Biology Establishes Learning Goals

In addition to acquisition of facts and concepts, Biology undergraduate majors should also acquire skills and perspectives relevant to the study of biology. The learning goals described here not only prepare students for a variety of career paths, but also provide tools for life-long learning in the rapidly evolving world of biological sciences. The following skills and perspectives are necessary for biology graduates.

Skills
1.  Observing and describing nature accurately, (2) constructing logical arguments in biology, (3) criticizing logical arguments in biology, (4) communicating ideas and arguments effectively, orally and in writing, (5) working effectively in a team, (6) applying problem-solving to learning, (7) applying quantitative reasoning to biological questions.

Perspectives
1.  Appreciating that learning changes "how one thinks" as well as "what one knows", (2) appreciating self-motivated, curiosity-driven learning, (3) approaching novel problems with flexibility, creativity, and confidence, (4) appreciating the interconnectedness of knowledge, (5) appreciating that the pursuit of science can be exciting and fulfilling, (6) acquiring confidence in oneself as a college-trained biologist, (7) appreciating the diversity of living things and the diversity of approaches used to study them, (8) appreciating the impact of biological science on the environment and society.

These learning goals emphasize the overriding importance of skills and perspectives, and imply the secondary nature of the knowledge base. Indeed, many fields in biology advance so rapidly that a curriculum based primarily on factual content is outdated within a short period; in contrast, skills relating to the scientific method, logical reasoning, problem solving, communication, and information sources, have an indefinite life span. At a recent end-of-year awards ceremony, Dean Linda Slakey pointed to the Biology Department's learning goals as a model by which other departments' curricula might be refreshed.

Chairman Woodcock's Corner

The 1999/2000 academic year has been remarkably busy in the Biology Department, and very successful in many respects. A major event was the Academic Quality Assessment and Development (AQAD) review mandated by the trustees for all UMass programs on a seven year cycle. We were a guinea pig department, in the first round of reviews. The 120-page self-assessment document was two-inches thick, and was sent to four distinguished biologists at peer institutions in the USA. This March the external review panel visited for two days of intensive meetings with students, faculty and administrators. The reviewers reported that the Biology faculty have thoroughly engaged in the restructuring of the Biology curriculum for more faculty to balance the demands of the strength of the Biology Department, and its crucial need for more faculty to balance the huge increase in student interest. Here are a few excerpts from that report:

"The AQAD review team was simply overwhelmed by the enthusiasm and commitment that the Biology faculty have shown for their ongoing work. The University recognizes the centrality of basic biology in the mission of the University, and to have the University take whatever steps are necessary to adequately support the Biology Department."

For the text of our self-assessment or the full external review, e-mail chair@bio.umass.edu.

The process now moves to the second stage, a University-wide review, and, as usual, a great privilege for me to chair such an active and committed group of students, faculty, and staff. We must make sure the administration is aware of the recommendations of
Beneath the Connecticut River

In 1994, Dr. Ed Klekowski began exploring the Connecticut River which rises in northern New Hampshire and, on its way to LI Sound, passes through Vermont, Massachusetts, and Connecticut. Using scuba gear, Ed and a team of colleagues, and undergraduate and graduate students have come upon what appear to be an old dam, pieces of a train, the remains of a railroad trestle thought to have been ripped from its moorings by the flood of 1936, and remnants of the nation’s oldest canal built in 1792-95 near South Hadley. They have recovered anchors and variously colored glass elixir bottles. In August 1997, diving team members, grad students, Monica O’Guinn and Sean Werle, discovered a 120-foot-deep abyss. It was named King Philip’s Abyss in homage to Metacomet, the Wampanoag Indian chief who fought to drive English colonists from the Connecticut River Valley. Denizens of the river encountered by Ed and his divers include the yellow lamppussel, Lampsis cariosa, a freshwater clam (figured right) thought to have disappeared from the river 30 years ago, sponges the size of dinner plates, flatworms, mussels, eels, wall-eyed pike, and an abundance of the large green alga Chara as well as the bryozoan Pectinatella magnifica, a primitive filter-feeding animal. Clay deposits at the bottom of the river have yielded a new species of red bloodworm, Axarus varvensis.

On the bottom of the deepest parts of the river, Ed and his team have come upon varves, large stratiform sediments of clay and silt that were apparently formed when, with the waning of the most recent ice age, a massive body of water known as Lake Hitchcock (map right) covered the area between New Britain, CT and St. Johnsbury, VT. Some of the artifacts reclaimed from the bottom of the river are currently on display at the Springfield Science Museum. The exhibit, entitled “The Underwater World of the Connecticut River”, features an eight-minute videotape that focuses on the archaeological, biological and historical treasures of the river. The exhibit is the first collaborative effort between the Springfield Science Museum and the University of Massachusetts, Amherst. Another display documenting the underwater world of the Connecticut was exhibited at the Connecticut River Museum in Essex, CT last summer. The underwater exploration of New England’s largest river has led to the construction of a web site by Ed and project historian Libby Klekowski. It offers much interesting information about the biology, history and geology of the Connecticut River, URL: www.bio.umass.edu/biology/conn.river/

Darwin Fellows Enhance Biology Family

The Darwin Fellows Program, now in its fourth year, brings promising young postdoctoral researchers to the Organismal and Evolutionary Biology (OEB) Program at UMass Amherst. The Darwin Fellows Program awards two two-year fellowships and enables the recipients to undertake a unique combination of teaching and research responsibilities that are excellent preparation for academic positions. The fellowship program embodies the interdepartmental collaboration that characterizes the OEB Graduate Program. Darwin Fellows are active participants in OEB, acting as mentors to graduate students, conducting research, leading seminar courses, and teaching courses in the Biology Department.

Our current Darwin Fellows are Dr. Andrew Hendry, and Dr. Jim O’Reilly.

Dr. Hendry (right, with whale bones) is an evolutionary ecologist with a B. S. from U. Victoria, BC, and a M. A. and Ph.D. from U. Washington, Seattle. His research interests include (1) interactions between selection and gene flow during adaptive population divergence, (2) spatial and temporal scales of population structure, and (3) patterns and rates of micro-evolution in contemporary populations. Through collaboration with other biologists, Andrew’s work integrates theoretical modeling, molecular genetics, field and laboratory experiments, and surveys of biological diversity at varying scales.

Dr. O’Reilly (right, with a caecilian, a tailless legless amphibian) earned his Ph.D. at Northern Arizona University. Jim taught comparative vertebrate anatomy in the spring of 1999 and 2000. His research interests include (1) the evolution of the physiological basis of movement in vertebrates, (2) the emergence of novel complex functional systems during vertebrate evolution, and (3) the natural history of reptiles and amphibians.

Previous Darwin Fellows, who have moved on to positions at other institutions, are:

Dr. Karen Kellogg, Ph.D. Penn State University ’97, is a behavioral ecologist studying the evolutionary processes that gave rise to the diverse cichlid fishes of Lake Malawi, Africa. She is currently a Teaching Associate in the Environmental Studies Program at Skidmore College where she is helping to establish the environmental studies major.

Dr. Andrew Simons, Ph.D. University of Alabama, is a molecular systematist who investigates the evolution, morphology, behavior, and biogeography of fish. He is an Assistant Professor in the Department of Fisheries and Wildlife at the University of Minnesota.

Dr. Alison Hunter has a Ph.D. in ecology from McGill University (’92); her background is in terrestrial population and community ecology. She is currently Research Assistant Professor at the University of Notre Dame.

Dr. Paul Morris, Ph.D. Harvard ’91, specializes in invertebrate paleontology. Currently, Paul is the Academy Malacologist at The Academy of Natural Sciences in Philadelphia.

It is clear, that by providing growth opportunities to biologists at the beginnings of their careers, the Darwin Fellows Program has enriched the entire biology family.
Letters from Alumni

Webster A. Chandler, B.S. '37: I was one of R. E. Torrey's students who went on in plant science-Cornell and Penn State (5yrs army in between). I enjoyed walks with him ... Keep up the good work!

Frank Wing, B.S. '40: I trust a forthcoming newsletter will pay tribute to Dr. Gilbert L. Woodside. As a scholar ... and all round great person, I can think of no one in my undergraduate career who influences me more....

Eugene H. Varney, B.S. '49: It is sad to see Botany and Zoology (merged) but a three fold increase in majors more than compensates for the loss of identity. I'll also join the current trends and access the newsletters via the web....

Bob Marquis, B.S. '58: ... retired after spending 35 years in the pharmaceuticals industry (Merck) in sales and marketing. My scientific training at UMass helped a great deal....

Elliot Rosenfield, B.S. '62: Biology background allowed me to establish a medical practice niche in my CPA firm ...

Richard C. Franson, B.S. '65: Wonderful article: BioMass #1 on Dr. Wilce.

Austin Platt, M.A. '63, Ph.D. '65 and Pamela Platt, M.A. '66: Immensely enjoyed the articles about Ted Sargent's reminiscences and Dana Snyder's video about ... antique farm machinery.

Gail Buckley-Rudick, B.A.'65: M.D. in 1969... Two children.

Vicki Litt Merten, M.A. '68: Whatever happened to Dr. Ryan Drum, Dr. Bigelow? [Ed: Dr. Drum is a lecturer at Dominion Herbal College. Dr. Howard Bigelow is deceased and his wife Dr. Margaret Bigelow has retired to British Columbia. She has endowed the Margaret E. and Howard E. Bigelow Award which is administered by the OEB Program and helps fund research and publication in the area of organismal and evolutionary biology.]

Martha Adams McMahon, B.S. '70: Despite the fact that molecular bio did not exist when I was there, I got a good enough background ...

John Jenkins, B.S. '72: My biology roots are alive and well ... farming in Vermont

Celia Hooper, B.S. '75: Alive and well; working ... a career in science writing ...

Charles "Dana" Bangs, B.S. '77: ... supervising the clinical cytogentic lab at ... UCSF Stanford Healthcare.

Michael Brugger, B.S. '79: Proud father of identical twin boys ...

Beth Badstubner, B.S. '80: It's great to have the new "Biology" designation. ...

Donna Saatma, B.S. '92: I would love to see a web site that would allow alumni to track down classmates. [Ed: Were working on it!]

Kathy Uciniski, B.S. '95: Hope Prof. Sargent enjoys retirement ...

Heather Lebel, B.S '98: I have worked this year ... and am anxious to return to academia.

(see all the alumni mail, unexpurgated, at URL: www.bio.umass.edu/biology/alumni/links/alum_response.html)

Keep in touch using the various avenues provided:

- Jot down your comments and send them to:
  Biology Alumnus Newsletter
  Biology Department
  University of Massachusetts
  Amherst MA 01003-5810

- Use the electronic route via the Biology Alumni Forum where you can leave Email messages for all participating Biology alumni.

We hope you will keep in touch with us and your fellow classmates.

The BioMass Staff

STEMTEC Sparks Change in Teaching

The Science, Technology, Engineering, and Math Teacher Education Collaborative (STEMTEC) is aimed at improving math and science teaching from kindergarten through college and is spearheaded by physics professor Morton Sternheim at the University of Massachusetts.

The project has received a $5 million, five-year grant from the National Science Foundation (NSF). The grant is one of three such awards made across the nation by the NSF each year. STEMTEC participants include the University of Massachusetts, Hampshire, Amherst, Mount Holyoke, and Smith Colleges, Holyoke, and Greenfield Community Colleges and Springfield Technical College. Public schools in Springfield, Amherst, Holyoke, Hadley, Northampton, South Hadley, and Franklin County are also included.

Two Biology faculty have participated in the STEMTEC project, Dr. Joe Kunkel and Dr. Steve Brewer.

Joe Kunkel has used the principles learned in his STEMTEC experience to modify the Writing in Biology course he teaches to juniors which emphasises the skills needed by biologists to communicate effectively, whether that be orally or in writing.

STEMTEC support was used by Steve Brewer to incorporate new technologies into the introductory biology laboratories. One new laboratory uses the Biology WorkBench (URL: workbench.sdsc.edu), a web-based bioinformatics site which allows students to work with protein and nucleic acid sequence data. In the laboratory exercise, students begin with a short amino acid sequence, conduct a BLAST search to find similar sequences, perform an alignment to find conserved regions in the sequence, and then use a three-dimensional visualization package to ‘color in’ amino acids in the sequence to visualize the homologies. Students were able to rotate the molecule in three-dimensions and use various visualization techniques to allow them to formulate hypotheses as to why the amino acid sequences of certain regions were conserved. Students worked in small groups and made presentations on their molecule and its conserved regions to the rest of the class. Hypotheses they had developed were discussed.

Alumni Support

Our alumni should realize how important they have been and can continue to be to the Biology Department. For years, alumni, now situated in academic departments throughout the U.S.A. or holding nonacademic positions, have been invaluable to our recent graduates by providing advice and help in locating support for graduate studies and finding jobs. We want to remind all alumni that help from nonacademic quarters is more important than ever. If you would like to be on our list of potential contacts, please send a brief description of your field of work with advice on the most appropriate way to contact you to Ed Davis or Bruce Byers, Biology Department, Morrill Science Center, U. of Massachusetts, Amherst, MA 01003 or by Email to bbyers@bio.umass.edu. We have many student requests to have individuals with "real life" jobs (i.e., nonacademic ones) come speak with them. Should you be available for such talks with small student groups, or for one-on-one conversations, please let us know.

The Biology Department is continuing the scholarship funds started in the former Botany and Zoology Departments and established with alumni contributions. They include the Ray Ethan Torrey Scholarship for undergrads in the plant sciences and the Bill and Margaret Nutting Scholarship in field biology. In addition, the newly created Massachusetts Museum of Natural History would appreciate alumni support. Beyond specific funds, the Biology Department greatly appreciates unrestricted contributions. University budgets have been tight for many years and alumni contributions have become an extremely important source of funds for many initiatives for our students. If you respond to the annual UMass Telethon you should know that you can direct your donation or a portion of it to Biology.
New Faculty Profiles

In January 1999, the faculty welcomed Rolf Karlstrom to the Biology Department. Dr. Karlstrom comes to us with a B. S. from Northern Arizona University, a Ph.D. from the University of Utah and postdoctorals at the Max-Planck Institute for Developmental Biology at Tübingen, Germany and the Skirball Institute of New York University Medical Center. Rolf is featured in the Zebrafish article on page 1 of this issue. Shown here (left to right) is Biology Department Chairman Chris Woodcock at the opening of the new Zebrafish Breeding Facility which Rolf (with daughter astride hip) directs.

Last February we welcomed Yin-Long Qiu to the Biology Department. Dr. Qiu is our long awaited plant molecular evolutionist. Y-Q received a B. S. from Nanjing Agricultural University, PRC, and a Ph.D. from University of North Carolina, Chapel Hill. He spent three postdoctoral years at the University of Indiana with Jeffrey Palmer, one of the world's leaders in plant molecular evolution. He then accepted an Assistant Professorship at the Institute of Systematic Botany at the University of Zurich, Switzerland. Y-Q will join Ron Adkins, our recently hired mammalian molecular evolutionist, featured in BioMass Issue #1 "New Faculty Profiles", strengthening molecular evolution within our department.

Just at press time we received news that Jeffrey Podos, our prime candidate for the behavioral ecologist position, has signed on to come to UMass this fall. Dr. Podos comes to us with a B. A.

Help Us Help You

As you can see from the articles in this issue, the Biology Department has not been standing still since the last BioMass Alumnus Newsletter. If you feel you are not participating in this movement, all we can say is "Come on down"! We need your help and participation to make our efforts meaningful. Certainly, communicate with us via the return card or by Email. If you have an answer to alumni posed questions, why not write or Email us via the Alumni Forum. We will continue to publish thoughts you wish to share with your fellow alumni on our WWW page as well as in issues of this newsletter.

You may also be interested in how many of your fellow biology alumni have joined the new internet age with a presence on the WWW. The alumni links page includes internet examples of both the academic and commercial exploits of our Biology alumni. If you would like your WWW page listed, or if the one listed has changed, please contact us by Email through the Alumni Forum, or write directly to Joe Kunkel at jie@bio.umass.edu.

Another link from the Biology Alumni Website provides useful professional links which can help the young biologist explore the practical aspects of alternative paths in biology. In addition, there is another link which may help an academic plan the next sabbatical. Any additional links that alumni wish to share should be Emailed to us. Help us help all our alumni!

Visit your Biology Alumni Web Page at URL: http://www.bio.umass.edu/biology/alumni/.