A Newsletter of the Department of Biological and Allied Health Sciences

Bloomsburg UNIVERSITY

BioSynthesis

Volume 5 Issue 2 (March 2006) BioSynthesis On-Line: http://departments.bloomu.edu/biology/

Fall Semester Dates

MAR 24 — 26: CPUB meeting, Kutztown University

MAR 25: Biology Club trip to Baltimore Aquarium

MAR 30 & 31: Student Research and Creative Activities Poster Session, KUB

MAR 31—APR 2: PA Academy of Science meeting, Grantville

APR 6 & 7: Health Sciences Symposium, Understanding Cancer, KUB

APR 9: Biology Club Rafting Trip

APR 14: Spring Weekend begins

APRIL 17: Classes resume at 6 p.m.

APR 22: MCAT Exam

Look what's inside:

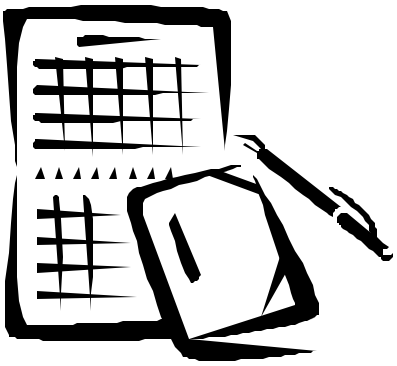
BAHS Alumna to Address Health Sciences Symposium

This year's Health Science Symposium will feature BAHS alumna Lynn McCormick Matrisian,'75 (pictured above at right.) Dr. Matrisian has had a distinguished career in the field of cancer biology. She is presently the Ingram professor of cancer research and chairperson of the Cancer Biology Department at Vanderbilt University School of Medicine. She has served as Associate Director for Education and Training and the Program Leader for the Host-Tumor Interaction Program and the Breast Cancer program at the Vanderbilt -Ingram Cancer Center. Dr. Matrisian recently completed a one-year term as president of the American Association for Cancer Research (AACR), a professional society of more than 24,000 laboratory and clinical scientists. Dr. Matrisian's research focuses on communication pathways between cells and their environment. Describing her research, she says, "We are interested in understanding the molecular mechanism that underlies cancer development, growth and metastasis. Our approach involves a combination of cell biology, molecular biology and whole animal techniques."

Dr. Matrisian is from Montgomery, PA and she began her education right here! Dr. Matrisian graduated from Bloomsburg State College in 1975 with a degree in medical technology. She initially took a position in a clinical genetics lab at the Hershey Medical Center and later went on to the University of Arizona where she earned a Ph.D. in molecular biology in 1982. Dr. Matrisian next headed to France to conduct post-doctoral work in the lab of Dr. Pierre Chambon. She was the first to clone a gene for a metalloproteinase, an enzyme that degrades matrix proteins. This proved to be significant since this gene is expressed in cancer cells, but not in normal cells. In cancer cells, the metalloproteinase is believed to play a role in breaking down the protein barriers between cells allowing tumor cells to enter the bloodstream and be spread throughout the body. Drugs that inhibit metalloproteinases are being targeted as potential cancer therapies. After returning to the United States in 1986, Dr. Matrisian joined the faculty at Vanderbilt University in Nashville, TN. To read more about Dr. Matrisian's journey from Bloom see http://www.mc.vanderbilt.edu/reporter/index.html?ID=2276

Dr. Matrisian will present the symposium's keynote address, "Understanding Cancer: How Research Can Help You" on Thursday, April 6, 2006, 7:30 p.m. in Kehr Ballroom. On Friday, April 7, 2006 at 8:30 a.m. in Kehr Ballroom, she will lead a workshop on "The Ins, Outs, and the Impact of Cancer Research." In addition to the featured speaker, the symposium will include posters and presentations by students and faculty. Among the faculty presenters is BAHS own Dr. Kristen Brubaker who will discuss "Deciphering the Mechanisms Involved in Prostate Cancer Metastasis to Bone." Awards will be given for outstanding undergraduate student posters. The symposium will also feature a Wellness Fair with over 50 exhibits (including one by our Biology and Allied Health Club) on a variety of health and wellness topics. This is always a big hit! The symposium is sponsored by the School of Health Sciences, the Central Susquehanna Community Foundation, the Provost's Lecture Series, and the University Health Center. We hope that you will join us!

Planning ahead!



Would you like to graduate on time?
Or do you want to spend an extra semester or two at Bloom?
And the secret to graduating on time is: taking your courses on time.
Since not all biology courses are offered every semester, you need to be aware of how you should schedule your courses.
How to do this:

1. visit your advisor to plan your next semester's courses,
2. make a four year plan and stick with it,
3. read BioSynthesis for articles on scheduling, and
4. read your BU e-mail for tips on upcoming courses, scheduling, etc.

When visiting your advisor, each semester, take your curriculum guide with you and update it with the help of your advisor. Add courses you have completed and are currently taking; ask your advisor for assistance about which category the gen ed's and bio electives serve.

If you are having a problem scheduling a biology course, see your advisor.
To substitute courses (e.g. Composition 2 for Writing in Biology) you need advance permission (See your advisor).

BAHS COURSES OFFERED ROUTINELY for BIO & ALLIED HEALTH MAJORS

SUMMERs	FALLs	SPRINGs
50.173 A&P 1*	50.107 Medical Term	50.107 Medical Term
50.174 A&P 2*	50.114 Concepts 1	50.114 Concepts 1
2 field biology	50.115 Concepts 2	50.115 Concepts 2
electives	50.173 A&P 1*	50.173 A&P 1*
	50.174 A&P 2*	50.174 A&P 2*
	50.231 Biology of Aging*	50.205 Intro Nutrition*
	50.240 Intro Microbiology*	
	50.242 Microbiology☒	50.242 Microbiology☒
	50.271 Cell Biology ☒	50.271 Cell Biology ☒
	50.290 Writing in Biology**	50.290 Writing in Biology**
	50.332 Genetics⃠☑	50.332 Genetics⃠☑
	50.333 Molecular Biology	
	50.351 Ecology⃠⧈	50.351 Ecology⃠⧈
	50.474 or 480 Vertebrate or	50.472 Animal Cell Physiology ☑
	Comparative Animal Physiology☑	50.477 Plant Physiology ☑
	(alternate years)	50.479 Integrated Phys Lab☑
	50.478 Microbial Physiology ☑	50.481 Sr Bio Seminar
	50.479 Integrated Phys Lab☑	50.484 Methods in Biotech***
	50.481 Sr Bio Seminar	

☒ Complete Cell Biology and Microbiology before the end of your sophomore year; most upper level courses have them as pre-requisites.
⧈Plan to take Ecology in your sophomore or junior year.
⃠ CONFLICT: Genetics and Ecology lectures conflict; plan for different semesters.
☑Plan to take Genetics, physiology lecture, and IPL in your junior or senior years.

*Note: these courses do NOT count for Biology BA or BS, but may count for Allied Health programs or for General Education requirements. See your advisor with questions.
**Counts as your second writing course. ***If enrollment is sufficient

OTHER COURSES OFFERED ROUTINELY for GENERAL EDUCATION of BAHS Majors		
SUMMERs	**FALLs**	**SPRINGs**
50.230 Human Sexuality*	50.230 Human Sexuality* 50.290 Writing in Biology**	50.230 Human Sexuality* 50.290 Writing in Biology** 50.254 Social Implications of Biology*

COURSES SCHEDULED 2006-07 THAT ARE NOT AVAILABLE EVERY YEAR		
LISTED FOR SUMMER 2006	**LISTED FOR FALL 2006**	**PROJECTED FOR SPRING 2007**
50.240 Intro Microbiology* 50.252 Field Zoology 50.430 Evolution 50.457 Entomology	50.233 Human Genetics 50.253 Freshwater Biology 50.333 Molecular Biology 50.364 Vert Histology 50.451 Conservation Bio 50.460 Population Bio 50.474 Vert Physiology (next F2008) 50.478 Microbial Physiology	50.250 Biodiversity & Conservation* 50.211 Invertebrate Zoology 50.342 Medical Micro 50.431 Developmental Biology 50.442 Virology 50.444 Plant & Animal Cell Culture 50.472 Cell Physiology 50.477 Plant Physiology

SPECIAL NOTES for STUDENTS requiring these courses:

CLS majors: Human Genetics (50.233) if offered fall 2006 and not again until fall 2008. You must take Medical Micro (50.342) in the spring 2007; its pre-requisite is Microbiology (50.242). (Med Micro will not be offered again until Sp 2009.)

Pre-Med Sciences, Pre-PTs, and Pre-PAs majors: Vertebrate Systems Physiology (50.474, advanced human physiology) and IPL (50.479) should be taken this fall. VSP will not be offered again until fall 2008.

Environmental Bio and Natural History majors: Freshwater Biology is available Fall 2006 (it will not be offered again for 3 years).

PROJECTED BIOLOGY ELECTIVES for 2007-2008

(These courses are not guaranteed to be offered; a course offering depends on having enough students to fill the course.)

SUMMER 2007	FALL 2007	SPRING 2008
50.200 Dendrology 50.453 Neotropical Biology ****	50.212 Vertebrate Zoology 50.222 Comparative Biology of Plants 50.361 Comparative Vertebrate Anatomy 50.411 Radiation Biology 50.430 Evolution 50.432 M&M Genetics 50.452 Limnology 50.476 Neurophysiology	50.343 Immunology 50.350 Plant Pathology 50.435 Bioinformatics 50.455 Environmental Microbiology 50.461 Animal Behavior 50.489 Current Topics (subject to be named)

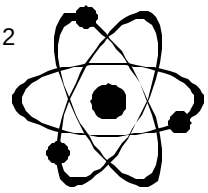
*Note: these courses do NOT count for Biology BA or BS, but may count for Allied Health programs or for General Education requirements. See your advisor with questions.

**Counts as your second writing course.

****Sufficient students must sign-up with Dr Corbin before December 15, 2006 for this course to be offered.

SPECIAL NOTES ON CHEMISTRY & PHYSICS COURSES:

Chem 1 (52.115) must be completed before scheduling Micro (50.242) or Cell Bio (50.271).
Intro Chem (52.101), Chem 1, and Chem 2 are all offered Summer 2006.
The one semester organic course (52.230 Fundamentals of Organic Chemistry) is offered spring semesters only.
Biochemistry 1 (50.341 and Ecology conflict; schedule them for different semesters. Biochemistry 2 (50.442) is a spring semester course, also.



54.107 Physics for Health Sciences is offered spring semesters only.
⦸ CONFLICT: Cell Bio and physics (54.111/2) lectures conflict. Take them in different years.
Intro to Physics 1 (54.111) is offered fall only and Intro 2 (54.112) is spring only.
Intro Physics 1 and 2 are offered this summer (Summer 2006).

Check out Fall 2006 biology electives

Unsure about what electives to take? Read on… Electives can help you explore new fields or strengthen an area of particular academic or career interest. Check your biology elective choices against your curriculum guide for approved biology electives. The following 3-credit electives will be offered fall semester 2006:

Human Genetics (50-233) 3 credits
Dr. Hansen
Prerequisites: Concepts in Biology I, or Cells, Genes and Molecules, or Human Biology

Biology has it own periodic table, although it includes not 100 elements but 100,000 of them - the genes of the human genome. Eric Landers, 1998

Human genetics provides one path to understanding who and what we are. We will address human heredity and variation from several perspectives: From the molecular basis of a gene to its expression as a trait; from the single cell to the individual; and from individuals to the human population. We will apply our understanding of genetics to address major issues in human society.

•human disease - from cystic fibrosis to schizophrenia to cancer.
•implications of the human genome project for medicine, biotechnology and genetic engineering.
•human origins and the relatedness of human populations.
•nature versus nurture: Just how much of what we are is encoded in our genes?

Three hours lecture/discussion per week.

Freshwater Biology(50.253) 3 credits
Dr. Rier
Prerequisites: Concepts in Biology II

Introduction to identification, life histories and ecology of organisms inhabiting lakes, ponds, streams and wetlands. Emphasis will be placed on the role environmental factors play in determining the abundance and distribution of these organisms. Includes laboratory and field investigations. Two hours lecture/discussion, three hours of lab per week.

Molecular Biology (50.333) 3 credits
Dr. Davis
Prerequisites: Cell Biology, Microbiology, and Fundamentals of Organic Chemistry or Organic Chemistry I,

Investigates the practical and theoretical aspects of molecular biology and gives students an opportunity to explore ontogenic and developmental problems from a molecular perspective. Topics include information processing from DNA to proteins, regulation of gene expression, DNA mutability and repair, and genetic engineering. Two hours lecture/discussion, three hours of lab per week.

Vertebrate Histology (50.364) 3 credits
Dr. Corbin
Prerequisite: Cell Biology or consent of instructor

This course takes a form-function perspective on microanatomy. Emphasis will be placed on cellular arrangement and properties of tissues as they relate to organs and organ systems. While the material is primarily centered on human systems, other vertebrate tissues will be used in a comparative fashion to highlight the diversity of life that can be seen through a microscope. The laboratory studies include the use of prepared microscope slides and color photomicrgraphs. Three hours lecture / two hours laboratory per week.

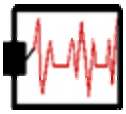
Conservation Biology (50.451/551) 3 credits
Dr. Wood
Prerequisites: Ecology or consent of the instructor.

This class presents the science of preserving biodiversity and sustaining the earth. Draws on and synthesizes information from the fields of ecology, evolution, genetics, philosophy, economics, sociology and political science. Emphasis on the development of strategies for preserving populations, species, biological communities and entire ecosystems in the face of growing human populations and their impact on the environment. Brings scientific principles and theory to bear on problems of management for preserving the richness of life on earth. Conservation Biology is an opportunity to apply science to real-world conservation issues. We'll examine conservation challenges and solutions, both locally and around the world. Three hours of seminar per week.

More Electives...

Population Biology (50.460) 3 credits
Dr. Hranitz
Prerequisites: Genetics or Ecology or permission of the instructor.
Presents selected themes in the biology of animal, plant and fungal populations. This course integrates topics in ecology including population structure and dynamics, population genetics, population ecology and speciation. Fundamental principles and current models and hypotheses will be stressed, along with treatments of research techniques, computer modeling, and applications to conservation management techniques and decision-making. Class projects will provide hands-on experience with population genetic data analysis using protein markers, nuclear DNA (microsatellites), and DNA sequences. Three hours of lecture/discussion per week. Prerequisite: Genetics or Ecology or permission of the instructor. More details are provided at http://facstaff.bloomu.edu/jhranitz/courses/.

Fall Physiology Offerings



Vertebrate Systems Physiology (50.474) 3 credits
Dr. Till
Prerequisites: Cell Biology and competence in college algebra.
Studies the major organ systems and how they work together to maintain body conditions compatible with life. Uses human systems to explain function, but includes examples from other vertebrates to broaden students' understanding of the variety of mechanisms used to maintain homeostasis. Mechanisms by which the systems' functions are integrated in the whole organism are emphasized. Three hours lecture and discussion per week.

Microbial Physiology (50.478) 3 credits
Dr. Kipe-Nolt
Prerequisities: Microbiology, Cell Biology, and Chemistry for the Sciences II
In this course you will learn how and why certain microbes synthesize the following:xanthan gum that gives smooth texture to “gushers” and keeps gravy thick; monosodium glutamate that enhances the flavor of all those oriental dishes; insect toxins that are used to control gypsy moth and Japanese beetles; proteases that act as stain removers in your detergents; plastics that are biodegradable; and antibiotics that you use to treat nasty bacterial infections. Which microbes can breakdown cellulose and lignin? How do they do it? Meet the best ethanol producers, those that grow at 110 o C, and those that prefer a pH of 1.0. How can some organisms survive several megarads of ionizing radiation? Learn about the microbes that fix nitrogen (they are my favorites), those that get their energy by oxidizing heaps of coal mining spoils, those that produce sulfur granules instead of oxygen in photosynthesis, and many many more. Three hours lecture and discussion per week

News You Can Use

Important Dates:

Last Day to Withdraw from a class: Tuesday, April 4, 2006
Spring Weekend Begins: Thursday, April 13 at 10 p.m. Classes Resume on Monday, April 17 at 6 p.m.
Reading Days: No Classes: Thursday and Friday, May 4 and 5
Finals Week: Monday, May 8 to Saturday, May 13
Undergraduate Commencement: Saturday, May 13. This year there will be two undergraduate commencement ceremonies and they will be held on upper campus at Redman Stadium. The ceremony for the College of Science and Technology will be in the morning at 10:00 a.m. Graduate Commencement is Friday, May 12 in Haas Auditorium.

Deadline to submit an application and proposal for Undergraduate Research in Biology:
For Summer: - Last day of classes in spring semester
For Fall: - Last day of classes in spring semester
(These are deadlines for submission of proposals to the dean’s office. Thye should be submitted to Dr. Till, one week before this.
Deadline to sign-up for Internships:
For Summer: 2nd day of classes of chosen summer session:
For Fall: 5th day of classes, fall semester
(Internship proposals must be turned in much earlier for sites with which the university does not have an affiliation.)

Pre-professional Committee News

Pre-medical Science Option

Students who are interested in the new pre-medical science option in the B.S. Biology degree can sign up at the Academic Advisement Office, 216 Student Services Center. For more information, contact your academic advisor . The pre-medical sciences curriculum sheet can be downloaded from http://departments.bloomu.edu/biology/curriculum_sheets.html

DASH for DIABETES

The medical students of the Family Practice Interest Group (FPIG) at the Pennsylvania State College of Medicine invite BU pre-medicine students to participate in their third annual Dash for Diabetes 5K Run/Walk and Children's Fun Run. The group is also looking for volunteers to assist on race day. Funds raised will support diabetes research and treatment at the Penn State Diabetes Center. The event will be held on April 8, 2006 at the Hershey Medical Center. Information and registration materials can be found at at http://pennstatehershey.com/fpig

Temple Podiatry Open House

The Temple University School of Podiatric Medicine invites you to explore options in the profession of podiatry by attending an Open House on Saturday, April 1, 2006. The program will include talks on Podiatric Medicine, a tour, admissions and financial aid information, information on the curriculum, information on post-graduate opportunities, and a question and answer session with faculty and students. Also their summer internship program will be discussed. If interested, please reply to Temple by March 29, 2006 by calling 1-215-625-5451 or 1-800-220-FEET.

Podiatry Internships: Foot Camp?

Temple University is sponsoring a **free** summer internship program in podiatric medicine from June 2 to 9, 2006. Students will have the opportunity to explore the field of podiatry through hands-on workshops, shadowing experiences, case studies, and seminars. Specific topics addressed include anatomy of the foot and ankle, an overview of the profession of podiatric medicine, biomechanics and pathomechanics of the foot and ankle, free screenings, and a look at podiatry specialties such as sports medicine, pediatrics, wound healing, orthopedics, surgery, geriatrics, and diabetes. To be eligible, students must have completed 30 college credits and must submit transcripts, a recommendation, a personal statement, and resume. For further information, see Dr. Ardizzi. The deadline is April 14, 2006.

The Ohio College of Podiatric Medicine in Cleveland, Ohio is providing summer internships for students. The students will interact with podatrists and podiatry students and gain experience in podiatry in a variety of clinical settings. To be eligible, students must have completed their freshman year, be in academic good standing, and submit one letter of recommendation. Applications and additional information may be downloaded at www. ocpm.edu

MCAT updates

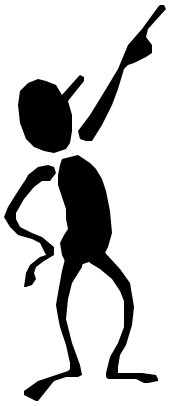
The MCAT is a standardized exam required for admission to allopathic, osteopathic, and many veterinary schools. The exam assesses mastery in biology, general and organic chemistry, physics, scientific problem solving, critical thinking, and writing skills. The exam is typically taken in the spring of the junior year or the summer between the junior and senior year. **The next exam is scheduled for APRIL 22, 2006. The late registration deadline is March 31.** The summer MCAT is scheduled for **August 19**. The registration deadline is July 14. To register go to: **http://www.aamc.org/students/mcat/start.htm**

Summer Medical Programs

The University of Vermont, College of Medicine is sponsoring a summer medical program for undergraduate, graduate, and post-baccalaureate students. Students become immersed in medical sciences by enrolling in key courses such as neuroscience, medical pharmacology, and medical physiology. For dates, housing information, and costs, phone 800-639-3210.

Any questions? Please feel free to contact any member of the Pre-professional Committee. The co-chairs of the committee are **Drs. Ardizzi** and **Melnychuk** (BAHS**).** Other committee members include **Drs. Surmacz** (BAH**S), Hallen** (Chemistry), **and Bell** (Chemistry).

Allied Health Updates



IMPORTANT NOTICE FOR MEDICAL IMAGING AND CLINICAL LAB SCIENCE MAJORS

Medical Imaging and Clinical Lab Science students who have applied to clinical programs this year should see Dr. Kipe -Nolt in the next 2 - 3 weeks. If you have been accepted and made a decision regarding clinical site, bring the following along with you: curriculum sheet filled out (in pencil) with all the courses you have taken and grades earned; clinical site; clinical director's name and contact information (phone and e -mail); and starting and ending dates for the program. Even if you have not been accepted or made a decision regarding the clinical site, you MUST schedule a meeting with Dr. Kipe -Nolt, 269 Hartline.

Learn about Roles of Medical Imaging

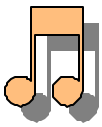
Our affiliate, The Johns Hopkins Hospital, will present a session on "Medical Imaging's Role in the Diagnosis and Treatment of Cancer" at 10:00 a.m. in Kehr Union Ballroom on Friday, April 7, 2006 as part of the Health Sciences Symposium. Anyone interested in medical imaging is invited to attend.

Attention Pre-Physician Assistant Students!

Pre-physician assistant is now an official area of advisement within the B.A. Biology curriculum. Pre -physician assistant students should officially declare this advisement area by signing up at the Academic Advisement Office, 216 Student Services Center.

The New Medicine to Air

PBS is airing a documentary entitled "The New Medicine" on March 29, 2006 from 9 to 11 p.m. The program describes current efforts to reintegrate modern medicine with the old traditions of compassionate care and holistic healing -- something that had become lost as medicine advanced into the 21st century. Zachary Hoffer, a BU biology alumnus and Drexel University medical student, was interviewed for the program. For more information see: http://thenewmedicine.org/



Class Notes.

During Summer 2006, session I, Dr Kipe-Nolt will offer **Introduction to Microbiology** (50.240) for medical imaging majors enrolled in the "Science Emphasis." **Medical Ethics** (28.290.91) will be offered during fall semester on Wednesday evening from 6:00 to 8:50 p.m. at Geisinger Medical Center). **Introduction to Nutrition** (50.205) is also being offered at Geisinger on Tuesday from 6 to 8:50 p.m.

BAHS Faculty Updates

Dr. Brubaker recently had a paper entitled "Administration of Zoledronic Acid Enhances the effects of Docetaxel on Growth of Prostate Cancer in the Bone Environment" published in the peer-reviewed online journal *BioMed Central Cancer*. Dr. Brubaker's co-authors are Drs. Lisha Brown, Robert Vesella, and Eva Corey.

Dr. Corbin spent spring break in London at the British Museum of Natural History. He collected anatomical data on specimens of passerine birds. These data will help him assess the relationship between morphology and ecology in Old and New World flycatchers and how that relationship has changed over time.

Dr. Rier, in collaboration with researchers at Stroud Water Research Center in Avondale, PA and Bucknell University have received funding (Campbell Foundation, Degenstein Foundation, Western PA Watershed Program) to investigate the role that acid mine drainage (AMD) from abandon coal mines plays in impairing the capacity of stream ecosystems to naturally process nitrogen and phosphorus pollution. This project will determine the overall effects of AMD on nitrogen and phosphorus loading to Chesapeake Bay and examine the effectiveness of current AMD mitigation efforts in restoring this vital stream function.

Dr. Surmacz has had an article entitled "The Cookbook Under Construction: Bringing New Life to Traditional Lab Activities" accepted for publication in the peer-reviewed monograph *Best Practices for Teacher Preparation in Mathematics and Science.*

Summer Opportunities

Summer College 2006

BAHS Offerings

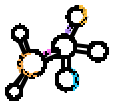
Session I: Human Biology (Dr. Melnychuk); Anatomy & Physiology I (Drs. Surmacz & Hranitz); Intro. Microbiology (Dr. Kipe-Nolt).
Session II: Evolution (Dr. Chamuris)
Session III: Cells, Genes, and Molecules (Dr. Chamuris); Anatomy & Physiology II (Drs.Wassmer and Corbin); Human Sexuality.
Session V: Entomology (Dr. Wassmer)
Session VI: Field Zoology (Dr. Hranitz)
Session VII: Ecology & Evolution - for summer freshmen (Dr. Wood)

Summer Sessions 2006

- Session I - May 30 to July 7 (6 weeks)
- Session II - June 19 to July 28 (six weeks)
- Session III - July 10 to Aug. 18 (six weeks)
- Session IV - May 30 to June 16 (three weeks)
- Session V - June 19 to July 7 (three weeks)
- Session VI - July 10 to July 28 (three weeks)
- Session VII - June 19 to July 28 (six weeks)

Chemistry and Physics Offerings

The Chemistry Department at Bloomsburg University plans to offer the following courses this summer: Intro. Chem (50.101), Chemistry for the Sciences I (52.115), and Chemistry for the Sciences II (52.116). The Physics Department will offer Intro. Physics I (54.111) during Session I and Intro. Physics II (54.112) during Session III.



Marine Science Consortium Offerings

The following courses are offered at the Marine Science Consortium in Walllops Island, VA this summer: Session I: May 25—June 2: 55.241 Marine Biology and 55.491 Coral Reef Ecology. Session II (June 5—June 23): 55.211 Field Methods in Oceanography, 55.343 Marine Ichthyology, and 55.431 Ecology of Marine Plankton. Session IV (July 17—August 4): 55.221 Marine Invertebrates. For more information, contact Drs. Klinger, Hranitz, or Corbin. Hurry—courses fill up quickly!

Summer Internship Opportunities

Research on Chemical Senses

The Monell Chemical Senses Center in Philadelphia, PA announces an eight-week summer apprenticeship program for undergraduates. Students will gain research experience in the lab of a Monell Center Scientist and will attend a variety of lectures and workshops. Participants receive an hourly wage. Applications can be obtained at www.monell.org/studentprogram/ and are due April 15, 2006.

Grassland Research

The Natural Lands Trust seeks a summer intern to work on the Gwynedd Grassland Research Project. The goal of this project is restore grasslands in southeastern Pennsylvania. The field work involves measuring the responses of vegetation to various burning and seeding treatments in experimental plots in central Montgomery County, north of Philadelphia. Some knowledge of plant identification and an interest in working under summer field conditions is desirable. To apply for the project, send a resume and letter of describing your interest to Dr. Jim Thorne, Director of Science and Education, Natural Lands Trust, Inc., Hildacy Farm, 1031 Palmers Mill Road, Media, PA 19063. Dr. Thorne may be reached at jthorne@natlands.org.

Bald Eagle/Wildlife Interpretation

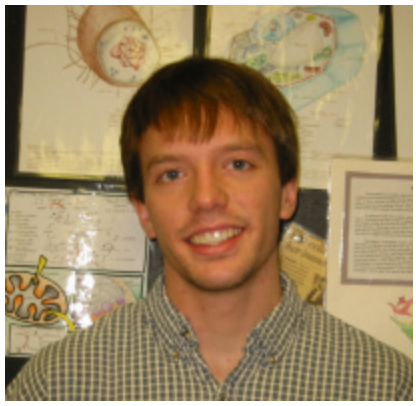
Would you like to earn college credit this summer while working with bald eagles, learning about their natural history and sharing your knowledge with the public? Then this internship is right for you! The Department of Biological and Allied Health Sciences in association with the Pennsylvania Raptor & Wildlife Association and Knoebel's Grove Amusement Resort are sponsoring internships in Bald Eagle/Wildlife Interpretation. Interns will field questions about bald eagle natural history and give frequent presentations to the general public at Knoebel's Grove Amusement Park near Elysburg, PA. Junior class status and a strong work ethic are required. To learn more about the internship, please see **Dr. Corbin,** 131 HSC or e-mail ccorbin @bloomu.edu

Agricultural Practices

The Lebanon County Conservation district seeks summer inters to assist in the study of prime farmland in Lebanon County and in the field delivery of best management practices in agriculture. Applicants should have some knowledge of agriculture, good oral and written communication skills, and own transportation. Interns will be paid $10 per hour for 35 hours per week. To apply, contact Mr. Charles Wertz at (717) 272-5314 or info@iccd.org

Celebrating Achievement

BAHS Scholarship Award Winners



Nicholas Bixler (left) and **Brock Solomon** (right) are the recipients of $250 scholarships awarded by the Department of Biological and Allied Health Sciences. Nick is a sophomore biology major who is interested in pursuing a career in optometry. Nick has served as the secretary of the pre-medicine club and is currently its vice-president. He is also a member of the Biology & Allied Health club and the racquetball intramural club. He has tutored in biology and chemistry. Nick also volunteers as a research student for Dr. Brubaker characterizing the expression of Daf-16 a factor associated with insulin signaling and considered to be a longevity factor. Nick has made Dean's list in all of his semesters at Bloomsburg. Brock is a junior working on his B.A. in Biology. He plans to become a physician assistant. He is a member of the Protestant campus ministry, ultimate Frisbee club, running club, and the Campus Crusade for Christ. Brock has made Dean's list three times at Bloomsburg University.

BAHS students inducted into Phi Kappa Phi

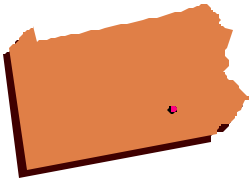
Phi Kappa Phi is the nation's oldest, largest, and most selective honor society that recognizes and promotes academic achievement in all fields of higher education. Only the top 7.5% of juniors and the top 10 % of seniors are invited to become members. **Dr. Carl Hansen** was the featured speaker at the society's recent initiation ceremony. He presented "The Sub-Antarctic: Fishing for Diversity in the Wake of the Heroic." The following BAHS students were inducted**: Bruce Bortree,** Medical Imaging; **Sarah Bounds**, Biology; **Megan Coyne**, Medical Imaging; **Jennifer Intelicato-Young**, Biology; **Christopher Kashi**, Biology; **Cara Shellenberger**, Biology; **Kay Wettlaufer**, Medical Imaging; **Jamie Willour**, Biology, pre-physician assistant; **Ashley Yelinek**, Biology;. BAHS students who are currently members include: **Rachel Boring**, Medical Imaging; **Nicole Dalessandro,** Biology, pre-medicine; **Kristine Tofts,** Biology; **Signe Dolloff Klinger** (Medical Imaging); **Michael Yohn** (Secondary Education, Biology) **Eileen Garvey,** Biology; and **Eric Melnychuk**, psychology, biology minor.

BAHS Students and Faculty Recognized by College

The College of Science and Technology held its annual spring banquet on Thursday, March 23. **Dr. Kristen Brubaker** was recognized for excellence as a faculty member in the Department of Biological and Allied Health Sciences. .**Dr. Chamuris** and **Dr. Brubaker** recognized several BAHS students for their excellent performance in the classroom. The following outstanding biology students were honored: **Holly Binkley, Nicole Dalessandro, Paul Farley, Eileen Garvey, Rachel Kaskie, Chase Kelch, Kristine Tofts, Valerie Van Cleef, Ashley Welikonich**, and **Linda Yeany**. **Kristine Tofts, Valerine van Cleef** and **Chase Kelch** were also acknowledged for their membership in Beta Beta Beta, the biology honor society. Outstanding Allied Health Students honored include: **Robert Blasko, Greta Gore, Janelle Haas, Jessica Horst**, and **Laura Reynolds**. Congratulations to all honorees!

Congratulations scholar athletes!

Five BAHS students were among the scholar athletes honored at the recent Scholar-Athlete Luncheon for their excellent work on the field, in the pool, and in the class room. Congratulations to **Sarah Bounds,** a biology major and a member of the cross country and track teams; **Courtney Dea**n, a pre-physical therapy, biology major and swim team member**; Lauren Sterkenberg**, medical imaging major and swimmer; **Ashley Yelinek**, biology and major and swim team member; and **Tonia Zangar**i, a biology major and member of the cross country and track team. Special congratulations go out to Ashley, first place winner in the 1650 freestyle at PSACs!



BAHS Students and Faculty to Present Research at PAS and CPUB

The Pennsylvania Academy of Science (PAS) is an organization dedicated to advancing science and technology in the commonwealth. This mission is accomplished by hosting annual conferences for scientists from academia and industry to present and discuss their research. BAHS will be well-represented at the upcoming PAS meeting in Grantville PA on April 1 and 2, 2006. **Stacy Rogers**, **Dr. Corbin** and **Dr. Wassmer** will present a poster entitled "Prevalence of nest ectoparasites is independent of group size and nest density in barn swallows (*Hirundo rustica*)." **Danielle Wartko, Linda Yeany**, **Dr. Hranitz** and Dr. Baird, a collaborator form the University of Central Oklahoma, will present "Heterozygosity-fitness correlations in a population of collared lizards, *Crotaphytus collaris*." **Linda Yeany, Danielle Wartko, Dr. Hranitz** and collaborator Dr. Baird will present "Investigation of the effect of population structure on heterozygosity-fitness correlations in collared lizards, *Crotaphytus collaris.*" **Nicholas Ernst** and **Dr. Corbin** will share their work entitled "Acid mine drainage and nesting insectivorous birds along tributaries of the Susquehanna river." **Kristine Tofts** will present her honors thesis entitled "Effects of obesity and cigarette smoking on reproductive success." Her collaborators are **Dr. Surmacz** and Aliceann Reilly from the Fertility Center at Geisinger Medical Center. **Dr. Hansen** and his collaborators Anna Stauffer and Dr. Robishaw from the Weis Center for Research, Geisinger Clinic, will present "G Protein receptor regulation of Zebrafish cardiac development." The PAS meeting will also feature symposia on emerging diseases in wildlife and on migratory birds.

Kutztown University will host the annual meeting of the Commonwealth of Pennsylvania University Biologists (CPUB). CPUB is an organization of biology faculty from the fourteen universities in the State System of Higher Education. CPUB holds annual meetings to highlight student and faculty research. **Andrew Troutman** and **Dr. Surmacz** will present "De-icer toxicity in *Lumbriculus variegatus*: a comparison of potassium acetate and sodium chloride." The meeting will feature a keynote address by Scott Weidensaul, author of many books on natural history, including the Pulitzer Prize-nominated Living on the Wind, about migratory birds. Weidensaul also writes for such publications as *Smithsonian*, *Audubon*, *Nature Conservancy*, and *International Wildlife.*

Alumni News

Matthew Corso (B.S. Biology, 1999) graduated from the Pennsylvania College of Optometry in 2005. He earned honors as an intern at the Feinbloom Vision Rehabilitation Center. He has joined the staff of Family Eye Care of NEPA in Honesdale.

Jennifer Dillow (B.S. Medical Imaging, 2004)) is studying abroad at the University of Edinburgh in Scotland. Jen is enjoying the opportunity to travel, learn about European educational systems, and room with students from Sweden, Japan, Spain, and Florida. She is pursuing a graduate degree in education at Alvernia College.

Artie Hagelgans (B.S. Biology, 2002) recently visited the department. Artie has recently graduated from the Physician Assistant Program at Penn College and is working in the emergency department at Griffin Hospital in Connecticut.

Jennifer Boyer Hopkinson (B.S. Biology, 1999) graduated from the University of Pennsylvania School of Veterinary Medicine. She previously served as an associate veterinarian at VCA Northside Animal Hospital in Bethlehem. She recently became the owner of Animal Care Hospital in Lewisburg.

Eric Horstick (B.S. Biology, Biotechnology option, 2005) is pursuing a doctorate in the Department of Neurosciences at the University of Michigan**.** Eric returned to BAHS over his spring break and presented a research seminar entitled "Characterization of the Zebrafish Mutant Stopped Action (stac).

Jennifer Kruk (B.S. Biology, Biotechnology option, 2004) recently stopped in to visit the department. She is currently in the Ph.D. program in molecular biology at Penn State University.

Rachel Melnick (B.S. Biology, 2003) received funding from the U.S. Department of Agriculture to continue her doctoral work at Penn State University. She is a member of the American Phytopathological Society.

Joshua Rickards graduated from the physician assistant program at Hahnemann/Drexel University and is currently working in pediatrics in Waterbury, Connecticut.

What's New?

Calling all creative BAHS students

Design an attention-grabbing logo for the College of Science and Technology and you could win a $300 gift certificate! The College of Science and Technology is sponsoring is searching for an insignia to appear on college recruiting materials, brochures, and the web page. The winning logo will capture the role of science and technology in our society and be representative of the college's departments (Biological and Allied Health Sciences; Chemistry; Geography and Geoscience; Instructional Technology; Mathematics, Computer Science, and Statistics; and Physics and Engineering Technology. The contest is open to all BU students. Logos should be submitted as a .psd or .tiff file on a labeled CD or DVD. All entries must be original and cannot contain copyrighted material. Deadline: March 31, 2006 at 4:30 p.m. in 176 HSC.

Thanks to the Science and Tech Day Crew!

Bloomsburg University hosted its annual Science and Technology Day on Saturday, February 18, 2006. This program provides an opportunity for high school seniors who are interested in BU's College of Science and Technology to visit campus and meet with faculty and students. BAHS hosted students and their families who have expressed interest in majoring in our academic programs. The day included a welcome and introductory session, a tour of department labs, hands-on demonstrations, and meetings with academic advisors to learn about our various curricula in biology and allied health sciences. The day was an unqualified success, due in large part to the students who helped make our visitors welcome. Thanks goes out to the following helpers: **Nick Bixler, Nicole Dalessandro, Kaylee Fisher, Shannon Hauer, Debbie Hunsberger, Lorianne Joseph, Michelle Sienkiewicz, Krissie Tofts, and Andy Troutman.**

Beta Beta Beta Seeking Members

Beta Beta Beta is an honor society for students of the biological sciences. Membership is open to students who achieve superior academic records and who display an aptitude for and interest in the life sciences. Its mission is to stimulate scholarship, to disseminate scientific knowledge, and to promote biological research. To fulfill this mission, the national organization of Beta Beta Beta recognizes the accomplishments of outstanding individuals and chapters and publishes a national journal, *BIOS*. The faculty advisor of the BU chapter of Tri-Beta is **Dr. Chamuris**. Applications for Beta Beta Beta can be downloaded at http://department.bloomu.edu/biology/BBB and our due to Dr. Chamuris (105 HSC) by March 24. Our chapter will hold its Spring 2006 Initiation Ceremony on Thursday, March 30 at 5 p.m. in 72 HSC. Attendance by new initiates is mandatory.

Biology & Allied Health Club Activities

The Biology and Allied Health Club is having a busy semester! The group heads to the Baltimore Aquarium on March 25, 2006. Also on the schedule is a rafting trip on Sunday, April 9th: BAHS Club members will float the Lehigh River in a white-water rafting trip led by Quest. The cost per student is minimum of $25 (a bargain compared to commercial trips) and equipment rental and transportation is included in the fee. A sign-up sheet is posted on the club bulletin board. This is an all-day trip and participants will need to bring their own lunch and snacks. Coolers will be available to store food. More details are available at the club web page (http://facstaff.bloomu.edu/jhranitz/) and there will be a pre-trip meeting on Friday, April 8, 2006. Do you have a green thumb? Check out the plant sale the week of April 17 to 21. Also stay tuned for details on the upcoming Biology and Allied Health Banquet on April 23, 2006. Tickets will go on sale soon! Regular meetings of the Biology and Allied Health Club are held on Tuesdays at 5 p.m. in the BAHS Conference Room. All are welcome. For more information, see any club officer: President, **Val VanCleef**; Vice-President, **Becky Rugg**; Secretary, **Rachel Brous**; and Treasurer:,**Joel Gyimesi**. **Dr. Hranitz** is the faculty advisor.

Good News!

Donald Astleford has been accepted to the pharmacy program at Lake Erie College of Osteopathic Medicine
Matthew Corridoni, a junior biology major, is featured on the BU web page as a Rising Star.
Eileen Garvey has been accepted into the physician assistant program at George Washington University.
Michelle Sienkiewicz will pursue her doctorate in Physical Therapy at Thomas Jefferson University, Philadelphia, PA.
.

Have you been accepted to a graduate school, clinical program, or professional school? (or doing something really cool!) Share your good news in *BioSynthesis*. Please e-mail Dr. Surmacz (csurmacz@bloomu.edu) or catch her in the hall!

The Reading Lamp: Current Topics in Evolutionary Biology

George Chamuris, Professor

Nothing in biology makes sense except in the light of evolution. – Theodosius Dobzhansky

It's elegant – it's economical – it's recruitment. As described by Wilkins (2002) and Futuyma (2005), recruitment refers to the evolution of novel functions from pre-existing developmental pathways and genetic systems. When broadly applied to the evolution of new characters, recruitment illustrates how natural selection can operate to generate novel and complex structures using existing structures and processes as a starting point. Contrary to claims made by intelligent design proponents, there is ample and accumulating evidence that novel and complex characters can be satisfactorily derived via evolutionary pathways involving recruitment, mutation, and natural selection (e.g. see Lenski et al., 2003).

A place to begin to build an understanding of recruitment is the evolution of enzyme cascades involving serine proteases of the chymotrypsin family. The blood coagulation cascade evolved from the complement cascade, which in turn evolved from developmental proteases (Krem and Di Cera, 2001). Another serine protease-mediated cascade controls the dorsal-ventral patterning in insect embryogenesis (e.g. Lemosy et al., 2001). Current models view these cascades as being assembled step-wise from the bottom up (Krem and Di Cera, 2002).

Thrombin is a key blood coagulation cascade enzyme that originally functioned in immunity (Adema et al., 1997). Thrombin is thought to have predated and served as the recruitment origin for the other vitamin K-dependent proteases (factors VIIa, IXa, Xa) which link the intrinsic and extrinsic pathways evolutionarily (Krem and de Cera, 2001). Thrombin itself plays multiple roles in an number of different processes (Di Cera, 2003). As we learn more about serine protease cascades, we are beginning to appreciate the role that recruitment played in adding levels of complexity step by step to these cascades.

In a more complex example, the antifreeze glycoprotein (AFGP) in notothenioid Antarctic fish has been recruited from the pancreatic trypsinogen gene (Chen et al., 1997a). This example is noteworthy because both coding and noncoding (intron) portions of the gene were recruited and amplified to result in the formation of a new gene, and a new protein! The authors hypothesized that the initial function of AFGP was to prevent freezing of the intestinal fluid. The antifreeze function then expanded into the circulatory system.

Similar characters may result from convergent recruitment episodes. For example, the recruitment of middle ear bones in monotremes and therians (marsupials and placentals) from reptilian jaw bones is thought to have arisen independently in each lineage (Rich et al., 2005).

Another example of convergence is the independent origin of some seventeen eye lens proteins called crystallins. Crystallins have been recruited from an array of genes, depending on the taxon (Piatagorsky and Wistow, 1991; Wistow, 1993). For instance, two common types of vertebrate crystallin, a and b, are derived from stress proteins. Other vertebrate crystallins were recruited from genes encoding enzymes such as lactate dehydrogenase (birds), alcohol dehydrogenase (camels), a-enolase (turtles), and aldehyde dehydrogenase (humans).

A third example of convergent recruitment takes us back to the antifreeze glycoproteins. The evolution of novel AFGP genes has taken place both in the Antarctic notothenioid fish and in the phylogenetically distant Arctic cod (Chen et al., 1997b). Although similarly recruited from pancreatic trypsinogen genes, there are sequence differences that reveal their independent origins.

There are many examples of recruitment at various levels of biological organization – molecules, genes, cells, tissues and organs can be recruited for novel function. Especially important are recruitment events that occur in conjunction with the duplication and change-in-function of developmental genes (such as the HOX genes; Wilkins, 2002), as well as changes in the function of transcription factors (e.g. the floral regulator LEAFY; Maizel et al., 2005).

Recruitment seems to be an important pathway by which novel form and function can arise. This is but another example of how our understanding of the mechanisms of evolution, particularly at the molecular-genetic-developmental level, is improving at an impressive rate.

Adema, C.M., L.A. Hertel, R.D. Miller, and E.S. Loker.1997. A family of fibrinogen-related proteins that precipitates parasite-derived molecules is produced by an invertebrate after infection. *Proceedings of the National Academy of Sciences USA* 94:8691-8696.

Chen, L., A.L. DeVries, and C.-H. C. Cheng. 1997a. Evolution of antifreeze glycoprotein gene from a trypsinogen gene in an Antarctic notothenioid fish. *Proceedings of the National Academy of Sciences USA* 94:3811-3816.

Chen, L., A.L. DeVries, and C.-H. C. Cheng. 1997b. Convergent evolution of antifreeze glycoproteins in Antarctic notothenioid fish and Arctic cod. *Proceedings of the National Academy of Sciences USA* 94:3817-3822.

Di Cera, E. 2003. Thrombin interactions. *Chest* 124 (Suppl):11S-17S.

Futuyma, D.J. 2005. *Evolution*. Sinauer Associates, Sunderland, MA.

Krem, M.M., and E. Di Cera. 2001. Molecular markers of serine protease evolution. *European Molecular Biology Organization* 20:3036-3045.

Krem, M.M., and E. Di Cera. 2002. Evolution of enzyme cascades from embryonic development to blood coagulation. *Trends in Biochemical Sciences* 27:67-74.

Lemosy, E.K., Y.-Q. Tan, and C. Hashimoto. 2001. Activation of a protease cascade involved in patterning the *Drosophila* embryo. *Proceedings of the National Academy of Sciences USA* 98:5055-5060.

Lenski, R.E., C. Ofria, R.T. Pennock, and C. Adami. 2003. The evolutionary origin of complex features. *Nature* 423:139-144.

Maizel, A., M.A. Busch, T. Tanahashi, J. Perkovic, M. Kato, M., Hasebe, and D. Weigel. 2005 The floral regulator LEAFY evolves by substitutions in the DNA binding domain. *Science* 308:260-263.

Piatagorsky, J., and G. Wistow. 1991. The recruitment of crystallins: new functions precede gene duplication. *Science* 252:1078-1079.

Rich, T.H., J.A. Hopson, A.M. Musser, T.F. Flannery, and P. Vickers-Rich. 2005. Independent origins of middle ear bones in monotremes and therians. *Science* 307:910-914.

Wilkins, A.S. 2002. *The Evolution of Developmental Pathways*. Sinauer Associates, Sunderland, MA.