered.

Table 4. Projected cost for BCOR courses in years following launch in FY05

Requested Funds from Provost for FY06 and beyond

BioCore 11/12

	FY 06		FY 07		FY 08	
	Biology	Botany	Biology	Botany	Biology	Botany
Faculty (salary given as lecturer salary)	\$25,475	\$33,967	\$27,003	\$36,005	\$28,623	\$38,165
Secretarial Support*	\$12,735		\$13,244		\$13,774	
Lab Technicians**	\$19,604		\$20,388		\$21,204	
Fringe Benefits @ 38%	\$21,969	\$12,907	\$23,041	\$13,682	\$24,168	\$14,503
Graduate Teaching Asst	\$8,682	\$8,682	\$21,879	\$21,879	\$30,630	\$30,630
GTA# ave. 2 semesters	0.625	0.625	1.5	1.5	2	2
Course Operating Funds	\$28,245	\$28,245	\$33,142	\$33,142	\$38,449	\$38,449
Totals	\$ 116,711	\$83,802	\$ 138,699	\$104,709	\$ 156,850	\$121,749
Grant Total		\$ 200,513		\$ 243,408		\$ 278,599

BioCore 101-103

	FY06		FY07		FY08	
	Biology	Botany	Biology	Botany	Biology	Botany
Faculty (salary given as lecturer salary)						
Secretarial Support*						
Lab Technicians**	33,904		\$35,260		\$36,670	
Fringe Benefits @ 38%	\$12,884		\$13,399		\$13,935	
Graduate Teaching Asst	\$13,891	\$13,891	\$14,586	\$14,586	\$15,315	\$15,315
GTA# ave. 2 semesters	1	1	1	1	1	1
Course Operating Funds	\$6,468	\$6,468	\$6,791	\$6,791	\$7,131	\$7,131
Totals	\$ 67,148	\$20,360	\$ 70,037	\$21,378	\$ 73,052	\$22,447
Grant Total BioC 101-3		\$ 87,508		\$ 91,415		\$ 95,499
Grant Total All BioCore		\$288,020		\$334,823		\$374,098

Note in FY07 two additional GTAs (1 each from Biology and Botany) transfer from Biol 1,2,(B) to BCOR 11,12. This transfer reduces the number of GTAs requested from the Provost compared to the original resource request document.