Biology Department

Program Review
2006-2012 Academic Years

Natural Sciences Division Chair: Robert Neher, PhD
Biology Department Chair: Jerome Garcia, PhD

Executive Summary

The Biology Department offers both BA and BS degrees in biology, and BA degrees in Biology-Teaching Track and Environmental Biology. A majority (90%+) of major courses are taught by full-time faculty, whose collective competencies cover that expected for a university-level major in the biological sciences. Degree requirements are similar to comparison institutions, and majors are required to complete both a culminating senior research project and pass a comprehensive exit exam to graduate. The number of majors over the 2005-2009 period fluctuated between 82 and 119 with a mean of 101 (compared to 58 and 91 and a mean of 75 during the previous 5 year interval), a 35% increase that is projected to continue. Ethnic diversity is high and is typical of the ULV student population. The majority of majors are advised by full-time faculty, and **mean class size for major level courses is approximately 19**. However BIOL 204, 205, 302, 311, 343, and 344 have seen dramatic increases (Table 6) that may signify larger increases in the future and could signal an increase in time it takes to graduate. These numbers must be monitored carefully to ensure the one on one attention the University of La Verne prides itself in is maintained. Also, taking into account the rigorous nature of Natural Science research projects, one may surmise that increased student numbers may have a negative effect on graduation rates and quality of the program.

Grant proposals and funding have been a major success during this 6 year time period. The faculty have succeeded in bringing in $6.2 million to the University of La Verne in the form of private, state, and federal grants. A key success of many of our students, in the form of admission to graduate programs and direct employment, is the strength of the training via the other natural sciences (Mathematics, Physics, and Chemistry) as well as the extensive hands on experience with research grade instrumentation. This was quite clear in the alumni surveys.

Learning outcomes for the various biology major tracks include knowledge and understanding of theory, research and application, awareness of issues of sustainability and human impacts on the global environment, and adequate preparation for graduate school and careers.

Assessment procedures used in compiling this document included an alumni survey, a senior exit survey, senior exam performance analysis, focus groups, faculty interviews, course evaluations, analysis of senior projects and syllabi, curriculum comparisons with other colleges, subject matter understanding and skills analysis, critical thinking assessments, and outcomes of graduates.

The findings suggest the following:

1. Students receive a good foundation in theory and principles of biology and realize significant enhancement of their critical thinking skills during their tenure as biology majors.

2. Strong departmental faculty commitment to environmental sustainability concepts, as well as alumni and stakeholder responses indicate that the goal of articulating the concepts of sustainability is being adequately met.
3. The department is quite successful in obtaining outside funding.
4. Students are admitted into highly sought after graduate programs such as medical, pharmacy, dental, veterinary, nursing, and physician's assistant schools to name a few.
5. Considerable effort is made by faculty to expose students to the primary literature of biology, but additional attention is warranted in oversight of preparation of the senior thesis.
6. Less than satisfactory senior project completion rates suggest re-evaluation of senior project expectations and the enhanced tracking of students in their senior thesis progress.
7. There is broad agreement that students receive good academic and career advisement.
8. Comparisons to peer institutions suggest adjustments in faculty course load should be explored.

I. Program Mission

The mission of the Biology Department is provide a biological foundation rich in theory, applications, and values that will enhance the quality of life and ensure opportunities that will fulfill our student's professional aspirations. This will be achieved by offering the highest quality educational program for both traditional-aged and adult students.

II. Program Learning Outcomes and Goals/Objectives

Biology majors will:

A. Acquire a foundation in the principles and theories of the biological and supportive sciences.
B. Be able to articulate the essential concept of environmental sustainability, and demonstrate an understanding of human impacts on the global environment.
C. Be able to apply and interpret the methodologies of science, and demonstrate skills in accessing, interpreting, and evaluating biological literature.
D. Design, implement, and prepare a formal report on the results of an independent research project or culminating senior experience.
E. Show competency in divergent areas of the biological sciences, including molecular/cellular, organismal, evolutionary and environmental sub-disciplines.
F. Receive good program and career related advising.
G. Gain acceptance into appropriate graduate programs and/or obtain employment in a biologically related field if so chosen.

The 2005 Biology Program Review listed 14 recommendations for action, all of which were met and/or revised. Over this period, the key achievements were:

1. Revision of the Environmental Management major – Due to the lack of interest, potential, and lack of enrollment the department has decided to remove this major as an option and focus more on the Environmental Biology major.
2. Teaching load adjustment – The addition of lab hours as credit has helped; however, the success and demands that grants have taken must now be considered as a new action item.
3. Planning for pending retirements – New hires have stepped in and have performed at a high quality with minimal transition time.
4. Incorporating programming at the Montana Magpie Ranch campus – Drs. Robert Neher, Jeffery Burkhart, Kathleen Weaver, and new hires Heidy Contreras and Todd Lorenz have or will be taking students to complete/conduct courses or senior projects. With the increased involvement of faculty and students plans for increased space will be a new action item.
5. Developing programs to recruit higher quality and better prepared students – Science and Your Future (Mathematics and Science open house), Career & Graduate Workshops for high school students and undergraduates, Science Technology, Engineering, and Mathematics Summer Camp, and science based clubs (Society of Physical and Life Science Scholars, Beta Beta Beta National Honor Society, Green Initiative for Village Empowerment, and Pre- Students of Osteopathic Medical Association, and Global Medical Brigades) has helped in this endeavor.

See Appendix A for details

III. Program Capacity and Description

1. Faculty and Courses

Currently (F2012) the Biology Department has 8 full-time and 7 part-time (adjunct) faculty (See Tables 1 & 2). All regular faculty have earned PhD degrees. See Appendix B for curriculum vitae of full-time faculty and courses taught. During the 2010-2011 academic year, adjunct faculty taught 7 (17%) of the 41 offered courses, significantly less than the Arts and Sciences mean of approximately 35%.

Over the past 5 years, with larger numbers of students matriculating into the biology program, there has been a steady increase in both course enrollments and numbers of matriculating majors. Enrollment increases have been especially notable for BIOL 302 (Microbiology), BIOL 311 (Genetics), BIOL 343 (Human Anatomy), and BIOL 344 (Human Physiology) reflecting in part the increased demand associated with the departmental support for the Movement and Sports Science (MSS) program and increases in the Biology Minor. These course offerings will only increase in the future once the Community Health Program begins to grow.

Additionally, over the interval of 2005-2011, 36% of students enrolled in Biology courses were enrolled in non-majors BIOL 101. Finally, during the 2005-2011 academic years, 64% of all courses for BIOL majors had a mean enrollment exceeding 19 students per course**.** The largest class size during this time span was 54.

Table 1: Full-time Faculty Profile

Name	**Highest degree**	**Year degree obtained**	**Degree area or specialization**	**Faculty status**	**Year hired**
Christine Broussard	PhD	1996	Immunology	Professor	2001
Jeffery Burkhart	PhD	1977	Zoology, Ecology, Tropical Biology	Professor	1999
Jerome Garcia	PhD	2007	Free-radical Biology in Medicine	Associate Professor	2003
Jay Jones	PhD	1984	Botany, Biochemistry, Geology	Professor	1986
Robert Neher	PhD	1963	Biosystematics, Cytotaxonomy	Professor	1958
Stacey Novak	PhD	2000	Plant Development and Molecular Biotechnology	Associate Professor	2000
Kathleen Weaver	PhD	2006	Ecology and Evolutionary Biology	Associate Professor	2006
Heidi Contreras	PhD	2009	Environmental Physiology	Assistant Professor	2011

Table 2: Adjunct Faculty Profile

Name	Highest degree	Year degree obtained	Degree area or specialization	Adjunct faculty status-title	Teaching since (ULV)
Patricia Caldani	M.S.	2010	Molecular biology	Adjunct Professor	2011
Fredda Fox	M.S.	1973	Ornithology	Senior Adjunct Professor	1987
Randy Good	M.S.	1997	General Biology	Senior Adjunct Professor	1997
Harvey Good	Ed.D.	1980	Physiology, Environ. Biol.	Professor emeritus	1969
Michael Kinney	PhD	2005	Botany	Adjunct Professor	2009
Raminder Kaur	PhD	1981	Microbiology	Adjunct Professor	2008
Pablo Weaver	M.S.	2005	Ecology	Adjunct Professor	2006

2. **Students and Majors**

The Biology major (either B.S. or B.A.) requires completion of 43-48 semester hours of BIOL courses and an additional 35 hours of supportive requirements (i.e. Chemistry, Math, Physics, Science Seminar). The Teaching-Track Major (B.A.) requires 41-45 semester hours of core requirements and an additional 32 hours of supportive requirements. The Environmental Biology major (B.A.) requires 51-55 semester hours of core requirements and 24 semester hours of supportive requirements.

The Natural History major (B.A.) is similar to the Biology Major; however, requirements for each student are worked out individually with the Program Chairperson. In recent years, this major has been primarily an option for students that have been unsuccessful in negotiating some of the more rigorous math and chemistry requirements of the Biology major. This major has recently been removed as an option, and is currently being taught-out for those students who have opted to continue with this major.

Completion of a written senior thesis, an oral presentation of the thesis work, and successful passage of a senior exam are required of all majors for graduation. Table 3 shows a steady increase; however, recent freshmen classes show more dramatic numbers (Figure 1).

Table 3: Total enrollment numbers for biology majors over the interval 2006-2010 (Source: ULV fact book).

	Years				
	F 2006	F 2007	F 2008	F 2009	F 2010
Majors					
Biology (inc. Teaching)	76	65	67	58	84
Environmental Biology	4	5	4	2	4

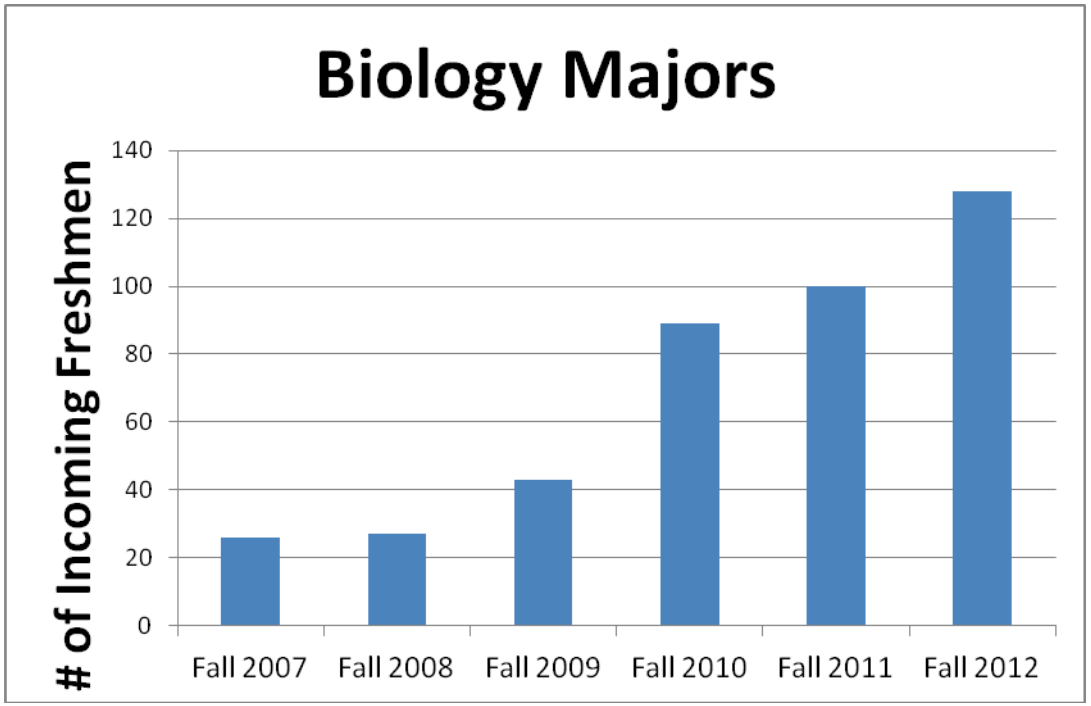

Figure 1. Number of incoming freshmen in the biology major by year.

During Spring 2004, a Biology minor was initiated, principally to meet a demand from Movement and Sports Science. The minor requires 24 semester hours of Biology, 16 of which must be upper division.

In previous meetings, the department felt that requiring specific courses might not serve the individual needs of students specifically taking Biology courses for graduate school pre-requisites. This flexibility has allowed us to attract talented students from other disciplines. May 2007 was the first year students (2) graduated with the Biology minor. In May 2008, the department saw an increase in the number of minors bestowed to students majoring in Chemistry (1), Psychology (2), Criminology (1), and Movement and Sports Science (1) for a total of 4. These students are either former Biology majors or have aspirations of applying to a graduate program that needs specific Biology requirements. This proposed blueprint provides a flexible framework in which professors can modify in order to help students fulfill their individual goals. The number of graduates can be seen in Figure 2.

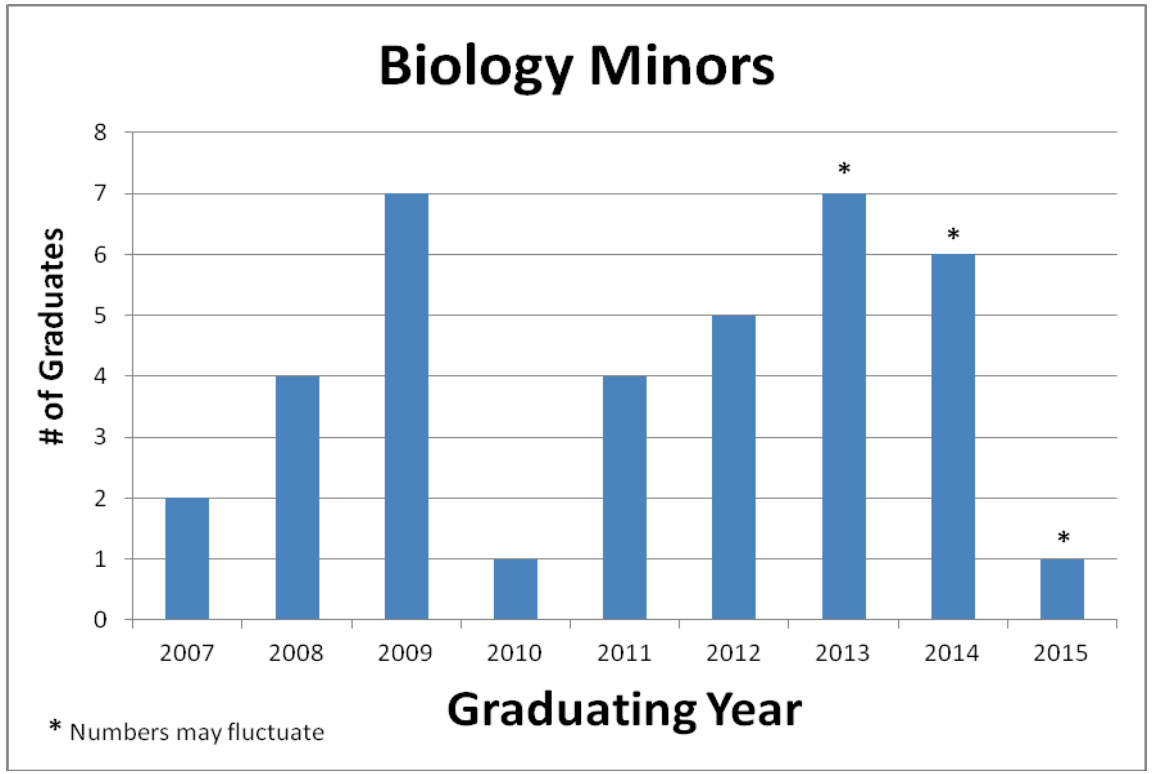

Figure 2. Number of biology minor graduates (or projected graduates) by year.

With the increase in Biology majors, as well as the popularity increase of pre-health MS degrees and other majors such as Athletic Training, Community Health, and Movement & Sports Science using upper division Biology courses as pre-requisites, we expect the number of Biology Majors and Minor graduates to increase over time.

3. **Degrees Conferred**

Recruitment strategies have dramatically increased the number of declared majors; however, the retention and subsequent graduation numbers do not portray the same increase. Though the numbers can be justified by the fact that many first generation students pursuing a Biology Major are ill prepared, the department must pay special attention to remediation, retention, and graduation numbers (Table 4). This will be an action recommendation for the next program review.

Table 4: Majors and Degrees Conferred: Pre-health, General Biology, Cell/molecular Biology, Teaching Track

Students	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Unduplicated Fall majors headcount -All campuses	101	119	103	82	101	160
Main campus	91	109	99	80	95	151
CAPA	7	7	4	5	5	9
RCA	3	3	0	0	1	5
On-line						
FTE students–All campus (Based on units generated divided by 30)	99.6	108.7	93.8	74.4	91.1	147.7
Degrees conferred-All campuses (7/1 to 6/30)	8	8	17	18	13	14

Traditional age freshman main campus		27	29	21	39	69
Transfers		10	3	5	9	11
Total new students		37	32	26	48	80

4. **Enrollment History**

Over the past 5 years, with larger numbers of students matriculating into the biology program, there has been a steady increase in both course enrollments and numbers of matriculating majors. Enrollment increases have been especially notable for BIOL 204 (Plant Biology), BIOL 205 (Animal Biology), BIOL 302 (Microbiology), BIOL 343 (Human Anatomy), and BIOL 344 (Human Physiology) reflecting in part the increased demand associated with the departmental support for the Movement and Sports Science (MSS) and Athletic Training (AT) programs and increases in the Biology Minor. These course offerings will only increase in the future once the Community Health Program begins to grow. With these increases, the percent of courses taught by FT and PT faculty has decreased and increased, respectively (Table 5).

Additionally, over the interval of 2005-2011, 36% of students enrolled in Biology courses were enrolled in non-majors BIOL 101. Finally, during the 2005-2011 academic years, 64% of all courses for BIOL majors had a mean enrollment exceeding 19 students per course**.** The largest class size during this time span was 54. Enrollment numbers for course offerings during the interval of Fall 2005 to Spring 2011 are contained in Table 6.

Table 5: Percentage of courses taught by FT and PT faculty

Faculty	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
% taught by FT faculty on load	59%	62%	69%	63%	73%	51%
% taught by FT faculty overload	0	5%	3%	0	0	6%
% taught by PT faculty	41%	33%	28%	37%	27%	42%
N (number of classes)	35	34	30	32	33	33

Table 6: Course enrollments: 2005-2012

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
B101-LifeSci	282	274	266	261	255	311	349
B203-PrinBio	31	31	40	-	-	35	29
B204-PlntBio	39	34	33	65	54	80	94
B205-AnimBio	29	25	27	30	55	86	133
B302-MicroBio	16	18	-	12	15	29	42
B305-Vert.Zoo	-	-	-	6	-	-	-
B310-CellBio	16	16	24	9	16	17	24
B311-Genetics	30	28	25	16	27	17	30
B312-EnvBio	22	12	17	18	13	18	19
B313-DevelopBio	9	14	17	9	9	12	15

B314-Biochem	16	22	11	9	9	12	20
B316-MolecBio	6	7	4	5	-	-	-
B322-MFWBio	6	-	-	5	-	15	-
B325-FieldBio	-	3	1	4	4	7	7
B327-Dsrt/MtnBio	-	-	6	-	-	-	-
B334-Ornithology	30	43	23	40	16	14	31
B336-InvertZoo	-	4	-	-	-	-	8
B343-HumAnat	57	55	52	57	69	96	125
B344-HumPhys	26	51	40	23	24	49	60
B346-Mol.Disease	7	7	6	-	-	-	-
B376-Toxicology	-	-	-	-	1	-	-
B378-Evolution	14	21	22	0	7	23	13
B379-ResMthds	24	22	13	0	17	22	28
B380 Biostats				11	14	16	24
B390-TropBio	-	-	9	-	14	2	3
B499-SrSmnr	14	36	43	24	28	35	30

During the 2001- 2005 interval reported in the last program review, the three freshman-level courses – BIOL 203 (Principles of Biology), BIOL 204 (Plant Biology), and BIOL 205 (Animal Biology) enrolled a mean total of **99** students per academic year. From F 2005 to F 2011 these three courses enrolled a mean total of **134** students per year, and in the past two years this number has increased to **229**, a 131% increase over 2001-2005! To accommodate the increased demand, BIOL 204 and BIOL 205 have had to be offered every semester rather than just once per academic year. This increase reflects both the increase in BIOL majors but also increasing numbers of chemistry and MSS majors, both of which require one or both freshman level BIOL courses of their students.

In 2008, BIOL 203 was inactivated to reduce the number of credit hours required of entering BIOL students; however, a significant number of matriculating freshman were found to be inadequately prepared for the BIOL 204-205 sequence, and in 2010 BIOL 203 was briefly re-activated. In Fall 2011, to better identify students requiring additional biology grounding, the administration of a freshman placement exam in biological concepts was initiated, and the current policy is that students failing to score above a minimum level will be required to take BIOL 101 prior to enrolling in either BIOL 204 or 205.

These enrollment increases are leading to similar increases of upper level courses as students work their way into their sophomore, junior and senior years. However, since the most significant increases have occurred since 2010, the full impact of the increased numbers has not yet been felt, but will be shortly as these students move into their junior and senior level courses. The increase is already being felt in the Sophomore/Junior Microbiology (BIOL 302) course, which will have 42 students compared to a mean of 15 during the previous 5 years.

Additionally, we are experiencing significant enrollment increases in courses such as Human Anatomy that are required by other growing majors (such as Movement and Sports Science). Human Anatomy (BIOL 343) enrollment has increased from a mean of 45/year during the 2001-2005 interval to 111 during the past two years (a 146% increase!). Because of the unprecedented increase in class size, BIOL courses have had to be taught in large lecture rooms such as Arts and Communications 212 (72 seats), which was barely enough for the Fall 2011 BIOL 205 and 343 courses. Because large classes are less effective learning venues, the BIOL 205 course for spring was split into two sections of ~35 each.

Such enrollment increases have lead to the addition of extra laboratory sessions, which has significantly stretched the laboratory facilities, increased supplies expenditures, and faculty loads. Because the department is committed to a smaller class size model, some of these courses are being split into multiple sections leading to even greater load imbalances. To cover this course splitting, one faculty member will carry a course load of 32 hrs.

5. **Program Maps**

Due to the increase demands of core major and specific elective courses (BIOL 302, 343, 344) other electives such as BIOL 326, 333, 345, 346, 361, and 376 have and will not be offered until more FT or PT faculty are hired and/or a new curriculum is implemented that will allow faculty to teach these other electives. Table 7 shows a breakdown of the 4-year rotation of courses.

Table 7: Program Map: 4 year rotation 2011-2016

Course	Course title	Credit	11-12	12-13	13-14	14-15	15-16
BIOL 101	Life Science: The Human Environ.	4	x	x	x	x	x
BIOL 203	Principles of Biology	4					
BIOL 204	Plant Biology	4	x	x	x	x	x
BIOL 205	Animal Biology	4	x	x	x	x	x
BIOL 302	Microbiology	4	x	x	x	x	x
BIOL 305	**Vertebrate Zoology**	4		**x**			**x**
BIOL 310	Cell Biology	4	x	x	x	x	x
BIOL 311	Genetics	4	x	x	x	x	x
BIOL 312	Environmental Biology	4	x	x	x	x	x
BIOL 313	Developmental Biology	4	x	x	x	x	x
BIOL 314	Biochemistry	5	x	x	x	x	x
BIOL 316	Molecular Biology	4		x		x	
BIOL 322	Marine and Freshwater Biology	4			x		
BIOL 325	Field Biology	2	x	x	x	x	X
BIOL	Mountain and Desert Biology	4		x		x	

327							
BIOL 334	Ornithology	4	x	x	x	x	x
BIOL 336	**Invertebrate Zoology and Parasitology**	4	**x**		**x**		**x**
BIOL 343	Human Anatomy	4	x	x	x	x	x
BIOL 344	Human Physiology	4	x	x	x	x	x
BIOL 345	**Immunology**	4					
BIOL 346	**Molecular Basis of Disease**	4					
BIOL 361	**Plant Physiology**	4					
BIOL 376	**Human and Environmental Toxicology**	4					
BIOL 378	Evolution and Biosystematics	2	x	x	x	x	x
BIOL 379	Research Methods	2	x	x	x	x	x
BIOL 380	Biostatistics	2	x	x	x	x	x
BIOL 390	Natural History of the Tropics	4	x	x	x	x	x
BIOL 441	Nutrition	4	x	x	x	x	x
BIOL 499A	Senior Project/Seminar A	1	x	x	x	x	x
BIOL 499B	Senior Project/Seminar B	1-3	x	x	x	x	x
BIOL 220	Natural History of California	3, 4					
BIOL 315	Advanced Biochemistry	4					
BIOL 326	Natural History of Baja California	4					
BIOL	Animal Physiology	4					

333							
BIOL 335	Entomology	4					
BIOL 342	Anatomy and Physiology	4					

6. **Curriculum Maps**

Due to the low number of courses fulfilling the learning outcomes a revision will be suggested in action recommendations for the next program review.

Table 8: Curriculum Map: Courses Where Learning Outcomes are Met

Course	**Course title**	**LO - A**	**LO - B**	**LO - C**	**LO - D**	**LO - E**	**LO - F**	**LO - G**
BIOL 101	Life Science: The Human Environ.	X	X					
BIOL 203	Principles of Biology							
BIOL 204	Plant Biology							
BIOL 205	Animal Biology							
BIOL 302	Microbiology							
BIOL 305	**Vertebrate Zoology**							
BIOL 310	Cell Biology			X	X			
BIOL 311	Genetics							
BIOL 312	Environmental Biology		X					
BIOL 313	Developmental Biology			X	X			
BIOL 314	Biochemistry	X						
BIOL	Molecular Biology							

316								
BIOL 322	Marine and Freshwater Biology							
BIOL 325	Field Biology							
BIOL 327	Mountain and Desert Biology							
BIOL 334	Ornithology							
BIOL 336	**Invertebrate Zoology and Parasitology**							
BIOL 343	Human Anatomy	X						
BIOL 344	Human Physiology	X		X				
BIOL 345	**Immunology**							
BIOL 346	**Molecular Basis of Disease**							
BIOL 361	**Plant Physiology**							
BIOL 376	**Human and Environmental Toxicology**							
BIOL 378	Evolution and Biosystematics							
BIOL 379	Research Methods			X			X	
BIOL 380	Biostatistics			X				
BIOL 390	Natural History of the Tropics							
BIOL 441	Nutrition							
BIOL 490A	Senior Project/SeminarA			X	X			
BIOL 490B	Senior Project/SeminarB			X	X			
BIOL	Natural History of California							

220								
BIOL 315	Advanced Biochemistry							
BIOL 326	Natural History of Baja California							
BIOL 333	Animal Physiology							
BIOL 335	Entomology							
BIOL 342	Anatomy and Physiology							

Biology subject matter, understanding, and skills were analyzed to demonstrate to the State of California that students seeking teacher certification in our program should be granted the CSET waiver. Appendix C contains summary tables of this analysis.

7. **Advising**

Traditional-age biology majors are normally advised by regular faculty members; however, some receive their initial advising by Academic Support and Retention, the Learning Enhancement Center (if matriculating with deficiencies), or Honors faculty. Sharla Geist, Natural Science Division coordinator, has recently been trained and approved as an academic advisor for Biology. During 2006-2011, students (including CAPA, dual major, and undeclared major students) were advised by Biology Department faculty or Sharla Geist. During Fall 2010, the number of faculty freshmen advisee assignments average was approximately 10 for a total of 80 students**.** During this same time period, approximately 20 freshmen students were advised by non-Departmental faculty or staff. The 20 students were typically involved in the First Year Resource Program, which are students admitted under special circumstances. We have requested from academic services and retention to now see these students during freshmen advising.

8. **Facilities, Labs, Computers, Library, and Other Resources**

a) The Biology Department has a long history of offering 'field' courses and the conducting of field research. Since J 2006, the number and variety of field opportunities has broadened with the development of a January term tropical biology field course, and the now operational Montana Magpie Ranch Field Facility. See Appendix D for details.

During the summer of 2005, four Biology students spent three weeks in Montana working on a combined class/research project. The summer of 2011, approximately 10 students completed courses and/or research projects. Additional programs and grants (summer research, course offerings with local institutions, and NSF grants) are planned to be implemented in the future. With the efforts of Drs. Robert Neher, Jeffery Burkhart and Kathleen Weaver this number has rapidly increased,

and we predict this will continue, as Dr. Heidy Contreras will be joining the two in summer 2012 and Dr. Todd Lorenz will be joining in summer 2013.

b) **Space:** The inadequacy of space for Biology and other Natural Science programs is long standing and recognized by the administration. A new facility was ranked highest on the list of University capital projects 15 years ago. The high cost of a science facility and other priorities shifted this ranking to reflect projects that were perceived to be within the University's fiscal reach. During the time the programs have nearly doubled in faculty, and in just the last two years the number of science students has more than doubled. We have also lost some important laboratory spaces such as the greenhouse preparation and storage area, storage and assembly space for field work, and storage and sample preparation areas for geology. In short, our facilities are woefully inadequate.

Comparisons with other similar institutions demonstrate that we are trying to function in about 1/3 the space afforded to programs of similar size. The quality of the meager space we have is also substandard. This inadequacy is increasingly impacting our program in the following ways:

a. Compromised ability to recruit quality science students
b. Inadequate ability to accommodate student research, a recognized best practice
c. Reduced functionality of instrument and imaging facilities
d. Efficient use of limited faculty and staff time in duplicating setups etc.
e. Reducing instrumental and other requirements weakening our program
f. Reducing departmental image and moral

There is general recognition that a new science facility is desperately needed. The envisioned Academic Building, the current top priority, is expected to be primarily focused on meeting this need. However, it is clear such a building is in the distant future and our needs are critical. Therefore, it is vital that additional space be allocated for faculty/staff offices, storage, bench space for student projects and faculty research, space for externally funded grant projects, instrumentation, as well as for greenhouse preparation and storage. See Appendix E for more details on space.

c) **Equipment and Instrumentation** are critical tools for linking theory with practice. This connection is critical for empowering students to do well and to do "good". Access to research grade instrumentation and application has been a hallmark and strength of the Biology and other Natural Science programs. Generally recognized "Best Practices" and the University mission of "excellence" in education, as well as our emphasis on engagement underscore the importance of instrumentation and equipment to the Natural Sciences programs. The Biology Faculty realize the importance of hands-on application for consolidating theory and for application of this knowledge in their future. For this reason the faculty have

sought to provide extensive laboratory experience similar to that which they would use in graduate programs and their ultimate careers. This not only prepares the students for direct entry into research, clinical and industrial labs but also makes theory "real" and empowers the student to apply theoretical knowledge. Validation of our approach can be found in the AAC&U* best practices, which emphasize direct student involvement in experimental design and execution as well as undergraduate research. It is a central part of our mission and a feature that distinguishes us from most other institutions.

The Department and University have also enhanced faculty research and professional development expectations. Equipment and instrumentation are also required for faculty research

Over the last 25 years the Biology Department and Natural Sciences Division have acquired and integrated an impressive array of research grade instrumentation. While R1 (research centered) universities have much more equipment, most research grade instrumentation is reserved for specific research projects or in central facilities not available to undergraduates. While exceptional undergraduates may gain experience in one laboratory the range of experience will be narrow compared to that which we provide. La Verne is also competitive with private "liberal Arts" institutions in that we generally spend more time with our students and have a broader and more powerful array of instrumentation. Most of this instrumentation has been acquired through external grants. These grants are generally provided to expand the capabilities of a program not for replacement. Internal funds have historically been pooled among the departments of the Natural Science Division when large replacements were necessary. During recent years the Biology Department and Natural Science budgets for equipment and supplies have been cut in spite of dramatically increasing enrollments**. It is impossible for us to maintain this strength without adequate budget.** The space and facilities required to properly accommodate current programs and projected growth have been assessed based on our mission and goals, recent curriculum changes, space and facilities at other colleges and universities, recommendations of the PKAL/ learning spaces group, faculty building shepherds, and architects. A general description of requirements, as they relate to the departmental mission, augmented by a spreadsheet summarizing specific uses and space requirements (appendix XX) is provided for use in strategic planning.

It should also be noted that our research grade instrumentation is one of the very few cards we can play when recruiting quality students. Our current strength helps us overcome the woeful inadequacy of our current space and facilities.

9. **Curriculum Comparisons with Other Universities**

The University of La Verne Biology program was compared to those at comparable colleges/universities, with the following parameters being evaluated: undergraduate population, SAT scores, number of biology faculty, number of yearly biology graduates, degrees/concentrations offered, senior project requirements, administration of entrance/placement/exit exams, teaching load, and research load. The information in this report was provided by a questionnaire sent to and completed by department chairs from the selected schools. Some program and school information was also taken directly from the school's web site. For most data reported, n=10 (see table below for a summary).

The average undergraduate population for this group of schools was 2075, with the high end being 3500 and 4708 at Chapman and Azusa Pacific University, respectively, and low end 1190 and 1250 at Westmont and Haverford Colleges, respectively. La Verne's Fall 2011 traditional undergraduate student population is reported as 2172. Average SAT scores for entering freshmen at these schools was not readily available for all schools; however, we were able to get scores from six schools that had an average of 1220. Pomona College was an outlier with an average of 1490, and if this value is excluded from the calculations, the average falls to 1166. The most recently reported SAT average for the University of La Verne is 1020; hence, we fall considerably below that of the schools with whom we were compared.

The average number of Biology faculty at the comparison schools was ten (10). At present, our department has seven (7) teaching faculty with an additional member to be added in F2012, bringing the total to eight (8), still below the comparison average. The number of biology graduates/year was approximately 30 for the 10 schools used in this comparison, while our number in recent years ranges from 15 to 20. With the currently accelerating growth of the ULV biology program, however, we anticipate graduation numbers to increase by at least 30% in the next few years.

About half of the surveyed colleges offer both BA and BS degrees, while half offer only the BS. Depending on concentration, we offer both, as do twenty percent (20%) of the surveyed schools. Likewise, most of the schools had concentrations similar to ours (pre-med, environmental, teaching, general biology, cell/molecular). The primary exceptions seemed to be that we offered more options, and we lacked a Biochemistry concentration, which is present in half of the survey schools. Generally, the survey schools offered only two to three concentrations, while we offer five (5).

A placement exam for incoming freshmen and a senior exit exam are currently administered by our department. Additionally, we have recently developed a junior candidacy exam, which we plan to begin administering in Fall 2012. Of the 10 schools surveyed, none gives either a formal entrance or junior candidacy exam, and only two schools require an exit exam.

A senior project is required for all biology majors in 50% of the schools reviewed but only for honor students at Juniata College. Two other schools (Kenyon and Colby) integrate a research-like project into a course. Kenyon does this during the spring semester of the freshman year in an introductory course, and Colby College integrates this requirement into various courses. Our department requires the senior project for all students, and in addition, several faculty integrate research into the laboratory component of their courses. Two of the surveyed schools (Pomona and Chapman) allow both grant proposal and major (40 page) review papers as alternatives to a research-based senior requirement. Our department allows these options as well, but with the highest grade possible being a "B". Students are strongly encouraged to select the research based senior project option.

Teaching loads are, in general, higher at La Verne than at comparable schools, in which the average number of lectures and labs taught each semester was 1.45 and 1.75, respectively, or a combined total of 6.4 lectures and labs for an academic year. In our department, we teach an average of 4 lectures and 4 labs or 8 lectures/labs for a typical academic year (which includes January term courses). Thus, La Verne Biology faculty teach an average of 1.6 lectures/labs, or 25% more per year than faculty at comparable schools.

Research loads were more difficult to evaluate. Two of the department chairs indicated that release time was available for those heavily involved in research. Most chair responses were vague, but the importance of research and with undergraduate involvement and pursuit of external grants was consistently noted. Faculty members of four of the schools were expected to generate one to two papers per year. These four schools had an average faculty size of 11, and each faculty member taught an average of 5.75 lab/lectures per year, compared to 8 at the University of La Verne.

Table 9 compares the University of La Verne to the other 10 institutions surveyed. When organized based on student population (low to high), La Verne falls in the bottom half. When compared strictly to the bottom five, the University of La Verne Biology Department has the largest number of concentrations as well as the most student requirements, yet has the lowest number of faculty.

Table 9: Data Summary of Program Comparisons with Other Universities

	UG population	# BIOL faculty	# conc.	Entrance Exam	Exit Exam	Senior Project	Teach Load (lec/lab/yr)	Teach Load (lec/lab/yr)*	SAT
University of La Verne	2000	8	5	yes	yes	yes	8	8	1040
Other schools	2075	10	3	no	2-yes 8 - no	5-yes 5-no	6.4	5.75	1166**
N=	10	10	10	10	10	10	10	4	6
Haverford College	*1190*	*10*	*4*	*no*	*no*	*yes*	*6*		*?*
Westmont	*1250*	*5*	*4*	*no*	*no*	*no*	*8*		*1200*
Knox	*1392*	*8*	*3*	*no*	*no*	*yes*	*6*		*1280*
Pomona College	*1560*	*16*	*3*	*no*	*no*	*yes*		*4*	*1490*
Juniata	*1593*	*8*	*1*	*no*	*no*	*yes - honors*	*8*		*?*
Kenyon College	*1600*	*12*	*2*	*no*	*no*	*no*		*5*	*?*
Colby College	*1800*	*15*	*3*	*no*	*no*	*no*		*6*	*?*
University of La Verne	*2000*	*7*	*5*	*yes*	*yes*	*Yes*	*8*		*1020*
Stetson	*2162*	*10*	*2*	*no*	*no*	*Yes*		*6*	*1135*
Chapman	*3500*	*10*	*3*	*yes*	*no*	*Yes*		*6*	*1200*
Azusa Pacific	*4708*	*14*	*4*	*no*	*yes*	*No*	*9*		*1017*

*These biology faculty are expected publish 1-2 papers/year
** Excluding Pomona College

IV. Assessment Procedures

The following were used to assess learning outcomes:

1. **Grants**
   A total of $6,220,115 in federal and private grants were obtained during the 2005-2012 time period. The grants have supported the learning outcomes that deal with science pedagogy, articulating scientific concepts, interpreting and evaluating biological literature, and increase competency in the interdisciplinary nature of the natural sciences. See Appendix F for details.

2. **Publications**
   A total of 13 publications have been submitted and/or accepted during the 2005-2012 time period. The publications range from discipline based to science education journals with a total of 3 undergraduates as coauthors. See Appendix G for details.

3. **Alumni Survey**
   Alumni who graduated (or who had finished all requirements for graduation other than their senior project) from ULV with a biological sciences major during the interval 2005-2011 were contacted by mail and requested to participate in an alumni survey. A total of 42 former students were contacted, of which 20 responded either via mail or an on-line survey soliciting responses concerning their ULV experience. A copy of the survey and a summary analysis of responses are contained in Appendix H.

4. **Senior Biology Student Focus Group Survey**
   In November 2011, Dr. Felicia Beardsley Associate Dean for the College and Michelle Alfaro, graduate assistant to Dr. Beardsley and a Psy.D. student, conducted a focus group with 15 Biology seniors to evaluate their perceptions of Biology Department strengths, challenges, and opportunities. Their analysis is summarized in Appendix I.

5. **Senior Exam Performance**
   To graduate, all biology students are required to successfully pass (with a score of 50% or better) a comprehensive exam given during their senior year. A summary analysis of exam pass rates and individual performance in different subject areas is contained in Appendix J.

6. **Senior Thesis Performance**
   To graduate, all biology students are required to successfully pass (with a score of 50% or better) a comprehensive exam given during their senior year. A summary analysis of exam pass rates and individual performance in different subject areas is contained in Appendix K.

V. Findings

1. Mission Statement, Program Goals, and Learning Outcomes

Under the new academic program review guidelines and recent reports in regards to science pedagogy, the mission statement, program goals, and learning outcomes require reorganization and revision. Table 8 clearly portrays the lack of learning outcomes fulfilled in the Biology courses. The 36 courses have 252 chances to fulfill each of the 7 outcomes. Of those 252 chances, only 18 were filled, strongly suggesting the reorganization and revision is needed.

2. Enrollment History

Course enrollments and declared majors/minors spiked in 2010 and have continued to rise. New faculty lines, space, staff, and creative course offering times must be developed/remedied. If needs are not fulfilled, capping the major must be discussed seriously to prevent deterioration of quality as well as faculty, staff, alumni, and student moral. Figure 1 shows a trend of increased number of entering, traditional aged undergraduates declaring the Biology Major. The magnitude of these large classes is now being felt as we have 40 students entering our senior project 4 course series. Though we have 7 faculty, the responsibilities of the Chair do not allow consistent research to occur, which decreases the number of faculty who can mentor senior projects to 6. This means that next semester each faculty will have to average approximately 6.7 students in order to graduate these students in 4 years. The 2010 incoming freshmen class pales in comparison to the incoming class of 2011 and 2012 as their numbers are 90, 100, and 128, respectively.

When comparing the University of La Verne Biology Department to other institutions of similar undergraduate populations (Table 8) La Verne has the largest number of concentrations as well as the most student requirements, yet ULV has the lowest number of faculty. Coupled with the fact that the department also serves/offers prerequisite courses for the MSS, AT, and CH majors and Biology minors, one can deduce that this department will be overwhelmed/overworked by the next program review. These facts support the notion that new faculty lines, space, staff, and creative course offering times must be developed/ remedied. If these needs are not fulfilled, capping the major must be seriously discussed.

3. Curriculum

The curriculum must be revised in order to fulfill the potentially new mission statement, program goals, and learning outcomes. The justification is strongly linked to the arguments given in Finding #1.

4. Comparison with Other Universities

Besides the increased enrollment, Table 9 clearly shows the expectations of both faculty and students are much higher than comparable universities. When comparing the University of La Verne Biology Department to similar institutions, it has less faculty

yet has more concentration tracks, higher teaching load, and higher expectations for student in the form of an entrance exam, senior exit exam, and senior projects.

5. Grants

The Biology Department has been quite successful at earning grants; however, a balance must be attained between teaching, research, and grant obligations.

6. Publications

A total of 13 publications have been submitted and/or accepted during the 2005-2012 time period. These publications have provided a good foundation for future success and increased number of undergraduate co-authors.

7. Alumni Survey

Majority of the participants felt that the Biology Department offered a high quality program, that they were prepared to do research, found a job within 2 years, and felt equally prepared for their career when comparing to their peers from other universities. Overall, the alumni survey data portrayed a positive experience from alumni. When asked if they were to enter college all over again to obtain a B.S. in Biology, the majority stated they would still attend La Verne. Though the minority chose to attend another university, their comments were interesting as the two main justifications referred to tuition and classes getting too large, which is one of our growing problems.

8. Senior Biology Focus Group

Summary of findings from the senior Biology focus group:

Strengths of the Program

The students who participated in the focus group expressed an overall level of concern with the program and the department. However, the students did identify several key aspects of the department that they consider strengths. Hands-on experience with various kinds of instruments was a major strength identified by the students. An additional strength was the one-on-one attention they receive from faculty. As science majors, the students are expected to carry a heavy load of classes and take on a high level of responsibility toward their studies, but the student-faculty one-on-one attention and hands-on experiences are factors that the students enjoy. Other experiences that students identified as strengths include attending conferences and participating in research. For their senior projects, students are allowed the opportunity to conduct their own research or participate in a faculty member's project.

Another strength that the students noted was that there is open communication with the professors. Students feel that they can comfortably approach professors and are able to get feedback and assistance in their work. As well, the professors challenge their

students intellectually and help guide students in their future goals. Students commented that the professor's efforts do not stop within the classroom setting.

Students further shared that they enjoy the interaction among the different sciences at the University of La Verne. It is a unique feature that is not seen at other universities and a major contributor as to why students like the department.

Needs and Challenges

Although the students outlined a number of strengths within the department and program, there were weaknesses that the students noted, were concerned with, and hope that change can be implemented in order to bring about needed improvement. One of the first weaknesses that students noted is the relationship among faculty. Students shared that there is discord among faculty, especially those who have been in the department longer to those who were recently hired. As well, the poor interaction among faculty is further exacerbated when faculty make comments about other faculty members during class time. The lack of interaction among faculty also affects the coordination of course material; classes are impacted because content/material is either repeated from one course to the next, or it is not covered at all because it was supposed to have been covered in another class. This lack of coordination was behind student comments that they feel that taking certain classes are not beneficial, or at least should be reprioritized. Students suggest that the courses could be scaffolded, and courses sequences reconsidered. As well, students noted that there is a clear issue of disrespect among the faculty, and they feel caught in the middle unable to say anything to any of the faculty about this issue.

Another weakness that students commented on was the growth of classes. As more students are admitted into the university, class size is growing, which makes it difficult for students to take classes they need because they become full. As classes grow, they said, labs become limited because there is a lack of sufficient number of materials for all students to utilize. Lab safety was also a concern, as there is a lack of storage space in the labs for harmful chemicals. Students shared that because of the limited scheduling of science courses, they are unable to proceed in taking their required GE courses, which can delay their graduation time. Students are required to go on field trips with little advanced notice (many work and do not have the leeway to work out an alternative schedule), go to seminars, complete their lab work, and attend their weekly scheduled courses, which leaves little to no time for GE courses.

Students further noted that grading policies across the program classes should be reevaluated. Many students have had to take courses over because of their inability to pass the initial time they took the course. Many students shared their frustration at having to repeat multiple classes because of the high grading expectation of the professors. Consequently, in having to repeat classes, students earn a lower GPA, which affects them negatively when applying to graduate programs. This has been frustrating because even though students feel they know the information, their GPA does not reflect their actual knowledge. Grading issues among professors is a major concern because the grading is inconsistent, the questions on exams are highly subjective, and there is little justification for how grading is evaluated.

Opportunities
Students identified a number of ways to improve upon some of the weaknesses that were noted above. Students suggested that changing lab requirements might be helpful in having students complete the work within their allotted timeframe. Students stated that checking on their lab work nearly every day is not fair when lab is only scheduled for once a week. Possible changes could be to change the lab assignments, to add more units to the lab, or schedule it accordingly to the work that needs to be completed. Students also shared that having better equipment that is more advanced would also be helpful because the equipment that is currently available is not efficient or sophisticated for the level of work that they are required to complete.

Students further suggested that professors be more open-minded when they assist students. Students feel that professors are not willing to listen to either them or their ideas, primarily because professors are used to certain ways of doing things and do not seem to like change. Students feel that they are not allowed to express or develop their own ideas because professors immediately discount them.

Students are also concerned with the amount of work that is required in certain courses. In one class, students noted that they have to read their textbook, attend lecture, do lab exercises, participate in field trips, and read extra books that are required but not discussed in class. Students feel that many of the requirements in this course, and a couple of other courses, does not match the units assigned to the course. They recommend a reevaluation of requirements-to-units would be helpful.

Lastly, students appreciate the continued support and assistance they receive from professors, but when applying to graduate programs, their grades, MCAT scores, and letters of recommendation do not coincide. Professors are able to provide students with letters that assist them in getting into graduate school, but because of the inconsistencies between grading and test scores, their grades make them appear as though they would not succeed in graduate school. Students recommend that grading systems and evaluations to be reviewed and be consistent.

9. Senior Exam

Beginning in 2005, the **Biology Senior Exam** was rewritten to present a more equitable distribution of subject areas. For non-environmental Biology tracts the exam consists of 181 points of multiple-choice questions, with a minimal passing score of 50%. Mean scores for the covered years (2006-2011) ranged from 51% to 59% with the two lowest scores being in 2006 and 2007, and the highest score being in 2011, suggesting an improvement in performance. During this time interval, the initial pass rate ranged from 85 - 93%, with the ultimate pass rate (following retakes) being 90%. One student (2010) was caught cheating on the exam and received a zero that was not used for calculating either mean exam scores, or mean pass rates. Between 2006 and 2010 ten percent of students taking the senior exam failed to receive a passing score and did not receive their degrees. Additionally, there are currently two students currently completing their senior projects have yet to pass the senior exam.

The biology exam has not been edited since 2005 hence needs to be re-evaluated for coverage and suitability, as noted in a recent Biology Departmental meeting (8 June 2011).

The **Environmental Biology Senior Exam**, by contrast, has been in an essay format (including a case study analysis), with questions being drawn from principles of environmental biology, and applications of these principles to the understanding of global and local environmental issues. A score of 70% is considered passing on this exam. All 5 students that took the environmental exam during the interval passed with a mean score of 85%. With Dr. Neher stepping down from teaching duties, Jeff Burkhart has assumed the Environmental Biology course, which is now more focused on principles of ecology, hence senior environmental students should probably take the same exam as the other major tract students.

10. Senior Thesis

With a graduation sample size, n = 53 total from 2007 to 2011, the rate of four-year graduation of this cohort of students has risen from 40% to greater than 70%. This represents a major shift in the on-time completion rate of our majors. It is also interesting to note that first-generation students (first in family to attend college) average 6.1 yrs to degree completion compared to 4.6 yrs for students who were not first in the family to attend college. In-depth study of the first-generation cohorts may reveal the cause of this disparity. It may be that first-generation students tend to be underprepared and must take more remedial courses, which would lengthen time of matriculation. Or, the first-generation student may have a greater financial need, which would cause them to work more and have less time to focus on courses. While matriculation time differs for these two groups, the number of majors pursuing graduate professional or academic degrees has increased for both.

VI. Action Recommendations

1. Evaluate the Biology Department Mission, Program Goals, and Learning Outcomes.
2. Update the Biology Curriculum to reflect our mission statement, national trends, expectations, increase primary experience with diversity and "natural" environments, and increase retention and graduation numbers.
    a. 4 year plan
    b. Candidacy or informal evaluations of potential students must be built into the 4 year plan to ensure ethical practices with respect 4 year graduation goals
3. Discuss the balance of STEM Education and Discipline Based Research training/ via conferences and workshops.
4. Expand research and teaching laboratories to support hands on learning for students and faculty research.
    a. Renovate animal room for efficiency
    b. Biosafety Level 2 laboratory has been requested by a number of interviewees during the hiring process
    c. Museum relocation or renovation
    d. Lab renovation to maximize numbers for teaching and research labs
    e. Evaluate maximum lab offerings
5. New faculty lines to support courses that are now required to be offered every semester (2 labs) due to increased demand.
    a. BIOL 204, 205, 302, 343, and 344 are now offered every semester as they are pre-requisites and/or core courses for Community Health, Movement & Sports Science, Athletic Training, and Biology minors.
    b. There is also increased interest in Nursing and Physicians Assistant graduate programs. Many La Verne students, outside the Biology major, are taking these courses to qualify for admission into these programs
6. Streamline the Biology major with the LV Experience
7. New Staff Position to support the current Biology Laboratory Manager in order to allow satisfy/fulfill the increased course offerings, grants, and research
    a. One biology lab manager/technician
    b. An alternative would be hiring post-baccalaureate positions; however, a streamlined process must be negotiated
8. Further explore ways to better incorporate Montana Magpie Ranch into home campus programs and plan for pending saturation of space.
9. Re-evaluate the necessary preparation of students for success in the Biology major.
    a. Make sure students succeed in the Biology major – provide honest advice and alternatives - be ethical →Jr candidacy or informal evaluation?
10. Evaluate work load with respect to teaching, research obligations, grant obligations, departmental assignments, and senior project supervision.
11. Revision of all departmental exams (placement, junior candidacy, and senior exit)
12. Consider a Science Diplomacy/Policy Advisors track as this maybe a growing area

VII. Appendices

A. 2005 Biology Program Review Updates

The 2005 Biology Program Review listed 14 Recommendations for Action. Initiatives of highest priority are noted with a **.

1. ****Explore the revision of the Environmental Management major into an interdisciplinary Environmental Studies major.**
   Concern for the environment and the implementation of sustainability have been, and continue to be, at the heart of the mission of both the University and the Division of Science and Mathematics. Further, in these environmentally difficult and uncertain times, the commitment to training students that can help deal with a multitude of environmental challenges is even more important.

   Two Biology majors, Environmental Biology and Environmental Management, offer curricula that provide similar training. However, due to low Environmental Management enrollments, the major was suspended in 2008, with the intent to implement revisions, following a study on what sort of applied environmental program would best fit student interests, market needs and faculty strengths. At present, there remains no specific target date to resurrect the undergraduate environmental management major.

2. **Refocus green campus efforts by involving students in environmental campus projects.**
   Since the 2006-07 academic year, SPLSS (Society of Physical and Life Science Scholars - the Natural Science Division's student organization) has been directly involved in the planning and implementation of annual Earth Day events, and each year, we continue to see dedicated student commitment and effort in the planning of this important event.

   Additionally, student participation continues on ULV's Sustainable Campus Committee and the Green Valley Initiative (as the Green Initiative for Village Empowerment, or GIVE). Moreover, the GIVE chapter continues to attract students from disciplines outside the sciences. In each of these important environmental initiatives, students continue to make key contributions in crafting solutions to pressing environmental issues, both on and off campus.

3. **Consider expanding the research methods and biostatistics course into a 3-4 hour course to better cover biostatistics, or possibly require students to take a statistics course offered by another department, such as Psychology.**
   As noted in the 2007-08 Program Action Update, the addition of a required 2-hr statistics course (BIOL 380 Biostatistics) has strengthened the overall Biology program, helped improve the quality of senior projects, and better prepared our

students for post-graduate school and careers in the sciences. We attribute at least a portion of the notable improvement i the timely completion of senior projects to the strengthening of their research skills emphasized by courses such as these.

4. **Consider an alternative to the currently emphasized empirical senior project for meeting graduation requirements.**
   The grant proposal model initiated in 2006 has become a valuable senior project option for both currently enrolled seniors, but also a significant number of students that, in past years, left the university without project completion. (Over the past two years, Departmental faculty have made a focused effort to locate non-completed students and work with them to complete their projects.) While the number of students selecting this option is relatively small (6 of 24 students completing their projects in 2008-09), we believe it likely that a majority of these would have failed to finish were it not for the availability of this option.

5. **Develop a better tracking strategy to monitor progress of senior projects and minimize the chances of students losing the momentum begun in the Fall semester of their Junior year.**
   Considerable effort has been devoted of late to more careful tracking of senior project students, and the effects of new policy outlined in previous Action Updates can be readily seen. During the 2008-09 academic year 24 students completed senior projects, of which 12 were students that had completed coursework prior to Fall 2008. We are especially pleased with the successes in this area, because previously too many of our 'graduates' were leaving without actually completing all degree requirements. The improvement in senior project completion success has been due in part to course restructuring and new project options, but also to a determined and renewed effort by Departmental faculty. Similar success rates have been seen from 2009-20012.

6. ****Consider adjustment of teaching load expectations of faculty engaged in research, and oversight of student research projects beyond a given number.**
   The consensus among Departmental faculty remains that the standard teaching load of 24 hours is excessive when added to the demands of conducting significant research, which has become a major focus of the Department. Currently, four faculty (Broussard, Novak, Weaver, Garcia) have externally funded research projects that demand heavy time investments. This important concern has been discussed with administrators at various levels and we continue to press for implementation of policy changes that offer additional course-release time for those faculty heavily involved in research. To their credit, both Dean Yaffe and the Faculty Research Committee have been supportive in funding course releases for several faculty.

7. **Rethink/revitalize the science seminar format**
   Modifications made during the 2006-2007 academic year have significantly improved the quality of the Science Seminar. Additionally, since Spring 2008 semester, all senior project oral presentations are scheduled for a single day in an event that is attended by all Division faculty and majors outside of Mathematics. This arrangement more closely mimics the format of the typical scientific meeting, and allows celebration of all student work in a single event.

   Each year, some of our seniors also present their project work at local or even national scientific meetings, and in the past 5 years, three of these students have received recognition for the quality of their work. During Spring 2009, Sergio Sandoval received a **top student paper** award for his senior project work presented at the 2009 Southern California Academy of Science meeting.

8. **Apparently low MCAT scores in recent (2004/05) years suggest that there may be a problem with preparation of students for matriculation into graduate schools and this issue warrants further analysis.**
   To date, no specific effort has been devoted to further investigate this concern, however, over the past two years (2008-09) the pass rate for the initial taking of Biology Senior exit exam was 70% and 82% respectively. However, there remains a small number of students that are unsuccessful in passing the currently administered Departmental exam, even after multiple efforts. The majority of these are ones that have remained in the program in spite of low performance. To help better advise marginal students, the Department has administered a **junior candidacy program** in which second semester sophomore students must take a **junior candidacy exam** and apply for candidacy for acceptance into the Junior year. Those that do to meet candidacy requirements (determined by exam score and class performance) will be counseled to consider a change in major. Appeals will be considered for those who request reconsideration.

   One of the best indicators that the Department is doing a superior job of preparing students is the number of graduates that are being accepted into post-graduate programs. Between 2003 and 2007 a mean of 6 students were accepted into professional or graduate programs, in contrast to 15 and 14 students, respectively from the 2008 and 2009 graduating classes.

9. **Consider revision of the biology curriculum, including identifying courses for possible deletion and courses for addition.**
   Following the rather extensive modification in the Biology curriculum in 2007-2008, no further changes were made in 2008-09. One new course, NASC 350 Natural Sciences Fieldwork was developed by Harvey Good and was offered fall 2009 for the initial time. This course was designed for Science students in the Teaching Track that seek a waiver from the CSET exam normally required of all aspiring teachers in California.

10. **Cultivate additional adjunct faculty to aid in the offering of additional CORE 340 courses**.
    Dr. Harvey Good, Professor of Biology emeritus, has been retained to teach additional CORE 340/INTD sections, and during January 2010 will offer two special CORE (340 and 310) courses in Vietnam.

11. **Revise syllabi to address perceived deficiencies as identified by Dr Wright of Pomona College.**
    No focused evaluation has been done to monitor progress in this area, however a general review of syllabi indicate that Departmental faculty have implemented many of Dr. Wright's suggestions.

12. **Plan for pending retirements and staffing needs.****
    Recent hires (Dr. Kathleen Weaver and Jessica Varney Tocts, Biology Laboratory Manager) are both doing an excellent job and have already become integral to Departmental operations. Jessica, has been a particularly valuable addition, with Pablo Weaver's resignation as lab manager. Ms. Tocts was one of our 2008 graduates, and her laboratory experience made her transition into the manager position much easier. As noted in the 2007-08 report, the Biology Laboratory Manager position is very demanding, and requires the equivalent of another ½ time position in terms of workload. Our main concern is, that given the considerable and diverse workload, that we will be unable to retain quality staff in this essential support position.

    Finally, the Biology Department (and the Natural Sciences Division) is rapidly gaining a national reputation for its efforts in an innovative curriculum, and to recruit under-represented minorities to STEM (Science, Technology, Engineering, and Mathematics) fields. The evidence for our enhanced reputation is NSF and Department of Education funding of our programs (approximately $4 million to date) and the solicitation of our faculty in national forums to discuss and create blueprints for action in science education. The current momentum cannot be maintained without some re-structuring of the Department. Furthermore, additional demands are being placed on the Department by Regional Campus programs to develop on-line and hybrid courses to satisfy the needs of RCA students (see point 3 under Other Accomplishments of Note). In order to ensure the quality of our program both on and off-campus, we need a dedicated full-time coordinator. We propose to hire a Biology 101 coordinator who would serve 1) to teach BIOL 101 courses (our main adjunct Fredda Fox will be retiring in the next couple of years), 2) to innovate the curriculum of BIOL 101 and other courses in collaboration with Department faculty, 3) to write federal grant proposals to support assessment of curricular innovation, and 4) to coauthor publications in science education to highlight our efforts and the results.

    We already have a Department staff member who would serve well in this role. Pablo Weaver continues to teach on an adjunct basis (including BIOL 101), and provides the Department with valuable expertise in the areas of aquatic and field

biology. He is an excellent classroom teacher and mentor that team-taught Marine and Aquatic Biology (with me) during Spring 2009, and who has supervised several senior projects. Additionally, he supports one of our faculty with her snail research and the BIOL 325 course offered at the Montana campus. Pablo would be an ideal candidate for the Biology 101 coordinator. Moreover, he has plans to pursue an Ed.D. with a focus on assessment. His additional training would provide expertise that does not currently exist in the Department, but that is sorely needed. Federal agencies dispersing funds for science education now demand a well-developed assessment component to all grant proposals. If we are to continue to be successful securing extramural funding, we will need to have that expertise available.

13. ****Explore ways to incorporate programming at the Montana Magpie Ranch campus into home campus programs.**
Over the past three years, Kathleen Weaver has taken student groups to the Magpie Ranch facility as a requirement of BIOL 325, Field Biology, during which time students spend 2 weeks conducting research on terrestrial snails. Part of this work has been funded by an extramural grants from the Washington State Department of Wildlife**.** We continue to seek ways to incorporate the use of the Magpie Ranch facility into the home campus curriculum and hope to add an additional course next summer (2010).

    During summer 2009, progress at the Montana campus was made on the completion of the new building which will provide additional student living quarters, a laboratory, and a roof solar system that will provide the majority of the station's electrical needs during summer activities.

14. ****Develop programs to recruit higher quality and better-prepared students**.
On March 7, 2009, the Division hosted a Math and Science Open House ("Science and your Future") for High School juniors to showcase Division programs. The event which was attended by fewer than the 43 students that had initially signed up but it was considered to be a success and is one we will continue next year.

    Other initiatives outlined in this document (GIVE, Beta, Beta, Beta Biology Honorary, etc) detail additional initiatives, which are helping address this goal.

B. Full-Time Faculty Curriculum Vitae

1. Christine Broussard, Ph.D.

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christine.broussard@gmail.com 909.593.3511x 4597 (office)
broussac@ulv.edu

EDUCATION
Ph.D. University of Texas, Southwestern Medical Center at Dallas, Dallas TX 1996
Immunology A role for C-myc in thymocyte differentiation and peripheral T cell function
M.S. Louisiana State University School of Veterinary Medicine, Baton Rouge, LA 1991
Immunology IL-4 production in influenza virus-stimulated CD8+ T cells
B.S. Louisiana State University, Baton Rouge, LA 1989
Microbiology with minors in psychology and zoology

TRAINING
Continuing Marine Biological Laboratory, Woods Hole, MA 2009
Education Analytical and Quantitative Light Microscopy (AQLM)
Continuing Marine Biological Laboratory, Woods Hole, MA 2003
Education Embryology: Concepts and techniques in modern developmental biology
Postdoctoral NIH, National Human Genome Research Institute, Bethesda, MD 1999-
Fellowship Role of Tec family kinases in thymocyte development and signaling 2001
Postdoctoral NIH, National Cancer Institute, Bethesda, MD 1997-
Fellowship Characterization of CD28-independent deletion of DP thymocytes 1999

TEACHING EXPERIENCE
Assistant & University of La Verne, La Verne, CA 2001-
Associate Lab courses: Cell Biology, Developmental Biology, Microbiology
Professor Molecular Biology, and Principles of Biology; Non-lab courses: Immunology,

Women & the Environment, Food & the Environment
Course Marine Biological Laboratory, Woods Hole, MA 2004-
Coordinator Embryology 2005
Guest KEMRI Malaria Research Station & Hospital, Kilifi, Kenya 2001
Instructor Immunology
Lecturer Johns Hopkins University, Krieger School of Arts & Sciences, Rockville, MD 2001
Cell Biology

PEER-REVIEWED PUBLICATIONS

Madhuri M, **Broussard C** (2008) Do I need to know this for the exam? Using popular media, inquiry-based laboratories, and a community of scientific practice to motivate students to learn developmental biology. *CBE – Life Sciences Education*, Spring; 7(1):36-44.

Broussard C, Fleischacker C, Horai R, Chetana M, Venegas A, Sharp L, Hedrick S , Fowlkes BJ, Schwartzberg P (2006) Development of a novel CD8 lineage in mice deficient in the Tec family kinases Itk and Rlk. *Immunity* 25: 93-104.

Korr JL, **Broussard** C (2004) Challenges in the interdisciplinary teaching of food and foodways. *Food, Culture, and Society* 7:147-159.

Lewis C, **Broussard C**, Czar M, Schwartzberg P (2001) Tec family kinases in lymphocyte signaling and function. *Current Opinion in Immunology* 13:317-325.

Schaeffer E, **Broussard C**, Debnath J, McVicar D, Schwartzberg P (2000) Tec family kinases modulate thresholds for thymocyte development and selection. *Journal of Experimental Medicine* 192:987-1000.

Wagner KU, Claudio-Vazquez E, Rucker EB, Riedlinger G, **Broussard C**, Siebenlist U, Hennighausen L (2000) Conditional deletion of the *bcl-x* gene from erythroid cells results in hemolytic anemia and hyperplasia of the bone marrow and spleen. *Development* 127:4949-4958.

Broussard-Diehl C, Bauer SR, Scheuermann RH (1996) A Role for c-myc in the regulation of thymocyte differentiation and possibly positive selection. *Journal of Immunology* 156:3141-3150.

RESEARCH and EDUCATION GRANTS

National Science Foundation: Robert Noyce Teacher Scholarship Program
$899,746 (2009-2014) Recruiting, Preparing, and Retaining Diverse Science and Mathematics Teachers: The La Verne Noyce Teacher Scholars Program

National Institutes of Health - Academic Research Enhancement Award Application
$150,000 (2009-2012) Prenatal developmental immunotoxicity of DES and methoxychlor

National Science Foundation: Course, Curriculum, and Laboratory Improvement
$150,000 (2007-10) Visualizing cells and embryos: Integrating modern cell and developmental biology techniques

into the undergraduate biology curriculum of the University of La Verne
James Irvine Course Transformation Grant
$2000 (2002) Curriculum development in instruction, content, assessment and classroom dynamics
University of LaVerne Summer and Faculty Research Fellowships
$1990 (2009-10) Sex-specific reactivity of embryonic thymocytes to endocrine disrupting chemicals
$4947 (2008-09) Developmental immunotoxicity of endocrine-disrupting chemicals
$2000 (2008) Mechanisms of developmental immunotoxicity of endocrine-disrupting chemicals
$950 (2007-08) Effects of methoxychlor on the development of CD4 T cells in C57BL/6 mice, supplement
$4950 (2007-08) Effects of methoxychlor on the development of CD4 T cells in C57BL/6 mice
$2000 (2007) Support to visit Davidson College and Marine Biological Laboratory
$900 (2006-07) *In vitro* risk assessment of methoxychlor on T cell development, supplement
$2750 (2006-07) *In vitro* risk assessment of methoxychlor on T cell development
$2000 (2005-06) The effect of excess zinc on the development and function of murine T cells
$4000 (2004-05) Transient exposure to methoxychlor on the development & function of murine T cells
$950 (2003-04) Characterization of signaling defects in a c-myc transgenic thymoma
$2000 (2003) Support to attend Marine Biological Laboratory's embryology course
$600 (2002-03) The effect of c-Myc overexpression in positive and negative selection
$4000 (2002-03) The effect of c-Myc overexpression in positive and negative selection
$2000 (2002) Protective immunity to *P. falciparum* variant antigens expressed at the infected red blood cell surface

National Cancer Institute Institutional Research Training Grant T32 CA09082-18
$12,000 (1994-96) Immunology Research Training

Solicited Donations
~$12,000 (2002) California Institute of Technology flow cytometer
~$80,000 (2001) National Institutes of Health thermal cyclers, incubator, centrifuges, and water baths

AWARDS AND HONORS
Caswell Grave Scholarship (2003) tuition support for education and professional development, MBL
Edwin Grant Conklin Memorial Award (2003) tuition support for education and professional development, MBL
Ida M. Green Award (1993) for service to the graduate community at UT Southwestern

PROFESSIONAL ORGANIZATION MEMBERSHIPS

American Association for the Advancement of Science (1992-present)
American Association of Immunologists (AAI – 2002-present)
American Society for Microbiology (ASM - 2008-present)
Society for Environmental Toxicology and Chemistry (SETAC – 2006-present)
Southern California SETAC Board (SoCal SETAC - 2006-present)

INVITED TALKS
Azusa Pacific University (2008) Effects of Endocrine Disruptors on Prenatal T cell Development.
SETAC North America 28th Annual Meeting (2007) Effects of Methoxychlor exposure on the development of CD4 T cells in C57BL/6 mice. Milwaukee, WI
International Colloquium for Vernacular, Hispanic, Historical, American and Folklore Studies (2003) Pedagogical Challenges in Teaching Food, Culture, and the Environment from a Combined Science/Humanities Approach—A Scientist's Perspective.

INVITED PANELS
Transforming Undergraduate Biology Education: Mobilizing the Community for Change (2009). Implementing Innovations and Assessing their Impact. National Sceine Foundation and the American Association for the Advancement of Science. Washington, D.C.
Faculty Research and Student Learning (2009) University of La Verne Faculty Retreat
Pathways to Peace: The Roadblocks of Global Hunger and Genocide (2008) University of La Verne International Studies Institute
Interdisciplinary Approaches to Teaching Food Studies (2003) International Colloquium for Vernacular, Hispanic, Historical, American and Folklore Studies
Growing with Diversity, Personal and Professional Experiences Concerning Diversity (2003) University of La Verne Faculty Retreat
Developing Relationships with Students (2002) University of Maryland, College Park Scholars

MENTORING EXPERIENCE (SELECTED COMPLETED PROJECTS)
Joyce DeLeon, (2008) Effects of diethylstilbestrol exposure on the gestational development of T-cells in C57BL/6 mice.
Alma Parada, (2008) Effects of methoxychlor exposure on the development of CD4 intermediate T-cells in C57BL/6 mice, an LOAEL analysis.
Jessica Varney (2007) The acetylcholinesterase inhibitor malathion is not toxic to thymocytes, but may alter the developmental program at low doses.

Ankit J. Vasa (2007) Effects of methoxychlor exposure on the development of CD4 T-cells in C57BL/6 mice.
Noel Clesceri (2007) The effects of malathion on the proliferative response of *Rana pipiens* splenocytes in response to mitogen stimulation.
Jeannie Gonzalez (2007) The effects of glyphosate (the active ingredient in RoundupTM) on the proliferative response of *Rana pipiens* splenocytes in response to mitogen stimulation.
Andrew Garcia (2007, completed 2008) The effects of sodium arsenite on the developing nervous system of chicken embryos *in vivo*.
Joan Ordonez (2006, completed 2007) An *in vitro* risk assessment model for the impact of pesticides on the development of T cells in C57BL/6 mice.
Kristin McKown (2006, completed 2007) Effects of zinc on developing thymocytes in fetal thymic organ culture.
Danny Maria Ramirez (2004) Investigation into the interaction between KSR and MEK during T cell development.
Tom Hatch (2004) The effects of excess zinc on developing murine thymocytes.
Alethea Ramos (2004, completed 2007) Effects of Moringa Oleifera on wound healing.
LaQuenta Long (2002) Zinc increase reduces oxidative damage in rats with iron overload.
Kristina Peralta (2002) Science writing. *Macroscope: Natural Science Journal*.
Madeva Chetana (2000) Kinetics and efficiency of T cell development in TCR transgenic and nontransgenic mice lacking the Tec family kinases Rlk and Itk.
Christine Case (2000) Defects in cytoskeletal reorganization in T cells from TCR transgenic, Tec family deficient mice.

PUBLISHED ABSTRACTS
(* INDICATES UNDERGRADUATE CO-AUTHORS)
Christine Broussard, Alma Parada*, Joyce DeLeon*, A.J. Vasa* (2008). Comparison of Effects of Methoxychlor and Diethystilbestrol Exposure on the Development of Embryonic T cells in C57BL/6 mice. Society for Environmental Toxicology and Chemistry North America, 29th Annual Meeting. Tampa, FL.
*DeLeon J, **Broussard C** (2008) Diethylstilbestrol inhibits development and promotes apoptosis in embryonic thymocytes. Southern California Society for Environmental Toxicology and Chemistry Annual Meeting. Dana Point, CA.
*Parada A, **Broussard C** (2008) An investigation of the effects of methoxychlor on the embryological development of T cells in C57BL/6 mice. Southern California Society for Environmental Toxicology and Chemistry Annual Meeting. Dana Point, CA.
*Chambers MC, **Broussard C** (2008) Effects of diethystilbestrol on the prenatal development of CD8 thymocytes from C57Bl/6 mice. Southern California Society for Environmental Toxicology and Chemistry Annual Meeting. Dana Point, CA.
Broussard C, *Varney J (2007) The acetylcholinesterase inhibitor malathion is not toxic to thymocytes, but may alter the

developmental program at low doses. American Association of Immunologists Annual Meeting. Miami Beach, FL.
Horai R, Handon R, **Broussard C**, Mueller K, Venegas A, Fowlkes BJ, Schwartzberg P (2007) The Tec kinase Itk regulates conventional versus non-conventional CD8 T cell development. American Association of Immunologists Annual Meeting. Miami Beach, FL.
*Varney J, **Broussard C** (2007) The acetylcholinesterase inhibitor malathion is not toxic to thymocytes, but may alter the developmental program at low doses. Southern California Academy of Sciences Annual Meeting. Fullerton, CA.
*Gonzalez J, **Broussard C** (2007) The effects of glyphosate on proliferation of Rana pipiens splenocytes stimulated with Con A and PHA. Southern California Academy of Sciences Annual Meeting. Fullerton, CA.
*Vasa AJ, **Broussard** C (2007) Effects of methoxychlor exposure on the development of CD4 T cells in C57BL/6 mice. Southern California Academy of Sciences Annual Meeting. Fullerton, CA.
*Ordonez J, **Broussard C** (2006) An *in vitro* risk assessment model for the impact of pesticides on the development of T cells in C57BL/6 mice. Southern California Academy of Sciences Annual Meeting. Malibu, CA.
*Hatch T, **Broussard C** (2004) The effects of excess zinc on developing murine thymocytes. Southern California Academy of Sciences Annual Meeting.
Broussard C, Fleischacker C, Chetana M, Venegas A, Sharp L, Hedrick S, Fowlkes BJ, Schwartzberg P (2002) Deficiency of the Tec family kinases leads to altered lineage development. American Association of Immunologists Annual Meeting.
Broussard C, Fleischecker C, Chetana M, Mijares L, Lewis CM, Fowlkes BJ, Schwartzberg P (2001) Deficiency of the Tec Family Kinases Leads to Altered Lineage Development. Experimental Biology.
Broussard C, Schaeffer E, Debnath J, McVicar D, Schwartzberg P. (2000) Deficiency of the Tec family kinases leads to altered T cell development. Signal Transduction in the Immune System, FASEB.
Broussard CA, Schaeffer EM, Debnath J, Mc Vicar D, Lenardo M, Schwartzberg PL (1999) Deficiency of the Tec Family Kinases leads to altered T cell development. National Institutes of Health, Immunology Interest Group Retreat.
Broussard-Diehl C, Schaeffer E, Debnath J, Littman D, McVicar D, Varmus HE, Lenardo MJ, Schwartzberg P (1999) Altered Signaling and T cell development in mice lacking the Tec kinases, Rlk/Txk and Itk. Keystone Symposium.
Broussard-Diehl C, Bauer SR, Scheuermann RH (1997) A role for c-myc in the regulation of thymocyte differentiation. Keystone Symposium.
Broussard-Diehl C, Bauer SR, Scheuermann RH (1995) Role of *c-myc* in thymic education. Ninth International Congress of Immunology.
Broussard-Diehl C, Scheuermann RH (1994) Developmental regulation of *c-myc* and *bcl-2* in thymic education. Experimental Biology.

TECHNICAL SKILLS

Immunology growth of transformed cell lines (T cells, B cells, hepatocytes, fibroblasts), *in vitro* death and differentiation assays with primary thymocytes, proliferation assays, cell enrichment/purification, fetal thymic organ culture, flow cytometry-based immunophenotyping, intracellular immunofluorescence, cell cycle analysis, FACScan/FACSCalibur operation

Cell & Developmental Biology phase-contrast microscopy, cell staining, fluorescence microscopy (compound and stereo), digital imaging, microtool preparation, microinjection, microsurgery

Molecular Biology subcloning, minipreps, maxipreps, PCR (RT-PCR), Southern blotting, SDS PAGE, Western blotting, immunoprecipitation

Software Cell Quest (flow cytometry), Flow Jo (flow cytometry), SPSS, Adobe Photoshop and Illustrator, MetaVue (microscopy), Advanced PubMed, iWeb (website design and maintenance), Microsoft Word, PowerPoint, and Excel

SERVICE

College of Arts & Sciences Council, University of La Verne (2008-2010)
Natural Sciences Division Web Development Committee University of La Verne (2008-present)
College of Arts & Sciences Curriculum Committee University of La Verne (2006-present)
General Education Committee University of La Verne (2005-present)
Biology Department Curriculum Committee University of La Verne (2005-present)
Biology Department Program Review Committee University of La Verne (2004-2005)
Undergraduate Appeals Committee University of La Verne (2003-2005)
Natural Sciences Division Committee for Promotion and Tenure Standards University of La Verne (2002)
Editor-in-chief *Macroscope: Natural Science Journal* (web-based) University of La Verne (2002-03)
Integrated pest management consultant, Fairplex Child Development Center, Pomona, CA (2006-present)
Hike coordinator, Biology Department, University of LaVerne (2002-04)
Volunteer scientist, The Mad Scientist Network, Washington University (1998-04)
Volunteer with Habitat for Humanity, Mi Casa, and Anacosta Watershed Society Greater DC Cares (1998-2000)
Biology classroom volunteer, Seneca Valley High School, Germantown, MD (2001)
Volunteer coordinator, Association for Women in Science Expanding Your Horizons outreach program (1995)
Volunteer coordinator, Science by Mail, Association for Women in Science (1994)

HOBBIES

Hiking, camping, contra dancing, attending folk music concerts/festivals, and reading and writing poetry

REFERENCES

Dr. Fred Yaffe
Dean, College of Arts and Sciences
University of La Verne
1950 Third Street
La Verne, CA 91750
(909) 593-3511 ext.4198
fyaffe@ulv.edu

Dr. Jeffrey Burkhart
Chair, Department of Biology
University of La Verne
1950 Third Street
La Verne, CA 91750
(909) 593-3511 ext.4599
burkhart@ulv.edu

Dr. Richard H. Scheuermann
Chief, Division of Biomedical Informatics
Director, Division of Translational Pathology
John H. Childers Professorship in Pathology
Department of Pathology
University of Texas Southwestern Medical Center At Dallas
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Dr. Barbara Lom
Associate Professor of Biology
Davidson College
Davidson, NC 28035-7118
(704) 894-2338
balom@davidson.edu

2. JEFFERY T. BURKHART

ADDRESS

Home: 1526 N. Bates Place, Claremont, CA 91711
Phone: Home: (909) 445-0655 Cell: 909-532-1613

Office: Department of Biology, University of La Verne
1950 Third Street, La Verne, CA 91750
Phone: (909) 593-3511 x 4599 email: jburkhart@laverne.edu

EDUCATION

Ph.D. Zoology (Ecological Energetics of the Alkali Grasshopper, *Anconia integra*), 1978, Arizona State University, Tempe, AZ

B.A. Biology, 1967, Humboldt State University, Arcata, CA

DISTINCTIONS

Honored Member of Empire Who's Who Executive and Professional Registry, 2006 - present

AcademicKeys Who's Who in Sciences Higher Education, 2004 - present

Who's Who Among America's Teachers, 2002 - present

Glenn Doyle Excellence in Teaching Award, Phillips University, 1997

Marquis Who's Who in Science and Technology, 1997 - present

Outstanding University Science Educator**,** Oklahoma Science Teacher Association, 1996

National Science Foundation Traineeship, Arizona State University, 1968

EMPLOYMENT

September 1999 to present
Fletcher Jones Professor of Biology

Chair, Department of Biology, 2003 to 2010
University of La Verne, La Verne, CA 91750

August 1997 to May 1999
Professor of Biology
Paradise Valley Community College,Phoenix, AZ 85032

August 1985 to 1997
Professor (1993) of Biology
Phillips University, Enid, OK 73701

August 1975 to 1985
Professor (1984) of Biology
Saint Mary of the Plains College, Dodge City, KS 67801

TEACHING EXPERIENCE

University of La Verne

General biology	Mountain and desert biology
Invertebrate zoology and parasitology	Animal biology
Research methods and biostatistics	Environmental biology
Evolution and biosystematics	Senior seminar
Freshwater and marine biology	

Tropical biology (field courses in Guatemala, Costa Rica, Belize, Ecuador, Kenya, Vietnam)

Paradise Valley Community College

Concepts of biology	Environmental biology
Natural history of the southwest	

Visiting Professor, Consortium of Independent Christian Colleges
Biology of the lowland tropics (Costa Rica, C.A., March 1996)

Phillips University

Environmental science	Ecology
Human anatomy and physiology	Field ecology
Vertebrate zoology	Field botany
Comparative anatomy	Organismic biology
Vertebrate morphogenesis	Tropical biology
Natural history of the vertebrates	Coral reef biology

Saint Mary of the Plains College

General biology	Evolution
General botany	Sociobiology
Plant taxonomy	Embryology
Field biology	Human anatomy
Ecology	Senior seminar
Invertebrate zoology	Vertebrate zoology
Raptor rehabilitation techniques	Comparative anatomy

Marine biology (field courses in the West Indies and Mexico)

Humboldt State University Telonicher Marine Station, Trinidad, CA.

Marine biology.

PROFESSIONAL ACTIVITIES

Reptiles of the Desert course, University of California, Riverside, and The Desert Institute, Joshua Tree National Park, Twenty-nine Palms, CA. April 4-6, 2009; May 14-16, 2010

March 2010, Understanding Poverty, Displacement, and the Environment Across Continents; Universidade Estadual do Norte Flumenense, Campos, Brazil

June 2009, ULV Summer Research Grant to visit Vietnam to set up a January 2010 Tropical Biology field course.

December 10-11, 2007, travel to Porto Allegra Brazil as a ULV FIPSE team member to meet with faculty from two Brazilian Universities (Universidade do Vale do Rio Dos Sinos {UNISINOS}, and Universidade Estadual do Norte Fluminense {UNEF}) and U.S. partner Fairfield University to finalize plans U.S./Brazil student exchanges.

Grant Participant, Fund for the Improvement of Post Secondary Education (FIPSE), 2007-08 academic year. Understanding Poverty, Displacement and the Environment Across Continents: Towards an Interdisciplinary, Intercultural, Values-Based Curriculum, US-Brazil Higher Education Consortia Program, U.S. Department of Education.

Senior Herpetologist, Operation Wallacea Biotic Survey of Cusuco National Park, Sierra de Omoa mountains, Honduras, C.A. June 26 – August 9, 2006.

Chautuaqua short course, 'Ecology and History of the Mojave Desert Region', California State University Desert Studies Center. May 26-30, 2006.

Chautuaqua short course, 'Marine Ecosystems of Belize', Wee Wee Caye Biological Station, Belize**,** January 2-7, 2006

Workshop, Differential reproductive success as a measure of Darwinian fitness: a predator-prey model for the classroom, Hawaii International Conference on Education, Honolulu, HI, Jan. 5, 2004.

Workshop, Slim Pickin': A student-centered model for demonstrating natural selection, California Science Education Conference, Long Beach, CA, October 12, 2003, Co-presenter: Lisa Burkhart.

Paper, *Salmonella* incidence in southern California lizards: Is there a correlation to fitness? Southwestern Association of Naturalists Annual Meeting, April 17-20, 2003, University of
Oklahoma, Norman, OK. Co-authors: Kelly Spencer and Ron Fauntleroy.

Paper, Incidence of *Salmonella* in free-ranging iguanid lizards of southern California,
Southern California Academy of Science Annual meeting, June 9, 2002.

2002 ULV Summer Research Grant, Lichen communities on conifers in the San Bernardino
mountains: An ecological survey relative to oxidant air pollution, revisited.

2002 ULV Faculty Research Grant, Frequency of the gut symbionts *Salmonella* in fecal samples of free ranging iguanid lizards in southern California.

2001 ULV Summer Research Grant, The incidence of *Salmonella* in fecal samples of the iguanid lizard, *Sceloporus occidentalis biseriatus* in southern California.

2001 ULV Summer Research Grant, Investigations on the biology of the long snout seahorse, *Hippocampus reidi* in southern Belize, C.A.

Venomous Animals of Joshua Tree National Monument, 2001, A report to the United States Department of Interior, National Park Service on diversity of venomous animals in Joshua Tree National Park.

Short courses: Venomous animals of the Mojave Desert, October 2000, May 2001, and April 2002 The Desert Institute, Joshua Tree National Park, Twenty-nine Palms, CA.

Mathematical Association of America/NSF Partnerships Workshop on Life Sciences and Mathematics, July 17-22, 2000, Carroll College, Helena, MT.

NSF Chautauqua course, The Dinosaur Family Tree, March 29-31, 2000, Los Angeles County Museum of Natural History.

National Academy of Sciences Colloquium: The Future of Evolution, March 16-19, 2000, University of California, Irvine, Beckman Center, Irvine, CA.

Publication: Lardie, R.L., D.L. Crosswhite, and J.T. Burkhart. 1999, *Leptotyphlops dulcis dulcis* (Texas Blind Snake) in Oklahoma. Herpetological Review 30(2):113.

NSF Chautauqua course, Tropical Plant Families-Dicots, Fairchild Botanical Gardens, Miami, FL, May 1997.

Organizer and Host, Oklahoma Native Plant Society 'Indoor Outing', February 1, 1997, Phillips University, Enid, OK.

Grant, Phillips University Tree Education Project, Oklahoma State Department of Agriculture and U.S. Forest Service, 1996. $10,202.

Consultant, Bass Regional Hospital, Enid, OK (identification of venomous animals and poisonous plants and mushrooms contacted by ER patients). 1993-1997.

Manuscript reviewer, The Southwestern Naturalist, 1996.

Field Course, Tropical biology of Belize, C.A., September 1995; January 2000.

NSF Chautauqua Short Course, Paleobiology of the Dinosaurs, Mesa College, Grand Junction. CO, June 10-15, 1995.

Visiting Professor, Coral reef biology, International Zoological Expeditions Marine Field Station, South Water Caye, Belize, C.A., Dec-Jan., May 1995.

Field Trip Chair, Oklahoma Native Plant Society, 1994-1997.

Paper, Wildflowers of western Oklahoma, 16th Annual Oklahoma Wildflower Workshop, Enid, OK, May 21, 1993.

Paper, Notes on the biology of the malachite spiny lizard (*Sceloporus malachiticus*) in Costa Rica, Oklahoma Academy of Science Technical meeting, East Central Oklahoma State University, Ada, OK, November 1993.

Summer Field Course, Tropical biology of Costa Rica, 1992, 1993.
Field Trip Leader, Oklahoma Nature Conservancy Annual Meeting, 1992-1997.

NSF Research Proposal Evaluator, Field Station and Marine Laboratory proposals, National Science Foundation, 1989-1991.

NSF Chautauqua Short Course: Inquiry teaching in the field sciences, Hampshire College, Amherst, MA, May 1989.

Organizer, Oklahoma Academy of Science Spring Field Meeting, Beaver's Bend State Park, Hugo, OK, April 14-16, 1989.

Judge, Oklahoma Academy of Science Collegiate Academy paper session, East Central Oklahoma

State University, Ada, OK 1986, 1987.

Paper, Non-traditional educational programs at Phillips University Colorado Field Campus, Ok. Academy of Science Technical Meeting, N. W. Oklahoma State University, Nov. 13, 1987.

Paper, Novel educational programming for biological field stations, Organization of Biological Field Stations Annual meeting, Bodega Marine Station, Bodega Bay, CA, September 19, 1987.

Vice-president, Kansas Wildflower Society, 1984-1985.

Board of Directors, Kansas Ornithological Society, 1983-1985.

Editorial Committee, Kansas Chapter of The Wildlife Society, 1983-1985.

Paper, Status of the western green toad (*Bufo debilis*) in Kansas, Non-game wildlife report to the Kansas Fish and Game Commission, 24pp., 1984.

Grant recipient, Kansas Fish and Game Commission Non-Game Wildlife Program for support of High Plains Raptor Rehabilitation Center, Dodge City, KS, 1982-1985.

Director, High Plains Raptor Rehabilitation Center, Saint Mary of the Plains College, Dodge City, KS, 1982-1985.

Member, Kansas Non-Game Wildlife Advisory Council, Herpetology Committee, March 1981-1985.

Report, Fish and wildlife resources of the Wilroads Gardens, Ks, riparian area, In: U.S. Fish and Wildlife Coordination Act Report, Wilroads Gardens, Kansas Local Flood Protection Report, Arkansas River and Tributaries Project. Compiled by the Kansas Field Office, Division of Ecological Services, North Kansas City, MO, 1981

President, Kansas Herpetological Society, 1981.

Participant, Denver-Lilly Continuing Education Program for College Teachers, Workshop in

Regulatory and Developmental Biology, University of Denver, CO, 1980, 1981.

Paper, The evolution of altruism, NSF Chautauqua Type Short Course Program, University of Missouri - Kansas City, MO, 1980.

Paper, Insects and Productivity - Some implications to world protein deficiencies, Kansas Academy of Science Annual Meeting, Fort Hays State University, Hays, KS, April 1977

Paper, Investigations on the ecological energetics of the alkali grasshopper, *Anconia integra*, Southwestern Association of Naturalists Annual Meeting, Fort Hays State University, Hays, KS, April 24, 1976.

Research Supervisor, Limnology of a southwestern Kansas pond, NSF Undergraduate College Research Participation Program, 1976.

Environmental impact statement, Faunal impacts of the central Arizona Project Canal, City of Scottsdale Long Range Planning Commission, Scottsdale, AZ, 1974.

Numerous popular, educational, and semi-technical presentations (including public television programs) on environmental and related topics presented to diverse audiences. Field trip leader for a wide variety of technical and popular outings.

ADMINISTRATIVE EXPERIENCE

Chair, Department of Biology, University of La Verne, 2003 - 2010.

Faculty Senate President, Phillips University, 1991 - 1992.

Chair, Biological Sciences Section, Oklahoma Academy of Science, 1989.

Director, Phillips University Field Camp, Monte Vista, CO., 1987-1992.

Elderhostel Coordinator, Phillips University, 1986 - 1992.

Chair, Division of Mathematics and Natural Sciences, Saint Mary of the Plains College, Dodge City, KS, 1980 - 1983.

HOBBIES

Fly fishing, hiking, wildlife photography, birding, gardening, collecting antiquarian books.

3. Jerome V. Garcia

Faculty Position

Associate Professor: 2008-Present, University of La Verne, La Verne, CA.

- Biology Department Chairman (Fall 2010 to present)
- Associate Director: Community Health Program
- Faculty Senator (Fall 2010- Spring 2012)
- CAS Council Member (Fall 2009-Spring 2012)
- Tenure awarded 2010

Assistant Professor : 2003 -2008, University of La Verne, La Verne, CA.

College of Arts and Sciences

Department of Biology

Courses Taught: Human Anatomy, Human Physiology, Molecular Basis of Disease, Human and Environmental Toxicology, Nutrition, Principles of Biology, Life Science: The Human Environment, and Sex & Gender Issues.

Honors:2009 Convocation Keynote Speaker, 2009 6th Annual Pacific Islander-Asian American Keynote Speaker, 2008 Excellence in Teaching Award, Phi Sigma Sigma Faculty Appreciation Award 2008 & 2009, 2007-2008 Housing and Residential Life Faculty Fellow Superstar, 2008 Winter Commencement Ceremony: Spirit Bell Ringer, and Commencement Marshall 2004 & 2006

Education

1998-2007 University of Southern CaliforniaLos Angeles, CA.

Ph.D.

Molecular Pharmacology and Toxicology Department

Emphasis on Molecular and Free Radical Biology

Thesis: Interactions between Dopamine and Nitrogen Oxide Species:

Implications for Neurodegeneration

1994-1998 University of La Verne La Verne, CA.
Bachelor of Science - Biology
Summa Cum Laude
Departmental Honors
6 Semester Dean's List

Funded Grants

- Rose Hills Foundation Grant 40,000?
- 2011-2016 Title V STEM Grant: 1.4 million
- 2010 ULV Faculty Research Committee Grant: $4,000
- 2008-2011 Title V STEM Grant : 3.58 million

Experience

2009 to present University of La Verne La Verne, CA
STEM Summer Camp – Organizer
Coordinated faculty and staff in the Natural Science Division, College of Business and Public Management and Housing & Residential Life to welcome 25 high school students to live on campus for 3 weeks. In that time students were exposed to the different disciplines, college life, and conducted their own research project.

2009 University of La Verne La Verne, CA
Science and Your Future - Organizer
Coordinated faculty and staff of the Natural Science Division, Admissions, and student clubs to expose high school students to the realities and opportunities of a natural science major. Activities included a Crime, Scene, Investigation scenario in which students, family, and friends had to determine the murderer based on data collected from the different Natural Science Division disciplines

2008 University of La Verne La Verne, CA

GEAR UP Science and Leadership Summer Camp - Organizer
Collaboration with the University of La Verne's College of Business and Public Management, Speech Communications Department and the Natural Science Division with the Rialto School District that exposed high school sophomores to the interrelatedness of the natural science majors.

2005-2011 University of La Verne La Verne, CA.
Housing and Residential Life: Faculty Fellow Program
Allows the opportunity to connect with students outside the traditional confines of the classroom and to break down any perceived barriers between students and faculty.

2003-present University of La Verne La Verne, CA.
Academic Club Advisor
Society of Physical & Life Science Scholars – Founded 2003
Global Medical Brigades – Founded 2007
Green Institute for Village Empowerment – Founded 2007
Beta, Beta, Beta (Biology Honor Society) – Fall 2009
Pre-Student Osteopathic Medicine Association – Fall 2009

2001-2003 University of La Verne La Verne, CA.
Part - Time Faculty
Courses taught: Human Anatomy (Fall 2001, 2002, and Spring 2003)
Human Physiology (Spring 2002)

2001 Francisco Bravo Medical Magnet High School
Graduate Student Mentor
Expose students to science and the procedures in asking/answering their scientific questions
Guide and focus the student's hypothesis

1998-2000 University of Southern CaliforniaLos Angeles, CA.

Teaching Assistant

Biological Systems (Human Physiology): responsible for tutoring, pop quizzes, take home workshops, and review sessions

Therapeutics IV, Biochemistry, Molecular Genetics, and Nutrition: responsible for grading and proctoring

1998-present University of Southern CaliforniaLos Angeles, CA.

Pharmacy Graduate Alliance

Vice President (1999-2002)

MPTX Representative (1998-2001)

Graduate Professional Student Senate Representative (1999-2002)

Graduate Affairs Committee Student Representative (1999-2000)

Teaching Assistant Task Force

Co-founder

1996-1998 University of La Verne La Verne, CA.

General Biology and Human Anatomy Teaching Assistant

Preparing all experiments and instruments for lab sessions

Lectured on the subjects the experiments were dealing with

Created and graded quizzes

In charge of reviews for lab practical and lecture exams

1997 University of La Verne La Verne, CA.

Orientation Week Leader-OWL

Lead in weekly classes

In general, aid students with the transition into ULV

1996-1997 University of La Verne La Verne, CA.

Genetics Tutor and Teaching Assistant

24 hour tutor
Lectured for 2 classes
In charge of review sessions and homework

1996-1997 University of La Verne La Verne, CA.
Resident Assistant
Oaks D-Top
Conducted educational programs
In charge of the general welfare of residents

Awards

- Phi Sigma Sigma Faculty Appreciation Award: 2008 & 2009
- University of La Verne: 2008Excellence in Teaching Award
- *Stephanie Lee Awarded the 2008 WCBSURC Seminar Award in Neurobiology
- University of La Verne: 2007-2008 Housing and Residential Life Faculty Fellow Superstar
- Nominated as the Housing & Residential Life Faculty Fellow: 5 Terms (2005-2010)
- Student Athlete Recognition Luncheon - Students asked to invite one professor that has had a positive influence in their undergraduate education 2004 -2008: Melinda Fairman, Ashley Gillis, Kace Matsunaga, Chris Duarte-McDermott, Amanda Jones, Jessica DeGiacomo, Sarah Hoisington, and Jose Luis Chavez
- Nominated to Who's Who Among America's Teachers by Stacey Kirk (former biology major student) for 2004 Edition
- Irvine Faculty Development Fellowship (2001)
- Free Radical Biology and Medicine 2000: Young Investigator Award
- O_2 Club of California 2000 World Congress: Lester Packard Award

- Alpha Chi (Honor Society)
- Recipient of the 1998 Chela Scholarship
- Nominated for the Chela Scholarship (1998) by USC School of Pharmacy
- Summa Cum Laude
- 6 Semester Dean's List
- Departmental Honors
- Recipient of the Society of Toxicology's Minority Travel Grant (1997 & 98)
- Invited to the University of Arizona's Short Term Research Program (1997)
- Science Scholarship recipient (1995-1996)
- Student Athlete Award (1994)
- Mabuhay Productions Scholarship recipient (1994)
- Andrea's Scholarship recipient (1994)

Publications

- Regulation of mitochondrial glutathione redox status and protein glutathionylation by respiratory substrates.Garcia J, Han D, Sancheti H, Yap LP, Kaplowitz N, Cadenas E. Journal of Biological Chemistry. 2010 Dec 17;285(51):39646-54. Epub 2010 Oct 11.

- Determination of GSH, GSSG, and GSNO using HPLC with electrochemical detection.Yap LP, Sancheti H, Ybanez MD, Garcia J, Cadenas E, Han D. Methods in Enzymology. 2010;473:137-47. Review.

- Role of nitric oxide-mediated glutathionylation in neuronal function: potential regulation of energy utilization.Yap LP, Garcia JV, Han DS, Cadenas E. Biochemistry Journal. 2010 Apr 28;428(1):85-93.

- Li-Peng Yap, Jerome V. Garcia, Derick Han, Enrique Cadenas, **The Energy-Redox Axis in Aging and Age-Related Neurodegeneration**,

Advanced Drug Delivery Reviews, August 27, 2009

- Derick Han, Rafealla Canali, Jerome Garcia, Rodrigo Aguilera, Timothy K. Gallaher, and Enrique Cadenas (2005) **Sites and mechanisms of aconitase inactivation by peroxynitrite: modulation by citrate and glutathione**, Biochemistry, volume 44, number 36, pg 11986-11996

- Mareck Malecki, Philip Eaton, *Brian Alva, **Fibrin Targeted MRI Contrast Agent for the Early Detection of Atherosclerotic Plaques** – Submitted Fall 2009 to the Public Library of Science

- Diaz, S, Farhang B, Hoien J, *Stahlman M, Adatia N, Cox JM, Wagner EJ. **Sex Differences in the Cannabinoid Modulation of Appetite, Body Temperature and Neurotransmission at POMC Synapses**, *Neuroendocrinology*. Jan 9, 2009.

Southern CA. Academy of Sciences & Society for Environmental Toxicology and Chemistry Book of Abstracts

- *Jessica DeGiaComo, Jerome Garcia, and Enrique Cadenas. Differential effects to dopamine oxidation in PC12 cells and primary astrocytes: A model for neurodegeneration, 2006.
- *Taylor Pupka, Li-Peng Yap, Jerome Garcia, and Enrique Cadenas. GSNO formation in astrocytes and neurons: Implications for nuerotoxicity, 2006.

** University of La Verne: Undergraduate Biology Student*

Oxygen Club of California Book of Abstracts

- Allen H.K. Chang, Derick Han, Jerome Garcia, and Enrique Cadenas.

GSNO induces protein S-Nitrosation in isolated intact rat brain mitochondria-Modulation of mitochondrion-driven apoptosis, 2006

- Nguyen D.T., Garcia J.V., and Cadenas E. Genistein causes cell cycle arrest and apoptosis in T47D breast cancer cells. Oxidants and antioxidants in biology, 2002.
- Garcia J.V., and Cadenas E. Can DZQ target cells with a high dt-diaphorase activity? Oxidants and antioxidants in biology, 2001.
- Garcia J.V., and Cadenas E. p53 independent induction of p21 and cell cycle arrest by 3,6-daziridinyl-1,4- benzoquinone. Oxidants and antioxidants in biology, 2000.

Free Radical Biology & Medicine Book of Abstracts

- Garcia J.V., Rettori D., and Cadenas E. Dopamine oxidation in cell culture medium, 2002.
- Nguyen D.T., Garcia J.V., and Cadenas E. Genistein causes cell cycle arrest in T47D breast cancer cells, 2001.
- Garcia J.V., Nguyen D.T., and Cadenas E. Genistein causes cell cycle arrest via inhibition of p53-independent mechanisms in T47D breast cancer cells, 2000.

Techniques

Mitochondria Isolation (Tissue and Cells): complex activity, RCR, swelling, and membrane potential

Apoptosis: TUNEL, Annexin V, Caspase 3 activity

Cell Cultures: Neuronal cells (PC12 and HCN-2), Breast Cancer Cells (MCF7, BT20, and T47D), and Leukemic cells (Jurkat T)

Cell Viability: MTT, trypan blue, and LDH Activity

FACS: Cell cycle, surface marker labels – Annexin V and cyclin labels

HPLC: GSH/GSSG measurement

Electrodes: Clark-Type - oxygen and nitric oxide

EPR: Free radical and semiquinone detection
Metabolism: DT-Diaphorase activity

Professional Memberships

- Oxygen Club of California
- Oxygen Club: Free Radicals in Biology & Medicine
- Society of Toxicology
- Southern California Academy of Sciences & Society for Environmental Toxicology and Chemistry

Service: Scholarly

- Faculty Research Lecture Series 2011
- University of Southern California PHRD 555 Lecture: Obesity
- Azusa Pacific Science Seminar Presentation Spring 2009: The Effects of Glutathionylation on Key Bioenergetic Proteins: Implications for Alzheimer's Disease
- Vistage Group Presentation Spring 2009: Antioxidant Research for Better Health
- ULV Faculty Research Day Participant: 2006 to 20011
- Hot Spots Faculty Research Lecture Series: Stem Cell Research & the Making of the Modern World (2005).
- ULV Science Seminar: Can a High Soy Diet Prevent Breast Cancer (2004)

Service : College and Community

- Chemistry Faculty Search Committee, Diversity Representative: S2012
- MSS Faculty Search Committee, Diversity Representative: S2010 & 12
- College of Arts and Sciences Council Member: 2009 - 2011
- 2009 Convocation Keynote Speaker
- Fall 2009 Tri-Beta Biological Honor Society Chapter Approval - Advisor
- Pomona High School AVID Speaker: Fall 2009

- Pre-Student Osteopathic Medical Association Advisor: 2009 to present
- Institutional Animal Care and Use Committee (IACUC): 2009 to present
- Housing and Residential Life Program Review Board: Summer 2009
- 2009 6th Annual Pacific Islander-Asian American Keynote Speaker
- Spotlight on ULV 2009 – Faculty Panel and Classroom Breakout Session
- STEM Summer Camp 2009
- Pasadena Youth Center – Adelante Mujer Latina Conference (coordinated & prepared Latina alumni, Connie Elejalde and Bernadette Barajas, to present information in regards to pursuing a science education: Spring 2009
- Sierra Vista High School Senior Project Board Judge: Spring 2009
- Upland High School Family Science Night 2009 Booth
- Upland High School Science Fair Judge 2009
- Graduate and Career Workshop Organizer: Fall 08 & 09 and Spring 09
- Spring 2008 Commencement Ceremonies – Introduction of the Commencement Speaker, Robert Neher Ph.D.
- ULV Mentoring, Academy for Teaching, Encouragement, and Support (MATES) Program – Faculty mentor to Cindy Olivas: 2008-2009
- Animo Locke Charter High School: NSD Preview Fall 2008
- GEAR UP Science and Leadership Summer Camp 2008
- Models of Excellence Conference and College Fair Presenter: Fall 08 & 09
- Spotlight on ULV – Faculty Panel: 2008
- Housing & Residential Life Speaker – Alcoholism: Fall 2008
- Pacific Islander/Asian American Graduate Celebration Keynote Introducer: Commencement 2007
- Arts & Sciences Bachelor Rite Candidate Speaker: Commencement 2007
- ULV Admissions: High School Counselors 5-Star Tour 2007-2009
- Global Medical Brigades Advisor: 2007 to present

- Green Initiative for Village Empowerment Advisor: 2007 to present
- Spotlight on ULV – Class Act Breakout Session: 2007
- ULV Admissions Counselors Day Speaker: 2006
- Western University of Health Sciences Contact Person (2006 to Present)
- Ekstrand Elementary in San Dimas : Gate Program Teaching Session 2006-2007
- Faculty Fellow Program: 2005-2010
- YMCA – Career Day Speaker (2005)
- Housing & Residential Life Faculty Speaker: Inter "Course" 101 (2005 and 2008)
- Society of Physical and Life Science Scholar Speaker: Resume Writing for Students in the Natural Sciences (2003-2006)
- Bowl for Breath (Cystic Fibrosis): Collaboration with Iota Delta – Funds Raised = $800
- Pacific Islander/Asian American Graduation Celeberation - Sash Bestowal: 2006
- Campus Tour-Division of Natural Sciences:
    A. Admissions: Spotlight Weekend (2006), Overnight Event (2005) and Azusa High School (2004)
    B. Outreach Tomorrow: 2006
- Faculty & Staff Interaction Committee (Convocation & Awards): 2006-2007
- Sustainable Campus Committee: 2003 present
- Faculty Athletic Representative: 2005-2006 and 2006-2009
- ULV Preview Day-Speaker for the College of Arts and Sciences: 2003-2009
- Student Orientation: 2003-2007
- Parent Orientation (Parent Liaison) : 2004
- Arts and Sciences Campus Diversity Initiative Grant Proposal : Career and

Life Mentors, submitted May 2004, *Result – Denied*

- ULV Commencement: Faculty Marshall 2004 & 2006
- ULV Earth Day 2004-2006: Air Quality Booth sponsored by Air Quality Management District, Plant a Tree Booth, Free Rides in a Hybrid and Hydrogen Fuel Car.
- Avon Breast Cancer Walk (2002 & 2006): Funds Raised = $5,600
- ATEP Community Fun Run
- Science Seminar: Interactions of Dopamine with Nitrogen Oxide Species: Implications for Parkinson's Disease (2003).
- Undergraduate Appeals Committee: 2003-2004
- Society of Physical & Life Science Scholars Advisor: 2003 to present
- Member of La Verne Historic Society: 2003 to present

4. Stacey Darling Novak, Associate Professor of Biology
Department of Biology, University of La Verne, sdarling-novak@laverne.edu,
(909) 593-3511 ex 4591

Education

Ph.D.	Botany Winter 2000 Department of Botany and Plant Sciences University of California, Riverside
M.A.	Biology 1993 Department of Biology California State University, Fresno
Certificate in Biotechnology	Department of Biology 1992 California State University, Fresno
B.A.	Biology 1988 Department of Biology California State University, Fresno

Professional Experience

A. Research

Asso. Professor of Biology, University of La Verne, La Verne, CA
2000-present Regulation of programmed cell death during maize endosperm development.
Development during orchid seed germination

Techniques used: DNA fragmentation studies; cDNA AFLPs; DNA sequencing;
DNase/nuclease gels; cDNA library construction and screening; RT-PCR; tissue culture;
fluorescence and light microscopy

Visiting Post Doc University of California, Riverside

Summer 2003 Research on the adhesion and directional growth of lily and Arabidopsis pollen tubes
Techniques used: Screening of a chemical library, pollen culture and microscopy;
protein and carbohydrate purification

Research Assistant University of California, Riverside,
1993-2000 Dissertation research on the effects of high sugar on germination
and kernel development of sweet corn.

Techniques used: Western blots; PCR; RT-PCR; subcloning; RNase gels and activity assays; Indirect ELISA's; gas chromatography; transmission electron microscopy; embryo and cob tissue culture; osmotic potential measurements.

Research Assistant California State University, Fresno
1990-1993 Thesis research on characterization of snRNP-like particles in a
cyanobacterium, *Synechococcus leopoliensis*.

Techniques used: Immunoelectron microscopy with peroxidase and colloidal gold; immunofluorescence microscopy; culture of human epithelial and cyanobacterial cells.

Teaching

Associate Professor University of La Verne, La Verne, CA
Lecturer for Molecular Biology, Microbiology, Plant
Aug 2000-present Biology, Genetics, General Biology

Responsibilities: give lectures, run laboratories, conduct research with

undergraduates

Adjunct Faculty Victor Valley Community College, Victorville CA
Jan. 1996-May 2001 Lecturer for Genetics and General Biology.

Responsibilities: give lectures, design lesson plans, run laboratories.

Teaching Assistant University of California, Riverside
1994-1997 TA for plant anatomy, honors botany, general botany, organismal biology for biology majors

Responsibilities: set up labs, write quizzes and lab practicals, grading, run laboratories.

Teaching Assistant California State University, Fresno
1990-1993 TA for general biology and general botany.

Responsibilities: coordinate, set up labs, write quizzes, grading, run laboratories.

Grants, Awards, Honors and Membership in Professional Organizations

Title V STEM Grant for outreach, lab construction and equipment (co-recipient) 2008
Honorary Member of Alpha Lambda Delta Honor Society 2008
LI-COR Genomic Matching Funds Grant 2005
Faculty Research Assistance Grants 2002, 2004, 2006, 2008, 2009 ULV
Faculty Summer Research Grants 2002-2009 ULV
Faculty Professional Support Grants 2001-2006 ULV
Member of Council on Undergraduate Research 2003
Member of the American Society for Plant Biologists 2001
Graduate Division Dissertation Research Grant and GSA mini-grant 1996-97 U.C. Riverside
Outstanding Teaching Assistant Award 1995-1996 U.C. Riverside

Elected Associate Member of Sigma Xi, Scientific Research Society 1996 U.C. Riverside

Graduate Student Research Award and Fellowship 1991-92 C.S.U. Fresno

Research Presentations and Writings

Ph.D. Dissertation and Master's Thesis

Novak S.D. (2000) Effects of high sugar/osmotic levels on kernel development, and seedling establishment in *Zea mays* L. Ph.D. Dissertation

Darling S.A. (1993) Immunoelectron microscopy of snRNP-like components in a cyanobacterium. Master's Thesis.

B. **Presentations, Published Abstracts, Papers**

Novak S. D., Pardiwala R.S. and Gray B.L. (2008) A study of NaOCl–induced necrosis indicates that only half of the embryo is required for seedling establishn *Spathoglottis plicata. Lindleyana* 21(3):32-8.

Pardiwala R.S. and Novak S.D. (2007) Hypochlorite-induced death reveals that micropylar cell division is not necessary for development of *Spathoglottis plicat* seedlings. 2007 Annual Meeting Southern California Academy of Sciences. Abstract:114;http://scas.jsd.claremont.edu/annual/13_Complete%20Abstracts.pd

Castro N. and Novak S.D. (2002) Role of high sucrose levels/low osmotic potentials in the regulation of programmed cell death (PCD) during maize endosperm development" SACNAS National Conference. Anaheim, California.

Novak S.D. (2002) Osmotic stress and its role in differential dehydrin expression and ethylene production observed during kernel development and germination of maize starch-deficient mutants (*su1, su1/se1, sh2*) and wild type (*Su1*) Keystone Symposium- Plant Signal Transduction. Tahoe City, California, January.

Novak S.D. and Kovacs S. (1996) Localization of a snRNP-like component in a cyanobacterium by immunoelectron microscopy." RNA '96 The First

Annual Meeting of the RNA Society. Madison, Wisconsin 1996.

Novak S.D. (1996) The role of abscisic acid in seedling growth response to elevated sugar or osmotic levels in maize. 47th Annual Meeting of the American Institute of Biological Sciences. Seattle, Washington 1996.

Service to Profession and Community

Research Talks:

University of La Verne, Faculty Research Seminar Series

Fall 2005: Gene expression during maize endosperm programmed cell death

Spring 2007: Fluorescence microscopy of orchids during germination

Fall 2008: Seed Development, Germination and Seedling Establishment in Maize and Orchid

University of La Verne, Science Seminar

Fall 2001: Dehydrin expression and the relationship between osmotic stress, ABA and ethylene in wild type and the starch deficient mutants, *su1, su1/se1* and *sh2* of *Zea mays.*

Fall 2005: Research opportunities in plant biology

University of La Verne, Honors Interdisciplinary Seminar

Fall 2002: Regulation of programmed cell death (PCD) during maize endosperm development

Fall 2004: Plant biology research in three systems: maize, lily and orchid.

Additional Service:

Fall 2009: Reviewer for text, Fundamental Molecular Biology 2nd ed., Allison

Fall 2008: Reviewer for text, Essential Genes 2nd ed., Lewin

Lectures, Presentations and Science Camps for K-12 students:

Summer 2009: STEM Summer Camp Director (several high schools)

Summer 2008: Rialto High School

Summer 2007: Roynon Elementary School

Summer 2005: Cals Middle School and Prado View Elementary

Summer 2004: Azusa High School

References

Jeffery Burkhart, Biology Dept. Chair, University of La Verne, burkhart@ulv.edu, (909) 593-3511 ex 4599

Jay Jones, Professor of Biology and Biochemistry, University of La Verne, jonesj@ulv.edu, (909) 593-3511 ex 4040

Elizabeth Lord, Professor of Botany and Developmental Biology, Dept. of Botany and Plant Sciences, University of California, Riverside, elizabeth.lord@ucr.edu (951) 827-4441

Elizabeth Bray, Senior Researcher, Dept. of Molecular Genetics and Cell Biology, University of Chicago, bray@uchicago.edu (773) 702-9558

Shirley Kovacs, Professor of Biology, California State University, Fresno, Shirleyk@csufresno.edu, (559) 278-2389

5. Kathleen Weaver

Curriculum Vitae
Biology Department

University of La Verne
Founders Hall 109A, 1950 3rd St.
La Verne, CA 91709
e-mail: kweaver@laverne.edu

Research Interests

Biogeography, Phylogeography, Conservation Genetics, Systematics, Malacology, Ecology Niche Modeling, and Science in Education.

Professional Preparation and Education

Department of Biology, University of La Verne. Fall 2006 – present.

Ph.D., Department of Ecology and Evolutionary Biology, University of Colorado Boulder, 2006.

Bellflower Unified School District – 7th & 8th grade science and engineering teacher, 1999-2001.

University of California at Berkeley, Berkeley, CA. Bachelor of Arts, Department of Integrative Biology, 1999.

Grants & Fellowships

2008, Title V, STEM (Science, Technology, Engineering, and Math) Grant Co-PI, $3,300,000

2008, University of La Verne Faculty Research Committee Grant Co-

PI, $4,000

2008, University of La Verne Faculty Support Committee $500

2007, Washington Forest Service, FY08 ISSSSP $23,500

2007, University of La Verne Faculty Research Committee Grant

$4,600

2005, Rozella Smith Graduate Student Fellowship $9,300

2004, South Dakota Department of Game, Fish and Park. Co-PI, $39,626

2004, National Geographic Society Research/Exploration Grant. Co-PI, $12,500

Publications

Weaver, K.F., Weaver, P.F., and Guralnick, R.P. Origins, diversifications and conservation status of talus snails in the Pinaleño Mountains: A Conservation Biogeographic Study in the Sky Islands of Arizona. Animal Conservation, *In press*.

Weaver, K.F., Perez-Losada, M., Guralnick, R.P., Nelson, A., Blatt, S., and Crandall, K.A. (2008) Assessing the conservation status of the land snail *Oreohelix peripherica wasatchensis* (Family Oreohelicidae). Conservation Genetics 9:907-916. [doi: 10.1007/s10592-007-9415-y].

Anderson, T., Weaver, K.F., and Guralnick, R.P. (2007) Patterns in morphological variation in Oreohelicid Snails in the Black Hills of South Dakota and Wyoming.
Journal of Molluscan Studies 73(2): 129-137.
[doi:10.1093/mollus/eym006].

Weaver, K.F., Anderson, T., and Guralnick, R.P. (2006) Combining phylogenetic and ecological niche modeling approaches to determine distribution and historical biogeography of Black Hills Mountain Snails (Oreohelicidae). Diversity and Distributions 12:

756-766.

Sims, K. (1998). Distribution of Christmas Tree Worms on Coral. Heads. Biology and Geomorphology of Tropical Islands: Student research papers. Moorea [Society Islands, French Polynesia]: University of California, Berkeley: 75-79.

Talks and Posters

AAC&U, Association of American Colleges and Universities (November 2008). Integrating Science Process and Discovery into Majors and Non-majors Biology. C. Broussard, K. Weaver, and C. Geiger.

American Malacological Society, invited speaker on Western Land Snails. Large Land Snails of the Western U.S.: Helminthoglyptidae, Monadeniidae, and Oreohelicidae. M. Ports and K.F. Weaver.

First International Conference on the Coqui Frog in Hilo, Hawaii (February 2008). S. Glavan, ULV undergraduate and K.F. Weaver.

GMBA (2007) Databases as tools to model climate change effects on montane and alpine species distributions. R.P. Guralnick, E. Walktari, and K.F. Weaver

Faculty Research Day (2007) Assessing the conservation status of the land snail *Oreohelix peripherica wasatchensis*.

Faculty Research Day (2006) Biogeography, Systematics, and Conservation Genetics in the Mountain Snail Group *Oreohelix* (Oreohelicidae).

American Malacological Society (2005) Examination of lineage diversity and isolation of *Oreohelix strigosa cooperi*, Black Hills, South Dakota.

CU Museum (2005) Walker Van Riper Presentation, Invited talk.

Evolution (2004) Species delineation in threatened and endangered American *Oreohelix* land snails.

Teaching – Courses Taught and Directed Studies

Natural Sciences Fieldwork (Spring 2010)

Animal Biology Lab (Spring 2009, Fall 2009, Spring 2010) – developed new lab activities

Biostatistics (Spring 2009, 2010) – developed new format for course

Research Methods (Fall 2009) – developed new format for course

Senior Seminar (Spring 2008, 2009, 2010) – developed new format for course

Field Biology (Summer 2007, Fall 2007 as directed study, Summer/Fall 2008 and Summer 2009)

Research Methods and Biostatistics (Spring 2008) – added scientific writing component and computer lab

Science Seminar (Fall 2006, Spring 2007, Fall 2007, Spring 2008) – developed new format for course

Evolution and Systematics (Spring 2007, Spring 2008) – incorporated Evolution reading group (Charles Darwin's On the Origin of Species).

Microbiology (January 2008, directed study)

Life Science: Human Environment (Fall 2006, Spring 2007) –

developed a new lab course manual.

Principles of Biology, Evolution (Fall 2007)

Environmental Management (Spring 2007, directed study)

Invasive Biology (January 2007) – newly developed course

Invertebrate Zoology (Fall 2006)

Students

Graduated

Matthew Nasont – ENM of *Oreohelix* in the Pacific Northwest **(*graduated Spring 2008*)**
Ernise Moore – NSF grant to improve the Clark Fork Research Station **(*graduated Spring 2008*)**
Mikaila Rimbenieks – Invasive Plant Removal of *Nicotiana glauca* and *Ricinus communis* along the Claremont Wilderness Trail in Southern California (co-advised with Dr. Jeff Burkhart) **(*graduated Spring 2008*)**
Rebecca Charland – Biogeography of *Oreohelix* in the Montana region **(*graduated Spring 2008*)**
Jennifer Palacio – Biogeography of the Land Snail *Helminthoglypta ayresiana* in the Channel Islands (***graduated January 2008***)
Yvette Paiz – Study of Reproduction in the genus *Oreohelix* **(*graduated Fall 2008*)**
Lauren Woodson – ENM of the Invasive Zebra Mussel **(*graduated Spring 2009*)**
Caitlin Geiger – Science Education (Teaching Track) **(*graduated Spring 2009*)**
Vanessa Morales – Biogeography of *Oreohelix* in the Pacific Northwest **(*graduated Spring 2009*)**
John Skelton – Aggression and nest protection in Red-Winged Blackbirds **(*graduated Spring 2009*)**
Aubry McSweeny – Non-lethal extraction of DNA from the garden

land snail *Helix*. **(*graduated Spring 2010*)**
Caitlin Kams – Science Education (Teaching Track) **(*graduated Spring 2011*)**
Sandra Ortega – Conservation genetics of *Oreohelix* land snails.
(*graduated January 2012*)
Madeline Clements – Ecology in *Oreohelix* species surrounding the Montana Research Station, a molecular study of gut contents.
(*graduated January 2012*)
Melinda Beeman – Science Education (Teaching Track)
(*graduated Spring 2012*)

6. Heidy L. Contreras

University of La Verne webpage: http://hcontrer.com Work Phone:
Biology Department Cell Phone: 760-490-6483
1950 3rd Street Fax:
La Verne, CA 91750-4401 email: hcontreras@laverne.edu

Education

Ph.D.- Comparative Physiology	University of California, Irvine	2010
M.Sc. - Biology (Ecological Physiology)	California State University, San Bernardino	2007
B.A. - Biology	California State University, San Bernardino	2002

Professional Experience

Assistant Professor of Biology	University of La Verne	2012
Postdoctoral Research Associate	University of Arizona	2010 - 2011

Publications

Peer-Reviewed Manuscripts:

A. **Contreras, H.L.** and Bradley, T.J. (2011). Respiratory gas exchange patterns of a semi-aquatic insect to changes in environmental humidity vs. oxygen demand. *Journal of Experimental Biology* 14: 1086-1091.
B. Bahadorani, S., Cho, J., Lo, T., **Contreras, H.L**., Lawal, H.O., Krantz, D.E., Bradley, T.J., Walker, D.W. (2010). Neuronal expression of a single-subunit yeast NADH-ubiquinone oxidoreductase (Ndi1) extends *Drosophila* lifespan. *Aging Cell* 9(2): 191-202.
C. **Contreras, H.L.** and Bradley, T.J. (2010). Transitions in insect respiratory patterns are controlled by changes in metabolic rate. *Journal of Insect Physiology* 6(5): 522-8.
D. Bradley, T.J., Briscoe, A.D., **Contreras, H.L**., Danforth, B.N., Dudley R., Grimaldi D., Harrison, J.F., Kaiser, A., Merlin, C., Reppert, S.M., VandenBrooks, J.M., Yanoviak, S.P. (2009). Episodes in insect evolution. *Integrative and Comparative Biology* 49(5): 590-606.
E. **Contreras, H.L.** and Bradley, T.J. (2009). Metabolic rate controls respiratory patterns in insects. *Journal of Experimental Biology* 212: 424-428.
F. Kolluru, G., Grether, G.F., **Contreras, H.L.** (2007). Environmental and genetic influences on mating strategies along a replicated food availability gradient in guppies (*Poecilia reticulata*). *Behavioral Ecology and Sociobiology* 61(5): 689-701.

G. Williams, K., Coffey, D., Osorio, Y., Maher, K., Meyer, A., Myers, K., **Contreras, H.L.**, VinZant, K. (2006). Habitat correlates of *Calochortus plummerae*, a rare Mariposa Lily, on the campus of California State University, San Bernardino. *Crossosoma* 32(2): 75-82.

Submitted Manuscripts:

Contreras, H.L. and Talbot, C.R. (2009). Differences in how water is exploited between dehydrated Pacific (*Pseudacris regilla*) and California (*P. cadaverina*) tree frogs. *Journal of Comparative Physiology A*

Manuscripts In Preparation:

Contreras, H.L. and Davidowitz, G. Competing energy demands in *Manduca sexta*.
Contreras, H.L. and Davidowitz, G. Effect of environmental humidity on nectar preference in *Manduca sexta*.
Contreras, H.L. and Bradley, T.J. Respiratory accommodations in *Rhodnius prolixus* as a response to increased metabolic rate after feeding.
Contreras, H.L. and Talbot, C.R. Differences in the osmoregulatory behaviors of two sympatric sister taxa.

Published Abstracts:

Contreras, H.L. and Davidowitz, G. (2012). The cost of processing nectar of different concentrations in *Manduca sexta*. *Society of Integrative and Comparative Biology* 52 (accepted).
Contreras, H.L. and Davidowitz, G. (2011). The importance of nectar sugar content in *Manduca sexta* flight performance. *Integrative and Comparative Biology* 51:6.4.
Contreras, H.L. and Bradley, T.J. (2010). The effects of feeding on the gas exchange pattern of *Rhodnius prolixus*. *FASEB J.* 24: 813.3.
Contreras, H.L. and Bradley, T.J. (2010). Respiratory gas exchange patterns of a semi-aquatic insect: effects of environmental humidity vs. oxygen demand. *Integrative and Comparative Biology* 50: 26.1.
Contreras, H.L. and Bradley, T.J. (2009). Respiratory accommodations in *Rhodnius prolixus* in response to increased metabolic rates. *FASEB J.* 23: 598.4.
Contreras, H.L. and Bradley, T.J. (2009). Osmoregulation in insects. *Integrative and Comparative Biology* 49: S4.5.
Contreras, H.L. and Bradley, T.J. (2007). Discontinuous respiration as a response to oxidative damage: Tale of a sedentary insect. *Integrative and Comparative Biology* 46: 65.5.
Contreras, H.L. and Talbot, C.R. (2006). Osmoregulatory Behaviors in Pacific and California Tree Frogs: Differences in ability to find water and species salt concentration preferences. *Integrative and Comparative Biology* 45: 74.3.
Contreras, H.L. and Talbot, C.R. (2005). Dehydration threshold of California and Pacific Tree Frogs, *Pseudacris cadaverina* and *P. regilla*. *Integrative and Comparative Biology* 44: 64.

Fellowships

- American Physiological Society K-12 Minority Outreach Fellowship 2011
- American Physiological Society Porter Fellow ($20, 772) 2009
- American Physiological Society Porter Fellow ($20,772) 2008
- UC Irvine Faculty Mentor Fellow ($25,000) 2007
- **Alliance for Graduate Education and the Professoriate Competitive Edge Summer Program Fellow ($4,000) 2005**
- USDA's Masters Fellow in Conservation Biology ($7,500) 2004
- CSU San Bernardino Graduate Equity Fellow ($3,000) 2003
- CSU San Bernardino Graduate Equity Fellow ($3,000) 2002
- UCLA Science, Engineering and Mathematics Fellow ($4,000) 2001

Grants and Funding

- APS/NIDDK Minority Travel Fellowship Award to attend Experimental Biology conference in Washington, DC ($1,200) 2011
- APS/NIDDK Minority Travel Fellowship Award to attend Experimental Biology conference in New Orleans ($1,200) 2009
- Elsevier's Zoology Travel Grant to attend SICB conference in Boston ($480) 2009
- Biological Sciences Dean's Office and Department of Ecology and Evolutionary Biology Conference Travel Funds to attend SICB conference in Boston ($450) 2009
- AGEP Travel Grant to attend the International Congress of Entomology in South Africa ($1,000) 2008
- Biological Sciences Dean's Office and Department of Ecology and Evolutionary Biology Conference Travel Funds to attend ICE in South Africa ($450) 2008
- APS Travel Grant to attend Professional Skills Workshop (registration, hotel and flight) 2008
- Sigma Xi – Grants in Aid of Research ($400) 2006
- Biological Sciences Dean's Office and Department of Ecology and Evolutionary Biology Conference Travel Funds ($450) 2006
- CSUSB Student Research Travel Funds ($574) 2005
- Associated Students Incorporated Endowed Scholarship ($1,000) 2004
- Associated Students Incorporated Research Grant ($500) 2004

- Associated Students Incorporated Research Grant ($500) 2003
- Associated Students Incorporated Research Grant ($500) 2002

Honors and Awards

- Named the American Physiological Society's Eleanor Ison Franklin Porter Fellow 2009
- First place in CSU Sam Bernardino graduate student research conference ($100) 2004

Invited Seminars

Department of Ecology and Evolutionary Biology, University of Arizona 2010
Department of Biology, California State University San Bernardino 2010

Contributed Posters and Presentations

Contreras, H.L. and Davidowitz, G. (2012). Conflicting energy demands in *Manduca sexta*. Experimental Biology – San Diego, CA

Contreras, H.L. and Davidowitz, G. (2012). The effect of nectar sugar concentration on the specific dynamic action of the hawkmoth *Manduca sexta*. Society for Integrative and Comparative Biology – Charleston, SC

Contreras, H.L. and Davidowitz, G. (2011). Conflicting energy demands in *Manduca sexta*. Arizona Physiological Society Annual Meeting– Tucson, AZ

Contreras, H.L. and Davidowitz, G. (2011). The importance of nectar sugar content in *Manduca sexta* flight performance. Society for Integrative and Comparative Biology – Salt Lake City, UT

Contreras, H.L. and Bradley, T.J. (2010). The effects of feeding on the gas exchange pattern of *Rhodnius prolixus*. Experimental Biology Meeting – Anaheim, CA

Contreras, H.L. and Bradley, T.J. (2010). Respiratory gas exchange patterns of a semi-aquatic insect: effect of environmental humidity vs. oxygen demand. Society for Integrative and Comparative Biology – Seattle, WA

Contreras, H.L. and Bradley, T.J. (2009). Transitions in insect respiratory pattern. Physiological Ecology Meeting – Bishop, CA.

Contreras, H.L. and Bradley, T.J. (2009). Osmoregulation in insects. Society for Integrative and Comparative Biology – Boston, MA

Contreras, H.L. (2008). Transitions between respiratory patterns in sedentary insects is dependent on metabolic rates; a look into the respiratory patterns of *Rhodnius prolixus* and *Gromphadorhina portentosa*. International Congress of Entomology – Durban, South Africa.

Contreras, H.L. and Bradley, T.J. (2007). Discontinuous respiration as a response to oxidative damage: A tale of a sedentary insect. Society for Integrative and Comparative Biology – Phoenix, AZ.

Contreras, H.L. and Talbot, C. (2006). Osmoregulatory behaviors in Pacific and California Tree Frogs: Differences in ability to find water and species' salt concentration preferences. Society for Integrative and Comparative Biology - Orlando, FL.

Contreras, H.L. and Talbot, C. (2005). Dehydration threshold in California and Pacific Tree Frogs, *Pseudacris cadaverina and P. regilla*. ***[poster]*** Society for Integrative and Comparative Biology - San Diego, CA.

Contreras, H.L. and Talbot, C. (2004). Taste in the Pacific Tree Frogs (*Hyla regilla*): Are Dehydrated Pacific Tree Frogs able to discriminate between different salts? CSUSB Graduate Student Research Conference – Cal State San Bernardino

Contreras, H.L. and Talbot, C. (2004). Taste in the Pacific Tree Frogs (*Hyla regilla*): Are dehydrated Pacific Tree Frogs able to discriminate between different salts? CSU Student Research Competition – Cal State Northridge

Contreras, H.L. and Talbot, C. (2003). Behavioral response to concentrated salt solutions in dehydrated Pacific Tree Frogs (*Hyla regilla*). CSUSB Graduate Student Research Conference – Cal State San Bernardino

Contreras, H.L. and Talbot, C. (2003). Behavioral response to concentrated salt solutions in dehydrated Pacific Tree Frogs (*Hyla regilla*). CSU Student Research Competition – Cal State Stanislaus

Contreras, H.L. and Grether, G. (2001). Male-male direct and indirect competition in guppies (*Poecilia reticulata*). ***[poster]*** UCLA Center for Academic and Research Excellence – UCLA

Research Experience

AGEP Doctoral Fellow	University of California, Irvine	Summer 2005
Laboratory Technician	CSU San Bernardino	2002 – 2005
- Biology of the Cell		
Research Associate		Summer 2004
- Institute of Applied Research and Policy Analysis		
Independent Research Associate		2002 – 2003
- Physiological Ecology		
Research Assistant		2000 – 2001
- Organic Chemistry		
Research Assistant		2000 – 2001
- Ecology		
Field Assistant	Vermejo Park Ranch, New Mexico	Summer 2002
SURF Research Intern	University of California, Los Angeles	Summer 2000

Professional Development

- Southern California Kaleidoscope Meeting 2012
- Community College Internship Program (CCIP)-Santa Ana College 2009
- HUTEP Postdoctoral Institution – nominated to attend by NSF-AGEP 2009
- HUTEP Preparing Future Faculty – nominated to attend by NSF-AGEP 2009
- Teaching Colloquium: "More than Student Evaluations: Using Portfolios to Represent your Teaching" 2009
- APS Professional Skills Training: Writing and Reviewing for Scientific Journals 2008
- School of Medicine, University of California Irvine: Human Medical Physiology 2008
  Instructor: Dr. Harry Haigler
- The Institute on Teaching and Mentoring – nominated to attend by NSF-AGEP 2007
- SABLE Systems International, Las Vegas NV: Small Animal Respirometry Course 2006
  Instructor: Dr. John Lighton

Advising/Mentoring Experience

Undergraduate Students

Clayton Pierce *University of Arizona* *2011- 2012*

- Clayton successfully took over a project focused on differences in nectar preferences due to gender in *Manduca sexta* and presented his results at this years Society for Integrative Biology national meeting.
- Clay didn't have research experience prior to working with me so I have advised him on research methods, data analysis and on how to prepare his data for the scientific conference.

Scott Janowski *University of Arizona* *2011-2012*

- Scott is assisting me with obtaining preliminary data for a project aimed at investigating the effects of nectar sugar concentration on the osmolality of adult *Manduca sexta* hemolymph.
- I have advised Scott on experimental design and insect handling

Andrew Daws *University of Arizona* *2011*

- Andy is working on a project investigating the effects of nectar concentration on the resting metabolic rates of adult *Manduca sexta*
- I have advised Andy on experimental design, statistical analyses, and in the use of respirometry (SABLE systems FoxBox) and Expedata software (used to analyze respirometry).

Jenny Stevens *University of Arizona* *2010-2011*

- Jenny assisted me with initial research on a project focused on the effects of environmental humidity on nectar preference in adult *Manduca sexta*
- I advised Jenny on experimental design, statistical analyses, and creating an effective powerpoint presentation

Graduate Students

Daniella Bruckman *University of California Irvine* *2009-2010*

- As part of the Alliance for Graduate Education and the Professoriate (AGEP) Competitive Edge Summer Program I was a peer mentor for Daniella during her first year as a graduate student in the department of Ecology and Evolutionary Biology at UC Irvine

Outreach Activities

Graduate Students

Chair of the Alliance for Graduate Education and the Professoriate (AGEP) Planning Committee 2009-2010

- Served as leader to AGEP Planning Committee and other AGEP scholars by: overseeing planning committee, representing AGEP at university functions, fostered growth and development of AGEP programming, working on relationship building within AGEP, assisting with publicity of AGEP events, facilitating liason between AGEP and other internal/external university groups

Graduate Student Mentor for AGEP Competitive Edge Summer Program 2009

- Peer mentor for incoming, first-year graduate students (10 weeks). Led workshops, assisted in professional development seminars, provided support and information for success as a first year graduate student, etc..

Graduate Student Mentor for Summer AGEP Program 2008

- Served as mentor by providing information regarding curricular issues, grant opportunities, internships and employment for graduate students
- Served on a committee to provide suggestions on how to improve the students' summer program experience

Active Member of AGEP Planning Committee 2008-2009

- Assisted in the development of activities for AGEP scholars
- Attended monthly meetings to give input on what events were of interest for AGEP scholars at UC Irvine

AGEP - Panel for First Year Students 2006

- Member of a panel aimed to assist first-year graduate students in their commencement of a PhD program

Undergraduate Students

Leader for the Undergraduate Summer Research Program 2011

- Throughout the summer led discussions for undergraduate students participating in a competitive summer program at the University of Arizona. Mentored students on how to compose a good graduate/medical school application, personal statements and Power Point presentations and overall provided mentorship throughout the summer. http://ubrp.arizona.edu/

Invited Panelist at CSUSB's Science Networking and Recruiting Forum 2010

- Participated in forum focused on providing information about possible career paths in the STEM fields

Graduate Student Representative (GSR) for Summer Research Program 2009

- Mentored 30 undergraduate students by leading professional development seminars/workshops, providing support and information during their stay at UC Irvine (10 weeks) and assisting with graduate school applications and preparations.

Invited Panelist at Orange County Community College 2007

- Spoke in a course focused on Biology Careers about life as a graduate student

K-12 Students

American Physiological Society PHun Week 2011

- Organized an event were 30 physiology students, postdocs and professors from the University of Arizona visited 7 Anatomy and Physiology classrooms at Tucson Magnet High School to engage students in the active learning of muscle phyiology. During PHun Week the APS strives to promote outreach to K-12 students throughout the nation. http://www.phunweek.org/

Science Expert – National Geographic BioBlits (Saguaro National Park) 2011

- Led a group of 23 4th graders on a insect inventory hike during the NG BioBlitz and a separate group of high school students on an insect inventory hike. Students learned methods on how scientists identify insects in the field and were able to contribute our findings to the overall species inventory for the Saguaro National Park. http://www.nationalgeographic.com/field/projects/bioblitz/

Scientist in Residence –American Physiological Society Frontiers in Physiology 2011

- Assisted in a week-long workshop, geared to improving the curriculum and teaching methods of middle and high school teachers. Provided scientific knowledge in order to help teachers create student orientated, active learning, lesson plans that they could take back to the classroom. http://www.frontiersinphys.org/

Science Fair Judge 2011
- Judged posters done by 5th graders for the annual Science Fair at The Hebrew Academy in Tucson, AZ

Ask A Scientist Day 2007
- Assisted high school students from Costa Mesa High School in Costa Mesa, CA with questions concerning insect physiology

Girls Incorporated 2006
- Led laboratory tour for girls belonging to Girls Inc., a national non-profit youth organization for girls

Sally Ride Festival 2006
- Assisted coordinator in leading a workshop at the Sally Ride Festival set at UC Irvine
- Workshop aimed at motivating elementary girls in becoming interested in the sciences

Ask a Scientist Night 2005
- Assisted high school students from University High School in Irvine, CA in developing and completing science projects to be entered in school science fair

Departmental and University Service

Judge for The University of Arizona's 19th Annual Student Showcase 2011
- Served on an interview panel to judge posters by undergraduate students in the Biological Sciences

Arizona Insect Festival - Helped Lead the Insect Development Booth 2011
- Led groups of children and adults from the community on chats related to insect development. The event, put on by the Entomology Department, was meant to inform the community about the importance of insects in our every day lives and to introduce them to the type of research being conducted at the University of Arizona. http://ag.arizona.edu/ento/festival/Festival/2011_Arizona_Insect_Festival.html

Leader for the Undergraduate Summer Research Program 2011

- Throughout the summer led discussions for undergraduate students participating in a summer program at the University of Arizona. Mentored students on how to compose a good graduate/medical school application, personal statements and Power Point presentations.

Judge for The University of Arizona's 18th Annual Student Showcase 2010
- Served on an interview panel to judge posters by undergraduate students in the Biological Sciences

Graduate Student Representative in Faculty Senate Committee on Student Experience 2009-2010
- Represented the Associated Graduate Students in Faculty Senate monthly meetings concerning student experience at the University of California, Irvine

Associated Graduate Students (AGS) Biological Sciences Representative 2009-2010
- Represented the Biological Sciences in the Graduate Student Government
- Attended monthly meetings and voiced the concerns of graduate students in the Biological Sciences concerning various issues

Committee Member for Departmental Interview Weekend 2008
- Assisted in the organization for weekend when external students visit the department to interview for acceptance into the graduate program

Committee member for Graduate Student Invited Speakers 2007
- One of three students organizing speakers invited to our weekly departmental seminar
- Graduate students chose the invited speaker and the committee organized their arrival and hosted them during the day

Departmental TA Professional Development Program (TAPDP) Panel 2006
- Panel to assist first-year graduate students beginning their first TA-ship

Community Service

Professional Affiliations

Society for Integrative and Comparative Biology Society - Panelist 2011
- Invited panelist for a workshop focused on helping postdocs and graduate students obtain a job

Society for Integrative and Comparative Biology Society - Session Chair 2011

- Chaired the Session on Energetics & Metabolism II at the 2011 Society for Integrative and Comparative Biology Meeting in Salt lake City, Utah

American Physiological Society- Porter Committee Member 2011-2013

- Active member of the American Physiological Society's Porter Committee which helps decide on graduate student awards, promoting diversity in physiology, and any other issue related to underrepresented minorities within the American Physiological Society.

Judge for SICB Best Student Poster Award 2011

- Served on the interview panel for the best student poster award at the 2011 SICB Annual Meeting in Salt Lake City, Utah

Judge for the APS David S. Bruce Excellence in Undergraduate Research Award 2010

- Served on the interview panel for the best undergraduate research award at the 2010 Experimental Biology Meeting in Anaheim, CA

Teaching Experience

Guest Lecturer **University of Arizona** **01/16/2011**
Physiological Ecology (ENT401)
- Gave a one hour lecture on the *environment and its effects on the gas exchange patterns of insects*

Guest Lecturer **Santa Ana Community College** **12/07/2009**
Fundamentals of Biology (BIO109)
- Gave a one hour lecture on *Biodiversity*

Guest Lecturer **University of California, Irvine** **2009-2010**
Human Nutrition (E136)
- Gave a one hour lecture on *Respiration* 2/05/2010
Honor's Physiology (E188)
- Gave a one hour lecture on:
  - *Insect Vision* 5/18/2009
  - *Insect Biological Clocks* 5/20/2009

Part-time Lecturer **CSU, San Bernardino** **Spring 2007**

Human Physiology and Anatomy II (BIOL224)

- Taught 3-hour laboratory course focused on the anatomy and physiology of digestive, respiratory, cardiovascular, urinary, endocrine and reproductive systems
- Wrote and delivered original 30-45 minute lectures per week
- Facilitated labs and dissections (**used cats and cadavers**)
- Wrote and graded all exams and assignments
- Assisted students outside of class
- Maintained class website
- Maintained and assigned student's grades

Teaching Assistant **University of California, Irvine** **2005-2008**

Field Freshwater Ecology Laboratory (E179L) Summer 2008/2006

- Taught 3-hour laboratory/field course, twice a week.
- Course focused on field and laboratory exercises and methods to teach analytical techniques for common water-quality variables of lakes, streams and rivers
- Facilitated field experiments and organized student groups
- Graded all exams and lab reports
- Helped students implement a small experiment, including experimental design and setup, data collection and analysis, and preparation of a 15 minute presentation.

Physiology Laboratory Discussion (BIO112L) Spring 2007

- Wrote and delivered original 50-60 minute lectures each week
- Course designed to teach students about the functional features of the major organ systems (cardiovascular, respiratory, digestive, muscular) in the human body
- Wrote and graded all exams and assignments
- Assisted students outside of class
- Maintained class website
- Maintained and assigned student's grades

Physiology Laboratory (BIO112L) Spring 2007

- Taught a 3-hour laboratory on human physiology
- Wrote and delivered 30-40 minute lectures once a week
- Facilitated labs and dissections (**frogs**)

- Wrote and graded all exams and assignments
- Assisted students outside of class
- Maintained class website
- Maintained and assigned student's grades
- Course taken along with discussion section (described above).

Organisms to Ecosystems Discussion (BIO94) Winter 2007/2006

- Taught three sections per week for this course which focused on patterns of diversity, ecology, and evolutionary biology
- Wrote and delivered original 50-60 minute lectures, assignments and activities
- Assisted students outside of class
- Maintained class website
- Maintained and assigned student's grades

Experimental Biology Lab (BIO100LW) Fall/Spring 2006, Fall 2005

- Taught a 3-hour laboratory course aimed to have students develop their scientific thought process and learn to communicate clear thinking in their writing.
- Wrote and delivered original 30-40 minute lectures once a week
- Facilitated labs
- Wrote and graded all assignments, research reports and presentation
- Assisted students outside of class
- Maintained class website
- Maintained and assigned student's grades

Life Sciences (BIO1A) Summer 2006

- Assisted professor with grading/writing exams and keeping lecture notes for a general course in Biology
- Provided office hours for students to come get help with topics covered in lecture.

Teaching Assistant **CSU, San Bernardino** **2002-2005**

Topics in Biology (BIOL100) Summer 2002/2003

- Taught 3-hour laboratory for a course focused on the broad understanding of biology, our molecular-organismic-ecological heritage and humankind's place within the biosphere.
- Wrote and delivered original 30-40 minute lectures once a week
- Facilitated labs
- Wrote and graded all assignments
- Assisted students outside of class
- Maintained and assigned student's grades

Population Biology (BIOL202) Spring 2002/2003

- Taught 3-hour laboratory for a course focused on the basic understanding of the principles of genetics, evolution and ecology of organisms, populations, and communities.
- Wrote and delivered original 30-40 minute lectures once a week
- Facilitated labs
- Wrote and graded all assignments
- Assisted students outside of class
- Maintained and assigned student's grades

Organismal Biology (BIOL201) Winter 2002/2003

- Taught 3-hour laboratory for a course focused on functional attributes of organisms and their diversity.
- Wrote and delivered original 30-40 minute lectures once a week
- Facilitated labs
- Wrote and graded all assignments
- Assisted students outside of class
- Maintained and assigned student's grades

Biology of the Cell (BIOL200) 2002-2005

- Taught 3-hour laboratory for a course focused on understanding the basic process of life and the universality of life processes at the molecular and cellular level.
- Wrote and delivered original 30-40 minute lectures once a week
- Facilitated labs
- Wrote and graded all assignments
- Assisted students outside of class
- Maintained and assigned student's grades

Editorial Services

Reviewed article for Zoology September 2009

Memberships in Professional Organizations

AAAS

American Physiological Society

Sigma Xi

Society of Integrative and Comparative Biology

References

Goggy Davidowitz (Postdoctoral Advisor)
University of Arizona
Department of Entomology
Forbes 410, PO Box 2100: (36)
Tucson, AZ 85721-0036
Phone: 520- 626-8455, Fax: 520-621-115
Email: goggy@email.arizona.edu

Timothy J. Bradley (Ph.D. Advisor)
Department of Ecology and Evolutionary Biology
University of California, Irvine
321 Steinhaus Hall
Irvine, CA 92697-2525
Phone: 949-824-7038, Fax: 949-824-2181
Email: tbradley@uci.edu

James W. Hicks (Ph.D. Committee Advisor)
Department of Ecology and Evolutionary Biology
University of California, Irvine
321 Steinhaus Hall
Irvine, CA 92697-2525
Phone: 949-824-6386, Fax: 949-824-2181
Email: jhicks@uci.edu

Normal instructor teaching responsibilities (credit hrs in parentheses)

Christine Broussard:	BIOL 310 (3), BIOL 313 (4), BIOL 345 (2); and BIOL 499 (1)
Jeffery Burkhart	BIOL 101 (4), BIOL 205 (4), BIOL 325 (2), BIOL 326 (4), BIOL 327 (4), BIOL 378 (2), and BIOL 390 (4)
Jerome Garcia	BIOL 203 (4), BIOL 343 (4), BIOL 344 (4), BIOL 346 (4), BIOL 376 (4), BIOL 380 (2), and BIOL 441 (2),
Jay Jones	BIOL 204 (5), BIOL 314 (5)
Robert Neher*	
Stacey Novak	BIOL 101 (4), BIOL 203 (4), BIOL 204 (4), BIOL 302 (4), BIOL 311 (3), BIOL 316 (4)
Kathleen Weaver	BIOL 101 (4), BIOL 203 (4); BIOL 325 (2); BIOL 336 (4), BIOL 378 (2), BIOL 379 (2), BIOL 380 (2), and BIOL 499B (1-3)

* Administrative duties only

Adjuncts

Patricia Caldani	BIOL 101 (4), BIOL 343 (4), and BIOL 344 (4)
Fredda Fox	BIOL 101 (4), BIOL 334 (2, 4) + (other CAPA courses)
Harvey Good	INTD 309
Randy Good	BIOL 101 (4)
Michael Kinney	BIOL 101 (4)
Raminder Kaur	BIOL 302 (4)
Pablo Weaver	BIOL 203 (4) and BIOL 322 (4)

C. Subject Matter Understanding and Skill in Biology Analysis

Skills and Knowledge (Learning Outcomes) Analysis of Biology Courses

Following are matrices that analyze required coursework taken by ULV Biology majors. Each course is rated with +, ++, or +++ scaled to the degree of emphasis of recommended skills and subject matter content as defined by the State of California Teacher Licensing Commission or the National Association of Biology Teachers.

Subject Matter Understanding & Skill in the Biology Major at ULV

Course	Genetics	Molecular Biology	Cell Biology	Biochem.	Micro.	Environ. Biology	Develpmtl. Biology	Physiology	Evolution
Domain 1 – Cell Biology & Physiology									
1.1 Prokaryotic & Eukaryotic Cells									
a.) Compare prokaryotic, eukaryotic, and viruses	++	+	+	+	+++	+	++		+
1.2 Cellular Reproduction									
a.) The stages of the cell cycle	++	+	+++		+++		+++	+	+
b.) Diagram & describe the stages of the mitotic process	++	+	+++				+++	+	+
1.3 Plant & Animal Cell Anatomy Physiology									
a.) Structure & function of cell membrane			+++	++	+++		+++	++	
b.) Methods of transport across the membrane			+++	+	+++		+++	++	
c.) The role of semipermeable membranes in cellular communication			+++	++	+		++	++	
d.) The role of the ER & Golgi apparatus in the secretion of proteins	+		+++	+			+	+	

e.) The role of chloroplasts in obtaining & storing usable energy	+			++					
f.) The role of mitochondria in cellular respiration	+		+++	++				+	
g.) Explain the role of enzymes in chemical rxns. & describe an exp't to test the its catalytic role and factors that affect activity			+++	++	+			+++	
h.) Anabolic & catabolic pathways involved in the metabolism of macromolecules		++	++	+++	+		+	++	
1.4 Integration & Control of Human Organ Systems									
Course	**Genetics**	**Molecular Biology**	**Cell Biology**	**Biochem.**	**Micro.**	**Environ. Biology**	**Develpmtl. Biology**	**Physiology**	**Evolution**
a.) Relate complementary activity of major body systems to provide cells w/ O_2 & nutrients & remove waste products							++	+++	
b.) Explain & analyze the role of nervous system in mediating communication between diff. parts of the body & its interaction with the environment				+			++	+++	
c.) The homeostatic role of the major organs				+		+	++	+++	+
d.) The function of feedback loops in the nervous & endocrine systems to regulate conditions in the body & predict the effects of disturbance on these systems			+	+			++	+++	
e.) The role of hormones in providing internal fdbk mechanisms for homeostasis at the cellular level & in whole organisms	+		+	+			+++	+++	
f.) The role of the musculo-skeletal system in providing structure, support, & locomotion to the human			+				+	+++	

organism									
1.5 Physiology of the Immune System									
a.) The humoral response to infection				+	++		++	+	
b.) Compare cell mediated & humoral responses to infection					++		++	+	
c.) Explain how vaccination works & distinguish among variables affecting success rate	+				++			+	
d.) Predict the consequences f a compromised immune system					+		++	+	
Domain 2 – Genetics									
2.1 Chromosome Structure & Function									
Course	**Genetics**	**Molecular Biology**	**Cell Biology**	**Biochem.**	**Micro.**	**Environ. Biology**	**Develpmtl. Biology**	**Physiology**	**Evolution**
a.) Relate the structure & function of DNA, RNA, & proteins to the concept of variation in organisms	+++	++		++	+++		++	+++	+
b.) Chromosome struct. as a sequence of genes each w/ a specific locus	+++	+++			++		+++	+++	
2.2 Patterns of Inheritance									
a.) The necessity of both meiosis & fertilization in promoting variation	+++						++	+++	+++
b.) The role of chromosomes in determining phenotypes	+++	+					+++	+	++
c.) Predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents & mode of inheritance	+++						+	+	++

d.) Genetic & cellular bases for Mendel's laws of dominance, segregation & independent assortment	+++								
2.3 Gene Expression									
a.) Explain how random chromosome segretation explainsthe probability that a particular allele will be in a gamete	+++						+		++
b.) Recognize that specialization of cells in multicellular organisms is usually due to diff. patterns of gene expression rather than to diff. among the genes themselves	++	+++		+	+++		+++		+
c.) Describe how alleles that are lethal in a homozygous individual may be carried in a heterozygote & thus maintained in a gene pool	+++						++		+
d.) Distinguish when & why mutations in DNA sequence of a gene may/may not affect the expression of the gene or the seq. of amino acids in an encoded protein	+++	++		++			+++		++
Course	**Genetics**	**Molecular Biology**	**Cell Biology**	**Biochem.**	**Micro.**	**Environ. Biology**	**Develpmtl. Biology**	**Physiology**	**Evolution**
2.4 Biotechnology									
a.) Recognize how genetic engineering produces biomedical & agricultural products	+++	+++		+	+++	+	+++	+	
b.) The construction of recomb. DNA by basic DNA tech. incl. restriction digestion by endonucleases, gel electrophoresis, ligation, & transformation	++	+++		++	+++		+++		

2.5 Bioethics									
a.) Discuss issues of bioethics incl. Genetic engineering, cloning, the human genome project, gene therapy, & medical implications	+++	+++		+		+	++		+
Domain 3 – Evolution									
3.1 Natural Selection									
a.) Explain why natural selection acts on the phenotype rather than the genotype of an organism	+++			++			+++		+++
b.) Predict survival potential of various grps. of organisms based on the amt. of diversity in their gene pool	++			++			+		+++
3.2 Evolutionary Patterns									
a.) Analyze fossil evid. w/ regard to biological diversity, episodic speciation, & mass extinction	+			+					++
b.) Analyze the effects of evolutionary patterns on diversity of organisms	++			++			++		+++
c.) The conditions of H-W equilib & why they are unlikely to appear in nature, & solve equa. to predict the frequency of genotypes in a popul	+++					+			+++
Course	**Genetics**	**Molecular Biology**	**Cell Biology**	**Biochem.**	**Micro.**	**Environ. Biology**	**Develpmtl. Biology**	**Physiology**	**Evolution**
3.3 Mechanisms for Speciation									
a.) Distinguish between the accommodation of an indiv. organism to its environment & the gradual adaptation of a lineage of	++						+		+++

organisms via genetic change									
b.) Describe a scenario that demonstrates the effects of reproductive/geographic isolation on speciation	++								+++
3.4 History & Origin of Life									
a.) The Theoretical origins of life on Earth	+			+	+				++
b.) Construct a branching diagram from a variety of data sources illustrating the phylogeny between organisms of currently identified taxonomic grps.	+			+			++		+++
Domain 4 – Ecology									
4.1 Biodiversity									
a.) Define biodiversity & describe the effects on biodiversity of alteration of habitat					++	+++			+
4.2 Energy Flow & Nutrient Cycles									
a.) Evaluate the importance of stability of produces, consumers, & decomposers				+	+	+++			+
4.3 Interrelationships & Change in Ecosystems									
a.) Describe various species interaction (e.g. predator/prey, etc.)				+	+	+++			+
b.) Analyze fluctuations in popul. size in an ecosystem due to the relative rates of birth, immigration, emigration , & death	+					+++			+
Course	**Genetics**	**Molecular Biology**	**Cell Biology**	**Biochem.**	**Micro.**	**Environ. Biology**	**Develpmtl. Biology**	**Physiology**	**Evolution**

c.) Analyze changes in an ecosystem resulting from changes in climate, human activity, intro. of nonnative species, & changes in popul. size	+					+++			+

+ Signs indicate the depth of coverage in each subtopic.

+ = Basic coverage, ++ = Intermediate coverage, +++ = Extensive coverage

Subject Matter Understanding & Skill in General Science at ULV

Courses	Astronomy	Geology	Principles of Biology	Plant Science	Animal Science	Chemistry I	Chemistry II	Physics I	Physics II
Domain 1– Astronomy									
a) Describe the chemical composition & physical structure of the universe	+++	+							
b) Describe the structure of the solar system & its place in the Milky Way galaxy	+++	+							
c) Distinguish between stars & planets	+++								
d) Recognize that stars vary in color, size, and luminosity	+++								
e) Describe a simple model of how fusion in stars produces heavier elements & results in the production of energy, including light	+++								
f) Describe the regular & predictable patterns of stars & planets in time & location	+++								
g) Explain & predict changes in the moon's appearance (phases)	+++								
h) Describe the use of astronomical instruments in collecting data, & use astronomical units & light years to describe distances	+++								
Domain 2 – Geodynamics									

2.1 Tectonic Processes & Features									
a) Diagram the features that provide evidence for plate tectonics		+++			+				
b) Summarize the thermal processes driving plate movement		++							
c) Explain how density & buoyancy are related to plate tectonics		++						+	
d) Describe types of plate boundaries[+]		+++							
Courses	**Astronomy**	**Geology**	**Principles of Biology**	**Plant Science**	**Animal Science**	**Chemistry I**	**Chemistry II**	**Physics I**	**Physics II**
e) Relate the cause of volcanoes, earthquakes, & earth resources to tectonic processes[+]		++							
f) Summarize earthquake processes in terms of epicenter, focal mechanism, distance, & materials, & the role various factors play in the amount of damage caused by an earthquake		+++							
2.2 Rock Formation									
a) Diagram & explain the rock cycle		+++							
b) Describe relative & absolute dating techniques, including how half – lives are used in radiometric dating		+							
c) Compare uniformitarianism & catastrophism		++							
2.3 Shaping Earth's Surface: Surficial Processes & Features									
a) Describe the dynamic processes of erosion, deposition, & transport		+++							

[+] signs indicate the depth of coverage in each topic.
[+] signs indicate the depth of coverage in each subtopic.

b) Describe coastal processes including beach erosion & natural hazards		+++							
c) Describe the effects of natural hazards, including earthquakes, volcanic eruptions, landslides, & floods, on natural & human – made habitats & environmental & human responses to those events		+++							
2.4 Energy in the Earth System									
a) Diagram the water cycle & describe interrelationships of surface & sub – surface reservoirs		++		+					
b) Explain daily & seasonal changes in the sky		+	+	+					
c) Analyze uneven heating of Earth by the sun		+			+				
d) Discuss the effects of air movements on weather		++							
Courses	**Astronomy**	**Geology**	**Principles of Biology**	**Plant Science**	**Animal Science**	**Chemistry I**	**Chemistry II**	**Physics I**	**Physics II**
e) Describe the energy transfer processes of convection, conduction, & radiaton in relation to the atmosphere/ocean & Earth's interior structure		++							
f) Interpret weather maps to predict weather patterns		+							
Domain 3 – Earth Resources									
3.1 Earth Resources									
a) Describe a variety of energy resources, including fossil fuels, nuclear fuels, solar, & biomass		+		+					
b) Recognize earth materials as resources		++		+					
c) Identify resources as renewable vs. nonrenewable		+		+					

d) Compare extraction & recycling in relation to energy, cost, & demands		+							
e) Explain sustainable uses of resources with respect to utility, cost, human population, & environmental consequences		+		+					
Domain 4 - Ecology									
4.1 Ecology									
a) Explain energy flow & nutrient cycling through ecosystems			++	++	+				
b) Explain matter transfer in ecosystems			++	++	+				
c) Distinguish between abiotic & biotic factors in an ecosystem			++	++	+				
d) Compare the roles of photosynthesis & respiration in an ecosystem			+++	+++					
e) Describe interrelationships within & among ecosystems			++	+	++				
f) Identify & explain factors that affect population types & size			++	+	++				
Courses	**Astronomy**	**Geology**	**Principles of Biology**	**Plant Science**	**Animal Science**	**Chemistry I**	**Chemistry II**	**Physics I**	**Physics II**
Domain 5 – Genetics & Evolution									
5.1 Genetics & Evolution									
a) Explain the inheritance of traits which are determined by one or more genes, including dominance, recessiveness, sex linkage, phenotypes, genotypes, & incomplete dominance			+++	++	++				
b) Solve problems that illustrate monohybrid & dihybrid crosses			+++	+++					
c) Compare sexual & asexual reproduction				+++	+				

d) Explain how the coding of DNA controls the expression of traits by genes			+++	+++					
e) Define mutations and explain their causes			++	++					
f) Explain the process of DNA replication			+++	+					
g) Describe evidence, past & present, that supports the theory of evolution, including diagramming relationships that demonstrate shared characteristics of fossil & living organisms			+	++	++				
h) Explain the theory of natural selection, including adaptation, speciation, & extinction			++	++	++				
i) List major events that affected the evolution of life on Earth			+++	+	+				
Domain 6 – Molec. Bio. & Biochem.									
6.1 Biology & Biochemistry									
a) Demonstrate understanding that a small subset of elements makes up most of the chemical compounds in living organisms by combining in many ways			++	++	+				
b) Recognize & different. the structure & func. of molecules in organisms, including carbohydrates, proteins, & nucleic acids			+	++	+				
Courses	**Astronomy**	**Geology**	**Principles of Biology**	**Plant Science**	**Animal Science**	**Chemistry I**	**Chemistry II**	**Physics I**	**Physics II**
c) Describe the process of protein synthesis, including transcription & translation			++	+++					
d) Compare anaerobic & aerobic respiration			++	++					
e) Describe the process of photosynthesis			+	+++					

Domain 7 – Cell & Organismal Biology									
7.1 Cell & Organismal Biology									
a) Describe organelles and explain their function in cell			++	+++	+++				
b) Relate the structure of organelles and cells to their functions			+	+++					
c) Identify and contrast animal and plant cells			++	+					
d) Explain the conversion, flow, and storage of energy of the cell			+++	++					
e) Identify the function & explain the importance of mitosis & meiosis as processes of cellular & organismal reproduction			+++	++					
f) Compare single – celled & multicellular organisms, noting the role of cell differentiation in the development of multicellular organisms			+++	++					
g) Describe the levels of organization in plants & animals			++	+++					
h) Describe the structures & functions of human body systems, including, but not limited to, the skeletal, reproductive, nervous, & circulatory systems			++		++				
i) Explain the major structures & their functions in vascular & nonvascular plants			+	+++					
j) Describe the life processes of various plant groups, including, but not limited to, reproduction, photosynthesis, respiration & transpiration			++	+++					
k) Explain the reproductive processes in flowering plants			+	+++					
Courses	**Astronomy**	**Geology**	**Principles of Biology**	**Plant Science**	**Animal Science**	**Chemistry I**	**Chemistry II**	**Physics I**	**Physics II**
Domain 8 – Forces and Motion									

8.1 Waves									
a) Compare the characteristics of sound, light, & seismic waves				+				++	++
b) Explain that energy is transferred by waves without mass transfer & provide examples								+++	++
c) Explain how lenses are used in simple optical systems including the camera, telescope, microscope, & the eye									+++
d) Explain and apply the laws of reflection & refraction									+++
e) Compare transmission, reflection, & absorption of light in matter				+					++
Domain 9 – Forces & Motion									
9.1 Forces & Motion									
a) Discuss & apply Newton's laws (i.e. 1st, 2nd, 3rd, & law of universal gravitation)								+++	
b) Define pressure & relate it to fluid flow & buoyancy (e.g. heart valves, atmospheric pressure)							+	+++	
c) Describe relationships among position, distance, displacement, speed, velocity, acceleration, & time; & perform simple calculations using these variables for both linear & circular motion								+++	
d) Identify the separate forces that act on a body (e.g. gravity, pressure, tension/compression, normal force, & friction) & describe the net force on the body.								+++	
e) Construct & analyze simple vector & graphical representations of motion & forces (e.g. distance, speed, time)								+++	
f) Identify fundamental forces, including gravity, nuclear & electromag. forces, & explain their roles in nature, ie., gravity.								++	++

Courses	Astronomy	Geology	Principles of Biology	Plant Science	Animal Science	Chemistry I	Chemistry II	Physics I	Physics II
g) Explain & calculate mechanical advantages for levers, pulleys, & inclined planes								+++	
Domain 10 – Electricity & Magnetism									
10.1 Electricity & Magnetism									
a) Describe & provide examples of electrostatic & magnetostatic phenomena									+++
b) Predict charges or poles based on attraction/repulsion observations									+++
c) Build a simple compass & use it to determine direction of magnetic fields, including the Earth's magnetic field									+++
d) Relate electric currents to magnetic fields & describe the application of these relationships									+++
e) Design & interpret simple series parallel circuits									+++
f) Define & calculate power, voltage differences, current, & resistance in simple circuits									+++
Domain 11 – Heat Transfer & Thermody.									
11.1 Heat Transfer & Thermodynamics									
a) Know the principle of conservation of energy & apply it to energy transfer				+		+	++	+++	
b) Discuss how transfer of energy as heat is related to changes in temperature				+			++	+++	
c) Diagram the direction of heat flow in a system							++	+++	
d) Describe the methods of heat transfer by conduction, convection, & radiation, & provide examples for each							+	+++	

e) Explain how chemical energy in fuel is transformed to heat				+				++	
f) Design & explain experiments to induce a physical change such as freezing, melting, or boiling								+++	
Courses	**Astronomy**	**Geology**	**Principles of Biology**	**Plant Science**	**Animal Science**	**Chemistry I**	**Chemistry II**	**Physics I**	**Physics II**
g) Distinguish between physical & chemical changes & provide examples of each						++	+	+	
Domain 12 – Struc. & Proper. of Matter									
12.1 Structure & Properties of Matter									
a) Identify, describe & diagram the basic components w/in an atom (i.e. proton, neutron, & electron)			++	+		+++	+		+++
b) Know that isotopes of any element have different # of neutrons but the same # of protons, & that some isotopes are radioactive			+	+		+++	++		++
c) Differentiate between atoms, molecules, elements, & compounds			++	+		+++			
d) Compare & contrast states of matter & describe the role energy plays in the conversion from one state to another						++	+++		
e) Discuss the physical properties of matter incl. structure, melting pt., boiling pt., hardness, density, & conductivity						+++	+++		
f) Recognize that all chemical substances are characterized by a unique set of physical properties						+++	+++		
g) Define & calculate density, & predict whether an object will sink or float in a fluid						+++	++	+++	
h) Explain that chemical changes in materials result in the formation of a new substance corresponding to the rearrangement of the atoms in molecules						+++			

i) Explain & apply principles of conservation of matter to chemical rxns, incl. balancing chem. equations						+++	+++		
j) Distinguish among acidic, basic, & neutral solutions by their observable properties						+++	+++		
k) Describe the construction & organization of the periodic table						+++	+++		
l) Based on position in the periodic table, predict which elements have characteristics of metals, semi-metals, non-metals, & inert gases						+++	++		
Courses	**Astronomy**	**Geology**	**Principles of Biology**	**Plant Science**	**Animal Science**	**Chemistry I**	**Chemistry II**	**Physics I**	**Physics II**
m) Explain chemical reactivity using position on the periodic table						+++			
n) Predict and explain chemical bonding using elements' position in the periodic table						+++			
o) Recognize that inorganic & organic compounds are essential to processes w/in living systems						+++	++		
p) Explain the central role of carbon in living system chemistry						++			

+ Signs indicate the depth of coverage in each subtopic.

+ = Basic coverage, ++ = Intermediate coverage, +++ = Extensive coverage

D. **Clark Fork Field Research Station, Drummond, MT**

During the past 17 years, considerable time and moneys have been expended in the development of the Clark Fork Research Station (aka, La Verne's Magpie Ranch), near Drummond, Montana. The facilities are now developed to a degree that allows hosting of student and other visiting groups. The major challenges for the facility are its distance from the main campus and better incorporation of its novel programming opportunities into the home campus program. Following is a description of the facility and programming during its history.

The primary mission of the Clark Fork Field Research Facility is to conduct research and to study the unique natural history and culture of Montana's northern Rocky Mountains. An added bonus is the opportunity to explore the wide variety of educational and recreational opportunities in the area. The facility is located in southwestern Montana, 50 miles east of Missoula, and seven miles west of Drummond, and consists of three land parcels (Figure 1). Dr. Robert and Mary Neher occupy and manage the Clark Fork Research Facility from May through August, providing support for scheduled courses and visiting faculty and student researchers. Students and alumni have worked at the field station since the land was acquired in 1995. Drs. Kathleen Weaver and Jeffery Burkhart have brought classes of students to the station each summer since 2005, where they participate in a variety of educational and research activities and established coursework (note research summary below).

The Clark Fork Field Research Facility consists of three parcels of land identified as 'Magpie Ranch', 'Clark Camp', and 'Baldy Base'. The main facility (Magpie Ranch) resides on 2 1/2 acres of historic pastureland, and consists of two main buildings that serve as lodging and research space. The larger structure, completed in 1998, is a 35 by 55 foot steel barn, which contains a two story living area, a kitchen, dining room, office, laboratory, restroom, laundry facilities, and storage space. Up to seven persons can be housed in this building. Contained within the lab areas are field gear, microscopes, freezers, miscellaneous laboratory equipment, and also a working herbarium and zoological specimen collection. The newer building, completed in 2009, added a small classroom/conference room, expanded the laboratory and shop space, provides additional housing for at least six students or researchers, and provides garage space for four vehicles. This structure is also provisioned with a solar array that provides electrical power for the entire station. A generous donation made possible the summer 2011 construction of an on-site molecular biology lab that is allowing students and faculty to conduct more sophisticated ecological and molecular investigations. Dr. Neher recently (2011) acquired an additional 20 acres of property (the old Bill Wiberding Farm), immediately to the west and north of Magpie Ranch proper. Acquisition of this property will allow control of erosion and weed problems on the original property and will provide additional space for future development (see grant prospects below).

A second land parcel, 'Clark Camp', consists of five acres of riparian habitat on the north bank of the Clark Fork River. Merely a quarter mile west of the Magpie Ranch, Clark Camp affords convenient access to the Clark Fork River and a variety of potential

research plots. Although this area provides good river access, it is located on a floodplain, hence permanent structures cannot be erected on this site. Each of these parcels is accessible by a paved, county maintained, frontage road that parallels Interstate 90.

A third acreage, 'Baldy Base', is located nine miles northwest of the Magpie Ranch, and consists of 160 acres of timberland on the slopes of rugged Baldy Mountain. Vegetation on the site includes an unlogged zone of old growth pine/aspen forest (a rarity), meadows and a pristine riparian zone along a small, year-round stream. Numerous wildlife species have been observed on and around the property, including black bears, mountain lions, elk, and bald eagles. With its biotic and habitat diversity Baldy Base presents a wealth of research opportunities and also a comparison site to the surrounding clear-cut forests and also the heavily impacted Clark Fork River site. Lacking a permanent structure, the functional use of the property is currently limited, with access requiring a traverse of seven miles of non-maintained fire and logging roads.

In summary, since 1995 University personnel (both faculty and staff), and friends have constructed two large multi-use buildings, drilled three water wells, installed potable and irrigation water systems, constructed a waste disposal system~~s~~, recycled a mountain of scrap, repaired miles of fencing, and made countless other improvements to the area, including the addition of two small storage barns for supplies and equipment.

Faculty and teaching

As the facilities and programming are relatively new, much of the early research and training activities have included efforts to document the diversity of plant and animal life on and around the field station. Student and faculty efforts have resulted in comprehensive collections of plants, and vertebrate and invertebrate animals, as well as a catalog of species of lichens, fungi, vascular plants, insects, mollusks and vertebrates. All of this material and information is available for use in research and field courses and for reference by visiting scientists.

Since its inception, the field station has hosted students as employees or in summer field courses, including Field Biology (BIOL 325) a home campus course that is currently offered principally in Montana. In this course, students learn local plant and animal identification, biotic sampling techniques and field equipment, data analysis, population dynamics, and animal behavior. Each scheduled course typically focuses on a particular biotic habitat or organismal group around which research projects are designed and abundant.

Currently, the research facility is open to both faculty and students for research, and courses between May and September. During that time, Dr. Neher and various faculty researchers who visit for shorter periods of time typically help in facility operations and maintenance. Students in field courses typically spend three to four weeks on site, from which they take day trips into the surrounding areas to conduct class and research activities. Drs. Jeffery Burkhart, Kathleen Weaver, and Harvey Good, as well as adjunct

researchers, including Pablo Weaver and Michael Kinney, have accompanied student groups during these times and, due to limitations on housing space and a desire to have additional support-staff available throughout the summer strive to stagger their visits. During Spring-term, 2012, Dr. Heidy Contreras will join the Biology faculty, and she too has plans to use the station as a research base.

Transportation at the Magpie Ranch is provided by two Chevrolet Suburbans, an older pickup truck, and occasionally private vehicles. All drivers must be insured and approved by University Security.

The facility welcomes and has hosted other collaborators and visitors during the summer months. Malacologist and professor at Great Basin College, Dr. Mark Ports, accompanied Dr. Weaver and the field class on a four-day sampling trip in June 2009, and Miguel Landestoy, a conservation ecologist and wildlife photographer from the Dominican Republic, accompanied students in the summer 2010. Dr. Richard Hurley of Montana State University visited the station in 2008 and offered help in the curation of the insect collection. Work from these visits is expected to lead to publication and at present three papers, two with undergraduates serving as first authors, are in preparation. With improved University funding and continued faculty support, the facility has the potential to serve as a year round base for studies of the local ecosystems.

Summary of annual progress on physical plant development and biotic surveys since 1994

1994: Biotic survey of the area donated to ULV by the Richard Base Family. Richard Base (ULV Alumnus) and Robert Neher

1995: Acquired additional property for Magpie Ranch and started flora and fauna survey collections. Nathan McConnell and Ari Farajolahi (Student entomologists), Robert Neher, and Robert McMahan, former owner of the McMahon Ranch which covered the entire surrounding valley.

1996: The shell of the main building was constructed with the help of Student, Faculty, and Alumni volunteers donating over 1000 hours of labor. Dr. Harvey and Connie Good, Milan and Beverly Rupel, Don Bundy and his father, Dan Herrig, Michael Johnson, Dr.Philip Escandon and his son, Steve, and Dr. Robert and Mary Neher.

1997: Continuing work on the building; framing the inside, plumbing, etc. Harvey Good, Denny Wheeler, Robert Neher and the Neher family, and Robert McMahan.

1998: Denny Wheeler, Harvey Good, Robert Neher, Gilbert Colorina and Rheannon Jensen continued with building and maintenance work on the facility, collecting, pressing and identifying local plants, and assisted with water and soil testing. Connie Good, Mary Neher and over twenty others worked at and visited the facility that summer.

1999: Mohamid Ghonim and Laura Ashby (students) completed new patio deck and continued working on plant and insect collections. More than twenty others spent time at the ranch.

2000: Jose Martinez, Brian Brew, and Matt Solomon (all football players) continued work on collecting and cataloging all local species, planting trees, moving very large rocks and general clean-up. Over twenty other people worked on and visited the ranch, including Paul Handley (former student and teacher at LV), and Duke, Bob McMahan's wolf dog.

2001: No Students, but the completion of many projects by staff and friends. The Harvey Good's, the Robert Neher's, the Dan Neher's, the Ken Neher's, the Terry Snell's, the Paul Handley's, the Heckman's, Randy Good and daughter Annikah, Ron Good, Dan Merritt, Jay Jones, Jon Neher; a total of 28 plus the contractors for the dry-walling, and flooring, five more.

2002: Adam Wucherpfennig, Jennifer Brady, Faysel Bell, Regina Husted (4 students), Dan Merritt, Harvey and Connie Good, and Bob Neher expanded their flora and fauna studies. Dean Held and Annette, Trustee Long, his wife and friends, the Neher family, the Good family including the Landrum's all added to summer activities.

2003: Jennifer Brady, Shane Haldeman, Kassandra Sendziak, Taylor Pupka (4 students). Other visitors and workers: Good's, Neher's, Burkhart's, Wheeler's, Landrum's, DeParte's, Timmon's, Sheppard's, Buchanan's, Snell's, Rupel's, Hanawalt's, Heckman's (Total: 41 +).

2004: Jennifer Brady (1 student); continued work on local bio-survey and ranch fences. Also, Good's, Boardman's, Wheeler's, Heckman's, Burkhart's, Robert, Mary, Ken, Jon and Dan Neher's (Total 21+)

2005: Jeff Burkhart's Field Biology class (BIOL 325) studied small mammals; Sally Maroquin, Stephanie Pavon, Makaila Rimbenicks, George Mendez (4). Other summer participants, the Rupel's, Dan Neher's, Jeff and Lisa Burkhart, the Good's, Trustee Don and Zandra Wilson, Chris Morgan, Michele, Reed and Brook, Dave Chappell and Mary Beth Fletcher (and dog), Charles Bentley and Erin Raley (photographer from MSU), Trustee Paul Mosely, Jennifer Brady, Tim Morrison, Chris and Jim Sink, Ken Neher's, Ray Moon, the Buchanan's, and Copper the Bassett Hound.

2006: Sundeep Samuel, water quality studies of the Clark Fork R. with Harvey Good. Others: Connie Good worked tirelessly on identifying and cataloging plant specimens. Harvey continued ~~his~~ collecting and mounting Insects. Dan, Mary, Wes, Ken, Jon, Mary and Bob Neher, Paul Handley: maintenance and plant collecting, and Gene and Linda Hipskind (alumni).

2007: Adam and Kathy Wucherphennig (GPS programming with Neher), Mikaila Rimbenicks, Rebecca Charland, Yvette Paiz, Lindsey Watson: Oreohelix studies with Kat and Pablo Weaver (5 students). Others: Jeff Burkhart, Mary Neher, the Shipcock's (Alumni), Marilyn Wissler, Brian Peters family, Dan, Mary and Wes Neher, Bob and Joan Timmons, the Ken Neher family and Molly, and the Buchanan's.

2008: Built the new building. Kat and Pablo Weaver (Kat's students collected data and snails in Washington and went directly home from there), Mary, Bob, Jon, Dan, Mary, and Wes Neher, The Randy Miller's, Jeff Burkhart and Jessica Yeuh, Paul and Dianne Handley, Harvey and Connie Good, Kay, Ashley and Amber Rupel Leum, and George, Jeanette, Nathan and Rebeca Keeler.

2009: Kat, Pablo and Samantha Weaver, Corban Toogood, Melinda Beeman, Maddie Clements, Lolita Almeda Caitlan Kams (5 Students) and collaborator from Elko Community College. Solar power installed. Harvey and Connie Good, Jeff Burkhart, Mary and Bob Neher and family.

2010: Kat, Pablo and Samantha Weaver, (Eight students: Heather Garcia, Nick Robles, Kristen Chapman, Justine Coyle, Jessica Helou, Will Ortez, Aubry McSweeny, and Sandra Ortega,), Mike Kinney, Miguel Landestoy, Harvey and Connie Good, Arts and Sciences Dean Jonathan and Annette Reed, Jeff Burkhart, Bob and Mary Neher and family, and a research colleague of Pablo Weaver's from the Dominican Republic.

2011: Kat, Pablo and Samantha Weaver, (Seven students studying invertebrates: Caitlain Karns, Oscar Valencia, Rebecca Fent, Vanessa Alvarez, Jory Grace Montalvo, Quincy Whitworth, and Jonathan Cabrara), Bob and Mary Neher and family, Jeff Burkhart, Sheridan Merritt, Paul and Diane Handley, Harvey and Connie Good, Gary and Tracy Colby, Don and Bobbie Vandergriff,

Research

Since 1995, faculty and students have worked together to survey and catalog the plants and animals in the areas around the research station, and as noted earlier, the station has a sizeable herbarium that houses vascular plants, fungi, and lichens, and a collection of small mammals and insects that includes pinned and preserved (aquatic species principally) specimens.

In 2004, Jeff Burkhart directed a student project, which involved extensive small mammal sampling at the Baldy Base site using Sherman live traps from which was generated a small mammal check-list for this forest site. Additionally there are published checklists for large mammals and birds that are appropriate for the station sites.

1. Lichen studies

Studies by Neher, Burkhart and W. Neher on the many lichen species growing in Granite County have been underway since 2004. Over forty Montana species have been reported, but as of 2011 fewer than twenty have been recorded on the field station property (including species of the common genera, *Letharia, Xanthoparmelia, Peltigera,* and *Collema)*. Many lichen species are sensitive to a variety of environmental changes, and some have been shown to be reliable indicators of degraded air quality. Our studies, are comparing species currently present (including some that are out of their reported distribution ranges), with those identified in earlier studies, to evaluate the hypothesis that declining air quality and /or climate changes have influenced lichen diversity.

2. Conservation genetics and ecology of the terrestrial pulmonate snail *Oreohelix*

Dr. Weaver's lab focuses on the conservation genetics, ecology, and distribution of the land snail *Oreohelix* in the Western United States. *Oreohelix* diversity is particularly rich in the area around the research station, which has provided a number of student research opportunities. Since the summer of 2007, Dr. Weaver has taken several groups of students to the station to work on a variety of evolutionary and ecology based projects. A sample of these projects includes: Rebecca Charland (2008) "Biogeography of *Oreohelix* in the Montana region", Yvette Paiz (2008) "Study of Reproduction in the genus *Oreohelix* at the Montana Research Station", Vanessa Morales (2009) "Biogeography of *Oreohelix* in the Pacific Northwest", Aubry McSweeny (2010) and Sandra Ortega (2011) "Non-lethal extraction of DNA from the land snails", and Madeline Clements (2011) "Ecology in *Oreohelix* species surrounding the Montana Research Station, a molecular study of gut contents." Many other students have served as field and laboratory assistants on these ongoing research projects.

In addition to student research projects, Dr. Weaver has presented this work at a national conference at the American Malacological Society. The presentation led to collaboration with Dr. Mark Ports from Great Basin College in the summer 2009. Dr. Weaver is currently in prep on three manuscripts: "Biogeography of *Oreohelix* in Western Montana" for Diversity and Distributions, "Non-lethal extraction of DNA from land snail" for the Journal of Molluscan Studies, and "The usefulness of radula in determining species level relationships in *Oreohelix"* for Biosis, a student research journal published by Beta-Beta-Beta honors society.

3. Heavy metal toxicology

Montana has a history of mining dating back to the 1860's. Gold and silver were the first to be mined, but since the 1870's the primary focus in this region has been on copper mining. Because the process for mining gold, silver, and copper involves the addition of other elements to help purify the ore, harmful toxins including zinc, mercury, lead, and arsenic are often released as byproducts. These toxic metals have detrimental effects on the environment and biota around the mining region. In the past year, Dr. Weaver and undergraduate Justin Coyle collaborated with Dr. Parchamazad and his student Karen Harberson to quantify toxin amounts in *Oreohelix* snail tissues and also water using ICP-MS and Atomic Absorption. After finding high toxin levels in snail tissues, Dr. Garcia began a study analyzing the correlation between toxin levels and redox state. During summer 2012, Drs. Weaver and Garcia plan to investigate this question in more detail. A future set of studies is scheduled to examine the bioaccumulation levels in secondary and tertiary consumers, such as area spiders, birds, and fish.

4. Biogeography of aquatic insects

During summer of 2010, Pablo and Kat Weaver initiated a series of studies to examine the effects of heavy metals on the biotic communities of southern Montana. The Montana Field station sits at a unique location at the foot of the Garnet Mountains and along

the banks of the Clark Fork River. With its proximity to the Clark Fork River, which is a part of the largest superfund site in America, the field station's location is ideal for studies of aquatic ecosystem dynamics and the influence of heavy metal contamination on stream communities. Students in our Field Biology courses have already begun to assess macro-invertebrate communities along the Clark Fork to examine the success of recovery efforts in the region. In addition, recent studies have shown spiders to be heavily impacted by heavy metal bioaccumulation, probably due to their trophic position as secondary and tertiary carnivores. Beginning with *Oreohelix*, a land snail at the bottom of the food chain, we have begun to analyze heavy metal bioaccumulation within invertebrate communities. This work will also lead to a related study to examine the correlation between toxicology results and redox state within the snails.
Finally, as previously mentioned, Dr. Heidy Contreras will join the faculty in Spring 2012, and we look forward to her research efforts that are planned for the Montana Field Station.

Grants

During Spring 2009, Bob Neher and Kat and Pablo Weaver, submitted an NSF Field Facilities Improvement Grant for $300,000 to add a new building at the station. Currently (2011), the station can adequately house only nine students plus faculty. Comments from reviewers were that the station is not yet sufficiently integrated into the home institution to a degree that indicates a long-term commitment. We especially look forward to Dr. Contreras coming to the University, and utilizing the Montana Field Station and also to increasing numbers of students and faculty participating in on-going and new research projects. We believe that as more publications are generated from investigations conducted at the station, and with increased student access to this unique resource, we will be able to show our long-term commitment and bring in additional funding for the station.

Addendum

Aside from the $10,000.00 per year budget support from the University, which covers utilities, upkeep and repair, and transportation, all building and remodeling projects have been funded by nearly $200,000.00 in outside donations and grants. All land parcels have come to us as gifts from individual donors. The 2010 Suburban was purchased with a grant from the Ahmanson Foundation. The current value of the entire 190 acre field station is well over $1.5 million.

E. **Facilities**

Space:
The inadequacy of space for Biology and other Natural Science programs is long standing and recognized by the administration. A new facility was ranked highest on the list of University capital projects 15 years ago. The high cost of a science facility and other priorities shifted this ranking to reflect projects that were perceived to be within the University's fiscal reach. During the time the programs have nearly doubled in faculty, and in just the last two years the number of science students has more than doubled. We have also lost some important laboratory spaces such as the greenhouse preparation and storage area, storage and assembly space for field work, and storage and sample preparation areas for geology. In short, our facilities are woefully inadequate.
Comparisons with other similar institutions demonstrate that we are trying to function in about 1/3 the space afforded to programs of similar size. The quality of the meager space we have is also substandard. This inadequacy is increasingly impacting our program in the following ways:

a. Compromised ability to recruit quality science students
b. Inadequate ability to accommodate student research, a recognized best practice
c. Reduced functionality of instrument and imaging facilities
d. Efficient use of limited faculty and staff time in duplicating setups etc.
e. Reducing instrumental and other requirements weakening our program
f. Reducing departmental image and moral

There is general recognition that a new science facility is desperately needed. The envisioned Academic Building, the current top priority, is expected to be primarily focused on meeting this need. However, it is clear such a building is in the distant future and our needs are critical. Therefore, it is vital that additional space be allocated for faculty/staff offices, storage, bench space for student projects and faculty research, space for externally funded grant projects, instrumentation, as well as for greenhouse preparation and storage.

Grist for space considerations:

1. Classrooms:
The program has no dedicated classroom space. Mainiero 156 is a flexible lab lecture room however, that is well suited for various learning modes from classical lecture to group activities. This space is shared with the physical sciences and occasionally for non-science classes. All of the other classrooms, e.g. MA153, FH211) are extensively shared with other programs and lack demonstration tables and other customized instructional features. All classrooms are fitted with basic projection and audio systems. Class size has become a critical issue. Several of our classes now exceed the capacity of any room available to us. Some of the general classes are

held in La Fetra auditorium, which is not an appropriate space especially for teaching introductory classes, where student-faculty contact is vitally important.

2. Laboratories:
Two types of laboratories are needed to provide quality education consistent with effective practices and common experience. Teaching laboratories are needed for class based instruction and research laboratories are needed to provide dedicated space for senior thesis and related faculty student research.
***Teaching laboratories* –** The Biology Department has two dedicated teaching laboratories (MA256 and MA252) and two shared with the physical sciences (MA156 and FH3). The physical layout of 256 and 252 was designed when the program was roughly 1/3 its current size. The deteriorating cabinetry is of the classic style and provides little flexibility in terms of meeting different course needs. Spacing between the benches is insufficient to allow adequate movement with today's OSHA mandated stools. Pier mounted lighting, electric and gas connections restrict bench space for activities that need broad surface areas. Ventilation is inadequate for labs involving dissection/examination of preserved specimens, or use of volatile chemicals. Particulate air quality is also an issue, in all of the laboratories. Founders Hall room 3 is in the old chemistry lab complex. The 18" concrete walls, lack of utility chases, failing plumbing and other issues limit the utility of this laboratory. Only 9 students can be comfortably accommodated in this lab at one time, which reduces efficiency and requires excessive faculty and support staff time. The severe issues with air quality, HVAC balance and bench distribution make this lab unsuitable for modern molecular biological work and most biochemical and molecular biological research.
Research laboratories* –** There are two communal research laboratories in the biology program. One was developed from a student/faculty conference and study area. The larger of the two was developed from what was our only large capacity (48 student) classroom. Both are designed for molecular work and the smaller one is mostly dedicated to **one faculty** member, two grant paid staff and her students ***(~12 people in a space of 400 sq. ft.) This space also has to accommodate equipment normally housed in dedicated spaces, such as ultra-cold freezers, incubators etc. Even more impacted is the larger lab (approx. 900 sq. ft.) that must accommodate **four faculty** members, plus three soft money employees, and all of their students. This lab also accommodates equipment that would normally be housed in dedicated central areas. Next year there will be an additional faculty member that will need to share this space. In contrast, each faculty member at Pomona College generally has at least 800 sq. ft. of space dedicated to their student-faculty research. **Three faculty members do not have any dedicated research space** and must rely on teaching classrooms for the research needs of the faculty and their students. This has become untenable as the number of laboratory sections has increased and eliminated most of the times students could work in the labs. We have lost students because of this limitation.

3. Specialized facilities: The Biology Department has four facilities that support the program: an imaging and microscopy center, the animal care facility, two greenhouses and a field station. The Field Station, provides support for field camp experiences, faculty-

student field research, Field Course elements, retreats and other activities. A separate section of this self study, is devoted to this facility.

Animal Care Facility – The animal care facility was added in the mid-1990's to house rodents for teaching and research. No space was available in the Founders/Mainiero complex so a separate structure was constructed in a small nook near the Sports Pavilion. This structure also served as storage for field equipment for aquatic biology and other courses. In addition it served as the head house for the attached greenhouse, housing tools, pots, potting materials, chemicals, labels, ties, irrigation and other supplies. The initial design did not incorporate features currently required by the USDA for animal care facilities. As a result of these requirements and expansion of the animal care needs, storage and greenhouse support were eliminated. The facility now meets USDA standards but is far from ideal. Ventilation issues remain a problem and even with the elimination of other functions the space is too small. An incoming faculty member will also use this facility and we are trying to determine how to accommodate the required equipment. It is likely that the new microbiology faculty member will also depend on the resources of this facility.

Greenhouse Facilities – The biology department has two greenhouses. Both are "makeshift" and labeled by the supplier as "hobby greenhouses" in contrast to professional greenhouses such as those at Redlands, APU and even Upland High School, which are designed to last many decades. The main teaching greenhouse is 30'x12' and was erected in the mid-1990s. The Lexan paneling has a shorter lifespan than glass and is showing its age. Some panels have been damaged particularly at the south end. Shade cloth is deployed on jury-rigged racks constructed of EMT electrical conduit. This facility is dependent on two swamp coolers, which do not have the reliability of a professional pad and fan evaporative cooling system. Their lifetime is short and reliability is an issue. The second unit was added as a backup after catastrophic failure of the first, which resulted in a devastating loss of our teaching collections. Because of the reliability issues we have been reluctant to rebuild the collection thus compromising the quality of lab experience we can provide. Even with the backup cooler we periodically have difficulties with temperature control. Watering systems, bench condition, improperly designed drainage and galvanic corrosion of the frame are all serious concerns. In addition, requirements imposed by USDA animal care regulations forced all storage and "head house" activities out of the joint facility. There is currently no place to store pots, potting soil, utensils and other items normally associated with a head house. These have been moved into the greenhouse reducing space and exposing these items to moisture and subsequent deterioration.

Garden plot –The garden plot has been moved to a rather remote location. It is serving the basic research needs for one faculty member and students, but accommodating garden projects in other courses would be difficult with the current configuration. A larger space is required so that conflicts in timing do not deter research or garden dependent instruction.

Field station and field vehicles – The Natural Science Division maintains a field station near Drummond, MT. The specifics of the field station are addressed in a separate part of this review.

The Biology Department has one Suburban for use in field courses, research and for transporting materials and supplies. This vehicle can transport 7 plus the driver. Many upper division classes that require field transportation now have enrollments that exceed 20. The Natural Sciences Suburban is often available but is still inadequate for large classes (limit 14). This causes some difficulty in

meeting transportation needs since students are no longer allowed to drive anyone other than themselves for University activities and no budget has been afforded for renting buses for this purpose.
It is also important to note that there is no dedicated staging and storage space for field work. For instance if a seat needs to be removed to accommodate field equipment it must be stored in the shop, causing clutter, as well as functional and safety concerns. Coolers, cages, field equipment and other such items must be tucked away wherever space can be found. This reduces efficiency, enhances losses, and often results in damage.
Instrument facilities – Instrumentation is generally accommodated within the teaching and research laboratories. This is appropriate in some instances but in others the equipment would better serve our needs if it were located in a central facility. Centrifuges, ice-makers, autoclaves etc. should have dedicated space. These items share space in other rooms reducing effective bench space and introducing noise and heat.
Analytical instrumentation is often shared within the Division. GCMS, NMR, FT-IR, high resolution UV-Vis spectrophotometers and other such equipment is housed in various places around the Division. The NMR is the only instrument housed in a properly designed facility. Two GCMS systems are housed in a converted office (FH154) with poor ventilation and a heat load in excess of 4 kilowatts without considering the contribution of occupants. This small room also accommodates an FTIR and our molecular modeling system. Temperature regulation, crowding, ventilation, and a lack of space for students during instruction are serious limitations.
Imaging and Microscopy Center – This facility houses flexible research grade light microscopes with varying capabilities from low power stereo microscopy to state of the art reflectance, transmission and fluorescence microscopy. In addition the facility houses a network connected Scanning Electron Microscope – Energy Dispersive X-ray system. However, all of this equipment is housed in less than 250 sq. ft. along with a critical point dryer, ultramicrotome and other support material. Specimen preparation is not compatible with the imaging instrumentation and these two functions are normally supported in their own discrete space. There is no space for histological preparations so the preparative processes are parsed among the few available spots. The knife maker and critical and sputter coater are placed in an awkward corner of MA156. Operation of the vacuum pump is noisy and morning through evening classes and labs greatly restrict the use of this equipment. This causes severe issues with availability.
A second grant funded teaching facility houses, light microscopes capable of fluorescent microscopy and imaging. This lab, used primarily for cell and developmental biology classes, is also designed to provide student driven imaging, shown to be one of the best practices in science education. It is housed in space carved out of a storage room, which also houses our icemaker. It is poorly ventilated and has cabinetry that does not fit the current use.
Jeager Teaching Science Museum – The Jeager Museum serves several functions. As a teaching museum it functions as storage and display facility for specimens used in Animal Biology, Plant Biology and Environmental Biology. It also houses specimens used in General Geology, a requirement for both the Environmental Biology track, Environmental Management and for the teaching credential. This room contains a diverse and amazing array of exquisite specimens. These are very useful in our outreach efforts. However, the museum is cluttered and suffers the same pot bound syndrome that characterizes most of our facilities. The collections

have simply outgrown the space. The importance of a Science Museum is underscored by the CSU mandate that every campus, regardless of size, must have a Science Museum of no less than 3,000 sq. ft.*.

Stockroom, storage and sample preparation – The stockroom is about one third the size that it should be. Reagents, dry chemicals, volatile organics, acids and bases are housed in the same space with a hood that often malfunctions. Refrigerators/freezers are filled to capacity and diversity specimens are crowded into two cabinets. There is only one small sink and bench space is extremely limited. A second space that was previously reserved for senior thesis work now functions as an extension for media and apparatus storage. This room also houses our ultrapure water supply and our autoclave. The bench space in this room used to be used for senior projects. However, the growth of the program has precluded use by students other than for transient preparative work.

*** CAPITAL PLANNING, DESIGN AND CONSTRUCTION SECTION VI - STANDARDS FOR CAMPUS DEVELOPMENT PROGRAMS section 9073 (Science Museum Standards)**

4. Offices:

All full time faculty have offices although the size and quality varies considerably. A decade ago all but one faculty member had adequate office space with a limited preparation/storage area. This is considered standard minimal accommodations for liberal arts science faculty. However, we have had to sacrifice office space to meet other critical departmental needs. Now, only one of the seven faculty has prep/research space. All of the others have had to divide their offices to create space for new offices, instrumentation facilities, teaching labs etc. Professor Weaver is relegated to a windowless poorly ventilated office in Founders and we have two new full time tenure track faculty coming for which we currently have no space. We have one small shared office for part time faculty with two desks that is currently accommodating one full time (nontenure track) faculty member and seven part time instructors. Grant funded support staff have been accommodated in the two molecular research labs and desks added to full time faculty offices.

Projected Space and Facility Needs

The Biology Faculty have carefully considered our current and projected space needs. It is clear that additional space and renovation must be added in the near term to handle our new faculty and a majors complement that has more than doubled. Appendix N1-N3 describe three renovations/additions that will provide some relief in the near term. These proposals would enhance existing labs MA252 and MA256, to provide ease of movement with OHSA approved stools and increase student capacity per lab. Additional office and lab space will also need to be found. A proposed addition to Mainiero will help meet many or the field biology needs in addition to needs of other departments.

It is clear however that the continued success of the Biology programs will require new facilities. Therefore, the faculty have assembled an estimate of needs and uses needed for the long term health of the Biology Programs and the University as a whole. In doing the faculty drew upon direct experience in the current environment, comparisons with our traditional comparison group, and site

visits to broader range of institutions including community college and R1 universities. The resources and advice of members of the PKAL Learning Spaces group have also helped in preparing a plan that avoids common pitfalls and provides a way to develop facilities that are truly tailored to meet La Verne's mission and needs. The design of the spaces is particularly important based on factors as diverse as occupant perception, learning efficiency, current use(s), flexibility to meet future use, aesthetics, and environmental footprint.

Extensive discussion of design features is premature and beyond the scope of this document. While the recommended process is clear, the specifics will be generated as a function of the project itself. The need for continuous and extensive faculty input into the planning and execution process, at all stages of the capital project, has been underscored by the PKAL/AAC&U as well as those that have been through the process. The chances of a successful outcome are greatly diminished without this input. However, it is necessary and appropriate to provide a summary of the spaces needed and approximate areas as a starting point for further planning. Appendix XX contains the Biology Faculty's initial estimate of current and projected space and facility needs. These items and size were determined with care using the resources discussed above.

Biology Space Requirements

Last revised: 6 10 12

All measurements in square feet.

Estimated space requirements:	**Current space for Biology Program**	
Estimated Cost:	Required primarily Biology space	16350
	Classrooms etc.	

Classrooms (with multimedia and digital capabilities)	**#**	**Cap.**	**Space Each**	**Est Space**	
Large lecture/Seminar venue	1	150	4000	4000	
High Capacity Lecture Rooms	1	75	1500	1500	
Medium Capacity Lecture Room	1	50	1000	1000	
Low Capacity Lecture Room	1	35	750	750	
				7250	Classroom space (shared)

Conference and study areas (with windows if possible)					Most in central complex for easy access
Small Conference Room	1	15	350	350	
Student study area/lounge(s)	1	25	500	500	1 embedded in ea Science Dept

				1700	
Laboratories					
Biology					
Large Intro Labs	2	28	1500	3000	1 w/ enh. Ventil. For dissections + 1 hood ea.
Aquatic and Field Biology	1	24	1000	1000	1 hood
Molecular Biology	2	20	1000	2000	1 chem hood in one lab
Microbiology	1	20	1000	1000	Transfer hoods
Microbiology prep, culture and incubation	1		500	500	Autoclave, incubators, chem hood, shakers . .
Stockroom/Storage	2		500	1000	1 lg prep hood, vented storage
				8500	
Faculty/staff offices					
Full Time Faculty	8		250	2000	
Part Time/Visiting Faculty	2		200	400	
Program Support Staff	3		150	450	
				2850	
Faculty-Student Research Labs					
For Faculty and Senior Thesis Research	10		500	5000	
				5000	
				15200	Dedicated Biology
Natural Sciences - Shared facilities with other programs					
Large Intro Lab	1	28	1500	1500	
Sample Prep and collections management	1		500	500	ground floor nr intro lab, sm hood
Museum	1		2000	2000	Secure
Greenhouse Faciilty (1500 greenhouse proper)	1		2000	2000	Roof? Incl autoclave
Animal Care Facility	1		1200	1200	Specifics to meet needs and USDA req.
Storage and staging	1		1000	1000	Ground near parking or dock
Storage (one hazardous complex)	2		500	1000	Haz. must be separate or attached bldg
				9200	

Central Instrument Facilities (Shared)

Autoclave/media prep/ultrapure water/washing etc	1		500	500	Heat load/240V, prep hood, canopy hood
Centrifugation/Ice (1by biochem, 1 in molec bio)	2		200	400	Heat load/240V molec bio w/ micro incub/ ^vent.
Chromatography-Mass Spectrometry GC, GC/MS, HPLC, HPLC/MS	1		750	750	Heat load/240V snorkel hoods Outlet intense
GIS	1		200	200	Ferromagnetic walls for maps
Imaging (6 rooms, ground floor away from traffic and eqpt.)	1		1750	1750	
AFM, STM (ea. Desk size)			*200*		Vibration sensitive
Confocal			*150*		
LM			*250*		
Sample Prep			*400*		
SEM/EDS			*400*		Vibration sensitive
TEM			*350*		Vibration sensitive
Interdisciplinary Computational Research Lab	1		200	200	
Machine and Electronics Shop	1		1000	1000	Snorkel hoods, 240V
Spectroscopy					
FTIR, UV-Vis, Spectrofluorometry, NIR	1		500	500	
AAS, ICP/MS	1		500	500	Ventilation, snorkel hoods
NMR	1		1250	1250	Special thermal envir. +/-1C, Virbr. & EMF sensitive, snorkel hoods
XRD	1		500	500	
Cold room	1		500	500	
				8050	

Biology Space Faculty FT: 8

Last revised: 6/8/12

MA150*	Support/storage	150

MA 156*	Lab	1073
MA 252	Lab	971
MA 256	Lab	725
MA 259	Small Molec /Tissue Culture Lab	653
MA 261	Large Molec Lab	971
MA 158*	Imaging Center	296
MA 158B	JJ Office	182
MA 254	Prep/storage	435
Animal Room	Prep/storage	356
MA 255	Autoclave	319
MA 250	JB/JT Office	319
MA 258	JG Office	261
MA 253	Prep/storage/microscopy	246
MA 257	CB Office/2	131
FH3	Lab	247
FH109A	SDN Office	132
FH109B	HC Office	115
FH109C	KW Office	132
FH109D	TL Office	110
		7823

Labs	Offices	Storage/Prep	Total
4936	1382	1506	**7823**

No dedicated classrooms are available for Biology, thus classroom space is not included.

This does not include the two "hobby" greenhouses.

The field station is also not included because of its remoteness.

* = indicates shared division resource with majority Biology use

F. **Funded Grants**

NSF - CCLI - Course, Curriculum, Lab, Instruction	Grant	Federal	$147,547
State of Washington Grant -- Forestry Service	Contract	State	$21,300
US Dept of Ed - Title V, STEM - Science, Technology, Engineering, Math	Grant	Federal	$2,928,446
NSF - R. Noyce Teacher Scholarship	Grant	Federal	$899,746
NIH - R15 AREA - Academic Enhancement Research Award	Grant	Federal	$203,000
NIH - R15 supplement #1	Grant	Federal	$57,346
State of Oregon -- Forestry Service	Contract	State	$2,500
NIH - R15 supplement #2	Grant	Federal	$9,387
NIH - R15 supplement #3	Grant	Federal	$57,346
USDA - HSI Education Program Award	Grant	Federal	$244,000
Developing a Model Pathway To STEM Degree Completion for Hispanic Students Through Targeted Outreach, Research-Based Teaching and Learning Reform, and Model Articulation	Contract	Federal	$1,449,499
Scientific Inquiry and Process: A Design for the Times	Grant	Federal	$199,998
		Total	$6,220,115

G. **Publications**

1. **Weaver, K.F**., Weaver, P.F., and Guralnick, R.P. Origins, diversifications and conservation status of talus snails in the Pinaleño Mountains: A Conservation Biogeographic Study in the Sky Islands of Arizona. Animal Conservation, *In press.*

2. Regulation of mitochondrial glutathione redox status and protein glutathionylation by respiratory substrates. **Garcia J**, Han D, Sancheti H, Yap LP, Kaplowitz N, Cadenas E. Journal of Biological Chemistry. 2010 Dec 17;285(51):39646-54. Epub 2010 Oct 11.

3. Determination of GSH, GSSG, and GSNO using HPLC with electrochemical detection.Yap LP, Sancheti H, Ybanez MD, **Garcia J**, Cadenas E, Han D. Methods in Enzymology. 2010;473:137-47. Review.

4. Role of nitric oxide-mediated glutathionylation in neuronal function: potential regulation of energy utilization.Yap LP, Garcia JV, Han DS, Cadenas E. Biochemistry Journal. 2010 Apr 28;428(1):85-93.

5. Diaz, S, Farhang B, Hoien J, ***Stahlman M**, Adatia N, Cox JM, Wagner EJ. Sex Differences in the Cannabinoid Modulation of Appetite, Body Temperature and Neurotransmission at POMC Synapses, Neuroendocrinology. Jan 9, 2009

6. Li-Peng Yap, **Jerome V. Garcia**, Derick Han, Enrique Cadenas, The Energy-Redox Axis in Aging and Age-Related Neurodegeneration, Advanced Drug Delivery Reviews, August 27, 2009

7. Madhuri M, **Broussard C** (2008) Do I need to know this for the exam? Using popular media, inquiry-based laboratories, and a community of scientific practice to motivate students to learn developmental biology. *CBE – Life Sciences Education*, Spring; 7(1):36-44.

8. **Novak S**. D., ***Pardiwala R.S**. and ***Gray B.L.** (2008) A study of NaOCl–induced necrosis indicates that only half of the embryo is required for seedling establishment in *Spathoglottis plicata. Lindleyana* 21(3):32-8.

9. **Weaver, K.F**., Perez-Losada, M., Guralnick, R.P., Nelson, A., Blatt, S., and Crandall, K.A. (2008) Assessing the conservation status of the land snail *Oreohelix peripherica wasatchensis* (Family Oreohelicidae). Conservation Genetics 9:907-916. [doi: 10.1007/s10592-007-9415-y].

10. Anderson, T., **Weaver, K.F**., and Guralnick, R.P. (2007) Patterns in morphological variation in Oreohelicid Snails in the Black Hills of South Dakota and Wyoming. Journal of Molluscan Studies 73(2): 129-137. [doi:10.1093/mollus/eym006].

11. **Broussard C**, Fleischacker C, Horai R, Chetana M, Venegas A, Sharp L, Hedrick S , Fowlkes BJ, Schwartzberg P (2006) Development of a novel CD8 lineage in mice deficient in the Tec family kinases Itk and Rlk. *Immunity* 25: 93-104.

12. **Weaver, K.F**., Anderson, T., and Guralnick, R.P. (2006) Combining phylogenetic and ecological niche modeling approaches to determine distribution and historical biogeography of Black Hills Mountain Snails (Oreohelicidae). Diversity and Distributions 12: 756-766.

13. Derick Han, Rafealla Canali, **Jerome Garcia**, Rodrigo Aguilera, Timothy K. Gallaher, and Enrique Cadenas (2005) Sites and mechanisms of aconitase inactivation by peroxynitrite: modulation by citrate and glutathione, Biochemistry, volume 44, number 36, pg 11986-11996

* Undergraduate student

H. University of La Verne Biology Alumni Survey Analysis

Tell Us About Yourself

Which campus/center did you attend?
- Central Campus, La Verne 100%
- Central Campus, CAPA (Campus Accelerated Program for Adults)

What was your status upon entry into ULV?
- Freshman, what year?:_____ 90%
- Transfer, what year?:_____ 10%

What was your major?
- Biology 100%
- Environmental Biology
- Environmental Management
- Natural History

Did you have a minor?
- No 95%
- Yes, please specify:_____ 5%

In what year did you graduate?
- _____

What is your gender?
- Female 80%
- Male 20%

What is your ethnic background?
- Caucasian 35%
- African American 5%
- Asian 15%
- Latino/Hispanic 40%

- Pacific Islander 0%
- Native American 0%
- Multiethnic/Multiracial 5%
- Other, please specify:_____

Academic Experience at ULV:

Analysis: Each answer was given a number in order to average the responses. The answer that was the most positive, with respect the University of La Verne and/or Biology Department, was given the highest value. For example in question #8 the "strongly agree" answer is the most positive and therefore given the score of 4 while agree 3, disagree 2, and strongly disagree 1. Each survey filled out contributed a number for question #8 and those numbers were averaged. The average number for question #8 was 3.6 suggesting the average answer is strongly agree.

8. **The ULV Biology Department offers a high quality academic program.**
   - Strongly agree 3.6
   - Agree
   - Disagree
   - Strongly disagree

9. ULV Biology Department has adequate teaching resources.
   - Strongly agree 3.5
   - Agree
   - Disagree
   - Strongly disagree

10. The Biology faculty actively engages students in learning.
   - Strongly agree 3.8
   - Agree
   - Disagree
   - Strongly disagree

11. The Biology faculty demonstrates a strong knowledge base.
   - Strongly agree 3.8

- Agree
- Disagree
- Strongly disagree

12. The faculty promotes critical thinking (evaluation, analysis, synthesis) in Biology courses.
    - Strongly agree 3.6
    - Agree
    - Disagree
    - Strongly disagree

13. How well, do you feel, did faculty of the Natural Sciences Division define and explain the basic principles and concepts of the life and physical sciences?
    - Not well
    - Somewhat well
    - Quite well
    - Very well 3.6

14. How well did Biology Department faculty demonstrate and prepare you in understanding the discovery process of science?
    - Not well
    - Somewhat well
    - Quite well
    - Very well 3.6

15. How well did the ULV Biology Department prepare you to analyze problems/data?
    - Not well
    - Somewhat well
    - Quite well 3.3
    - Very well

16. How well did Biology Department faculty prepare you to do research and problem solve?
    - Not well
    - Somewhat well
    - Quite well
    - Very well 3.5

17. How well did Biology Department faculty demonstrate and prepare you in understanding the role science and technology play in society?
    - Not well
    - Somewhat well
    - Quite well 3.3
    - Very well

18. Did you feel the pre-requisite courses helped you in your major?
    - Not at all
    - Very little
    - Somewhat
    - Very much 3.6

19. Did you feel the supportive course requirements helped you in your major?
    - Not at all
    - Very little
    - Somewhat
    - Very much 3.7

20. Were you happy with the existing technology and laboratory equipment in the Department?
    - Not at all
    - Very little 2.9
    - Somewhat
    - Very much

21. Were you happy with the hands-on labs in your major?
    - Not at all
    - Very little
    - Somewhat
    - Very much 3.7

22. Wednesday science seminars contributed positively to your learning process.
    - Not at all
    - Very little 2.5
    - Somewhat
    - Very much

23. Science related clubs contributed positively to student life.
    - Yes, specify which club:_____ 100%
    - No

24. Did you take a field course in which half or more of the class was based at an off campus site, for example Baja California
    - Yes, specify which class and location:_____ 35%
    - No 65%
    - If yes please elaborate on your experience:(comment box)

25. Was the research in conducting your senior project a positive learning experience?
    - Not at all
    - Very little
    - Somewhat
    - Very much 3.9
    - Please comment further: (comment box)

26. Where was your senior project conducted?
    - On campus 40%
    - Off campus, where?:_____ 60%
    - If you marked off campus please elaborate on how you obtained that opportunity (comment box).

Life After ULV

27. Do you apply the principles, concepts, and methods of life and physical sciences in your everyday life?
    - Not at all
    - Very little
    - Somewhat
    - Very much 3.7

28. Did your ULV Biology training give you an appreciation of the interdependence of humans and their environment?
    - Not at all
    - Very little
    - Somewhat
    - Very much 3.7

29. Does your lifestyle reflect what is necessary for creating a 'sustainable planet'?
    - Not at all
    - Very little
    - Somewhat 3.2
    - Very much

30. Did you pursue further education after attending ULV?
    - Yes (go to question 31) 80%
    - No (go to question 38) 20%

31. Please specify the name of the School or Institution:_____

32. Please specify the name of the degree or certificate program:_____

33. What post-graduate degree were/are you pursuing?
    - Second Bachelor's Degree
    - Master's Degree 50% of the 80% from #30
    - Doctoral Degree 50% of the 80% from #30

34. When did you begin graduate work (select the most accurate answer)?
    - Within 3 months after graduating from ULV
    - Within 1 year after graduating from ULV
    - Within 2 years after graduating from ULV 2.8
    - More than 2 years after graduating from ULV

35. How well do you feel your ULV Biology education prepare you for Graduate/Professional School?
    - Poorly
    - Fairly well
    - Well 3.4
    - Very well

36. How well do you feel you were prepared for Graduate/Professional School compared to your fellow graduate students from other universities?
    - Less prepared than most
    - Equally prepared 2.4
    - Better prepared
    - No basis for comparison
    - Not applicable

37. What is the highest degree you have obtained?
    - Bachelor's Degree 1.3
    - Master's Degree
    - Doctoral Degree (PhD, EdD, or?_____ - please circle)

38. Are you currently employed in a job related to your major?
    - Yes, please indicate job title:_____ 1.7
    - No, please indicate job title:_____

39. Did you find employment in a biology-related job following ULV graduation?
    - Yes, within 3 months following graduating from ULV
    - Yes, within 12 months following graduating from ULV
    - Yes, within 2 years following graduating from ULV 2.5
    - Yes, but more than 2 years after graduation from ULV.
    - Yes, but only after I completed my graduate education.
    - No, I was unable to find employment in a biology related job

40. How well were you prepared at ULV for your career compared to your peers from other universities?
    - Less prepared than most
    - Equally prepared 2.3
    - Better prepared
    - No basis for comparison

41. How well were you prepared at ULV to deal with diversity issues in the workplace compared to your peers?
    - Less prepared than most
    - Equally prepared
    - Better prepared 2.6
    - No basis for comparison

42. If you were to enter college all over again to obtain a B.S. or B.A. in Biology, which of the following options would you select.
    - Still attend the University of La Verne 2.7
    - Attend another private university
    - Attend a state college or University
    - If you chose to attend another college or University please explain why (comment box).
        i. Tuition
        ii. Too expensive
        iii. Classes getting too big

I. Biology Department Student Focus Group

Student Focus Group Report

Prepared by Michelle Alfaro
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November 21, 2011

Executive Summary

The Biology department program review process included one student focus group that was conducted on November 16, 2011 in Biology 499, the senior seminar course. All students participating in the focus group are biology majors at the University of La Verne; however, the all come from various backgrounds and ranges in age. Participants identified key aspects of the biology program that included challenges within the department as well as in various courses, interaction with the faculty, and possible improvements for the program and department. A summary of the findings is provided in the following write-up.

Purpose

The goal of the focus group was to gather student feedback regarding the strengths and challenges of the biology department, the faculty, the program, and overall opinions held by the students.

Methods

Participants

All students who volunteered to participate in the focus group are in the final year of their baccalaureate program. The participants included both male and females who are traditional, undergraduate students at the University of La Verne. All participants are biology majors at the university, and all are working on their senior capstone project.

Procedure

The focus group was conducted during the Biology 499 course (senior seminar). All students agreed to participate. Students were informed that their comments would be kept confidential and that identifying, demographic information would neither be recorded nor provided in the final summary. The course professor was contacted by the program reviewer for permission to allow students to participate in the focus group during regular class time. The professor agreed and the focus group leader conducted the session without

the presence of the instructor. The students in the focus group gave verbal consent to participate. Students' comments were recorded on paper.

Instrumentation
The following questions were used to guide the focus groups:
1. What are the strengths of this program?
2. What are the weaknesses of this program? How would you like to see these weaknesses improved?
3. What opportunities could the department program use to make improvements?
4. What additional comments would you like to include?

After the focus group was completed, student comments were subjected to a thematic content analysis to identify underlying themes.

J. Senior Exam and Thesis Performance

ULV Biology Senior Exam Scores (2006-2011)

Name	2006	Name	2007	Name	2008	Name	2009	Name	2010	Name	2011
BIOL	%	BIOL	%	BIOL	%	BIOL	%	BIOL	%	BIOL	%
MA	43*	AA	70	LB	53	ZA	61	BA	55	PV	42*
CA	56	BB	40*	JD	69	MF	61	AM	58	LL	51
JD	58	DB	50	NL	55	CG	65	CM	49	PE	54
AG	50	BM	54	MC	56	ML	77	FM	63	RM	50
CM	50	VN	50	EM	39*	RM	50	LN	35*	MD	56
SM	51	RN	57	APa	74	MM	58	DS	45	CZ	64
SO	50	JN	52	Apo	74	VM	44	VP	64	CT	70
TP	50	LR	50	JV	55	KP	65	ER	0**	HG	52
TW	52	CR	58	LW	36*	MR	37*	TR	55	CK	59
EM	49	AV	53	RC	64	LW	36*	GW	46*	MM	75
		MA	50	MC	78	SS	49			WO	54
		NC	53	CE	61	SP	?			MC	61
		JO	51	EM	41*					MB	66
				GR	57					SO	50
				KE	62					JM	75
				BG	67					AA	59
				MR	51						
				NC	53						
Mean scores	51%		53%		58%		56%		54%		59%
				ENV.	BIOL	ENV.	BIOL	ENV.	BIOL		
				MN	85%	JS	Pass	AM	88%		
				MR	80%			AP	85%		
Initial Pass %	90%		93%		85%		91%		75%		93%

Ultimate pass%	100%	93%			83%	93%
No. stdts	10	13	20	13	12	16

Notes:

- BIOL Pass rate: 50**%.;** ENV. BIOL pass rate: 70%
- * = non-passing; ** caught cheating
- First try pass rate = 87%. Ultimate pass = ~91% (two students 'pending')
- Non-passing in subsequent attempts: ~10% (final number pending)

K. Senior Thesis Performance

Senior Project/Thesis Evaluation and Completion Rates

For the past eight years, the University of La Verne's Biology faculty have actively sought to revise departmental programs to best address student needs, and to better prepare students for participation in an increasingly technological society. One problem identified in 2003, was that only 20-30% of biology majors were successful in completing their degree requirements within a normal four-year time frame. When surveyed, students responded that the number one challenge to finishing on time was completion of the senior project, a capstone mentored research experience. Furthermore, too few students were considering graduate and professional training, though the faculty felt they would qualify and do well in such programs. It seemed that students appreciated and understood theory, but had little experience or confidence with current technology in some courses. We hypothesized that giving students more hands-on experience with modern research techniques would improve on-time completion rate, performance in the BIOL 499 capstone experience, and increase participation in graduate programs.

The faculty elected to address the above concerns in three ways. First, we sought to redesign the curriculum, adding the course Research Methods and Biostatistics (BIOL 379), which was subsequently expanded into two courses, Research Methods (BIOL 379) and Biostatistics (BIOL 380), and also to add an additional semester of Senior Seminar (BIOL 499A, 499B) to provide a more structured experience for the capstone senior project. Secondly, efforts were undertaken to update and acquire additional equipment (fluorescence microscopes, microinjection/ microsurgical instrumentation, digital imaging) to enhance exposure to current technology and thus improve choices students have for capstone projects. Finally, the department began to incorporate new pedagogical strategies in laboratories to engage students in learning and provide earlier experiences with science process.