



BioSynthesis

Volume 3, Issue 3 (April 2004)

BioSynthesis On-Line: <http://departments.bloomu.edu/biology/biosynthesis.html>

Spring Semester Dates & Special Events

- APR 25** Earth Day Fair: Town Park
APR 28: BU Student Research and Creative Projects Poster Session
APR 29: College of Science and Technology Research Day
APR 29: Reading Day, No Classes
APR 30: Reading Day, No Classes; National DNA Day
MAY 3: Final Exams Begin
MAY 7: Graduate Commencement
MAY 8: Undergraduate Commencement
JUNE 1: Summer College Session I Begins



Look what's inside:

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College of Science and Technology Research Day

The College of Science and Technology will host its first Research Day on Thursday April, 29 to showcase faculty and student research. This special event coincides with Reading Day (no classes will be held). All are welcome to attend. Research Day events will be held in Hartline Science Center. The program features a variety of poster presentations and talks. The following biology talks are scheduled for 134 HSC:

- 1:00 p.m. **Emily Bray** and Judith Kipe-Nolt. "An evaluation of anaerobic digestion of animal manure: biogas production quality and quantity."
1:45 p.m. **Amy Risen** and Cindy Surmacz. "Lethal and sublethal effects of two water pollutants, calcium acetate and methyl tertiary butyl ether, in *Lumbriculus variegatus*."
2:00 p.m. **Eric Horstick**, Jasper Humbert, Janet Robishaw and Carl Hansen. "Cloning and sequencing of fish heterotrimeric G-protein gamma subunits."
2:15 p.m. **Katy Parise**, John Hranitz, Troy Baird, Ronald Van Den Busche. "Microsatellite evidence that high reproductive success is achieved through territorial defense in male collared lizards *Crotaphytus collaris*."

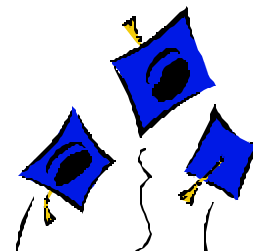
The featured speaker will be Dr. Zachary Hoffer, a BAHS alumnus currently at the College of Medicine, Penn State University. In addition to the talks, the students and faculty of the Department of Biological and Allied Health Sciences will present over a dozen posters on a wide variety of research topics. See page 5 for a complete listing. The College of Science and Technology is composed of six departments: Biological and Allied Health Sciences; Chemistry; Geography and Geoscience; Instructional Technology; Mathematics, Computer Science and Statistics; and Physics. We hope to see you at the COST Research Day!

BAHS Alumnus to Present Research

Dr. Zachary Hoffer will present a talk entitled "Movement coordination and cerebral circuitry: A functional neuroanatomical perspective" at the College of Science and Technology Research Day at 3:00 p.m. in 134 Hartline Science Center. Dr. Hoffer graduated from Bloomsburg University in 1995 with a B.S. in Biology. As an undergraduate, he had conducted an independent study research project on plasma lipid metabolism with Dr. Till. He has completed his Ph.D. and is currently a post-doctoral fellow at the College of Medicine, Pennsylvania State University. He has published in such journals such as *Brain Research*, *The Journal of Comparative Neurology*, and the *Journal of Neurophysiology*. Dr. Hoffer will attend medical school at Drexel University in the fall.

Hats off to our Graduates!

Good luck and best wishes to all of our graduates! Please stay in touch and let us know how you are doing. To stay connected, remember that *BioSynthesis* is online.



MAY GRADUATES

Biology

Lucas Blair, B.S. Biology
Kevin Brace, B.S. Biology, Microbiology option
Emily Bray, B.S. Biology
Erik Francis, B.S. Biology
John Gantz, B.S. Biology
Jason George, B.S. Biology
Jennifer Kapusta, B.S. Biology, Microbiology option
Jennifer Kruk, B.S. Biology
Christopher Maddage, B.S. Biology
Angela Mignogna, B.S. Biology, Microbiology option
Melissa Miller, B.S. Biology
Meredith Murray, B.S. Biology
Katy Parise, B.S. Biology
Natalie Peters, B.S. Biology
Stephanie Richendrfer, B.A. Biology
Amy Risen, B.S. Biology
Bethany Rovnack, B.A. Biology
Andrea Schmidt, B.S. Biology
Amanda Schompert, B.S. Biology
Ryan Smith, B.S. Biology
Erica Weiskircher, B.S. Biology, Microbiology
Elisa Woodby, B.S. Biology

Medical Imaging

Jennifer Dillow
 Mary Kieffer
 Karl Vincent

Secondary Education, Biology

Shawn Butler

Honors Graduates

College of Science and Technology Honors Graduate—highest GPA

Justin Stevens, B.S. Medical Imaging

Academic Honors:

Summa cum laude: **Justin Stevens**

Cum laude: **Jennifer Dillow, Janine Hess, Mary Kieffer, Jennifer Kruk, Katy Parise, Amy Risen, Andrea Schmidt**

University Honors Program Graduates:

Loren Abbott, Emily Bray, Katy Parise.

AUGUST GRADUATES

The following students are planning to graduate in August 2004 pending successful completion of required courses and clinical experiences.

Biology

Michael Chabot, B.S. Biology
Robert Ray, Jr., B.S. Biology

Clinical Lab Science

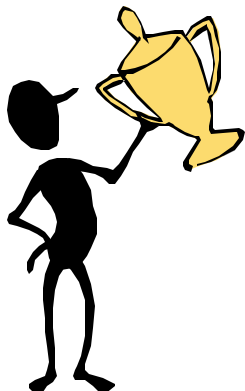
Loren Abbott
LeAnn McCracken



Medical Imaging

Harold Allen, Jr.
Ember Baron
Stacy Ciccanti
Naomi Clarke
Melissa Glunz
Desiree Hackenburg
Janine Hess
Lisa Johnson
Sandra Kocher
Calvin Mahoski
Nadirah Muhammad
Kelly Mullen
Lindsay Smith
Justin Stevens
Meredith Stocker
Amanda Watkins
Sameerah Williams

BAHS OUTSTANDING STUDENTS NAMED for 2003-2004



Jennifer A. Kruk has been named this year's outstanding biology student. Jenn will graduate in May 2004 with a bachelor of science degree in Biology. Jenn is the vice-president of Beta Beta Beta, the biological honor society. She is a member of the Biology Club and Alpha Phi Omega, a national coed service fraternity. She has been named to the dean's list 6 times and has served as a biology tutor. She received honorable mention for her poster at Bloomsburg University's Health Sciences Symposium. In the community, Jenn has assisted with the local blood drive, the Big Brother/Big Sister program, the breast cancer walk, Kid's fun Day, AIDS walk, Children's Museum, and ecoquest. Last summer, Jenn participated in the REU Interfaces in Biology Program at Los Alamos National Laboratory, Los Alamos, NM. She worked on a research project entitled "Cloning of tuberculosis proteins for yeast expression." She presented her results at the Bioscience Poster Session 2003 and the University of New Mexico, Los Alamos Symposium. This semester Jenn presented her independent study research project entitled "Molecular genetic analysis of the hardy kiwi" at the recent meeting of the Commonwealth of Pennsylvania University Biologists. Jenn plans to pursue a Ph.D. in molecular biology at Penn State University.

Justin Stevens has been selected as this year's outstanding allied health student. Justin will graduate in August 2004 with a bachelor's degree in Medical Imaging. He has been on the Dean's List each semester. He has recently been named as the *honor graduate* for the College of Science and Technology, a title bestowed upon the student with the highest grade point average. He is currently enrolled in the sonography program at Johns Hopkins Hospital in Baltimore, Maryland. While on campus, Justin was active in vocal music and took voice lessons, presented recitals, and toured with various ensembles. He was a member of both the Concert Choir and Chamber Singers. Justin and his group members in Anatomy and Physiology II received an honorable mention award for their poster on "Osteogenesis Imperfecta" at the 2003 Health Sciences Symposium.

Celebrating the Academic Year: The Biology Banquet!

The Biology Club recently sponsored its third annual Biology Banquet at the Willow Run Inn. This was a wonderful way for students and faculty to celebrate the end of the 2003-2004 academic year. It was a fun evening of great food and great company. Awards were passed out to students and professors. Thanks to the biology club for organizing this event. Special thanks to the 2003-2004 Biology Club officers: **Erica Weiskircher**, President; **Denise Lucas**, Vice President; **Katy Parise**, Secretary, and **Mike Kaminsky**, Treasurer.

Check out the happy students pictured at right: First row: **Jen Dillow**. Second Row: **Erica Weiskircher**, **Jenn Kruk**, **Emily Bray**, **Mike Kaminsky**. Third Row: **Amy Risen**, **Katy Parise**, **Denise Lucas**, **Kevin Brace**, **Eric Horstick**, and **Mary Jo Melichercik**.

Incoming officers of the Biology Club for the 2004-2005 academic year are **Val Van Cleef**, President; **Krissie Tofts**, Vice-President; **Joel Jyimesi**, Treasurer; **Kerry Ondrusek**, Secretary



News You Can Use



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

Deadline* to sign-up for Internships:

- For Summer: 2nd day of classes of chosen summer session:
- For Fall: 5th day of classes, fall semester

*Remember to submit early for new affiliations!



ALLIED HEALTH NEWS

Allied Health Scholarship

Would you like a \$1,000 scholarship? Benjamin Cummings, a publishing company, is awarding five \$1,000 scholarships to allied health students. To be eligible, you must currently be taking Anatomy & Physiology or Microbiology or have done so in the past two years. A poster describing the competition is on the bulletin board outside 114 Hartline Science Center. As part of the scholarship application you must write a brief letter to an elected official that expresses your view on a current national health issue. Application forms may be obtained from **Dr. Surmacz**, 105 Hartline. Deadline is November 1, 2004.



Medical Imaging Students Accepted to Clinical Programs!

All students who will be starting clinical education programs this summer or fall, please **SEE Dr. Kipe-Nolt** to fill out the paper work, if you have not already done so.

The following students have been accepted into clinical programs at Johns Hopkins Hospital, Baltimore, MD: **Sara Barrett** (Sonography), **Laura Reynolds** (Radiography), **Kelly Schwartz** (Sonography), **Kyle Snell** (Nuclear Medicine), and **Selena Wright** (Radiography). Lancaster General Hospital is the clinical site for: **Todd Gray** (Nuclear Medicine), **Jessica Horst** (Nuclear Medicine), and **Janelle Shaw** (Radiography). **Jenna Ghiringhelli** will attend Reading Hospital for her radiography clinical. **Brad Smith** will pursue nuclear medicine and MRI at Thomas Jefferson University, Philadelphia, PA. **Jennifer Kemmerle** will do her clinical in radiography at Abington Memorial Hospital. The following students will head to Geisinger Medical Center, Danville, PA for clinical experience in radiography: **Curtis Bower**, **Krista Garrett**, **Shaun Gaul**, **Tiffany Higley**, **Jill Lemoncelli**, **Stacey Minarski**, **Holly Ross**, **Desiree Showers**, **Michael Thompson**. **Jennifer Tomcavage** has been accepted to the sonography program at College Misericordia, Dallas, PA. **Kimberly Rotell** will enter the radiography program at Wilkes-Barre General Hospital. Congratulations to all students who have been accepted into clinical programs!

Students and Faculty Consider Impact of Genetic Information



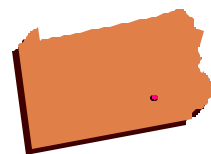
A full house was present at the Kehr Union Ballroom earlier this month for Dr. Dean Hamer's presentation "Living with your Genes." Dr. Hamer, the Section Chief on Gene Structure and Regulation in the Laboratory of Biochemistry of the National Cancer Institute, delivered his remarks as part of BU's annual Health Sciences Symposium. Dr. Hamer discussed some of the genetic links to sexual orientation, risk taking behaviors, anxiety, and cigarette smoking. The two-day symposium was a huge success. **Dr. Carl Hansen** led a faculty panel that addressed "Genetics: Predicting Our Future." The symposium also included student posters, and a health fair. Many students participated in the event by serving on various committees. These include: **Mike Kaminsky**, **Emily Bray**, **Megan Downs**, **Samantha Dancer**, **Stephanie Shenk**, **Danielle Voth**, **Lisa Guillama**, **Bonnie Vandermark**, **Michelle Sienkiewicz**, **Monical Altimari**, **Shannon Duke**, **Julie Sunday**, **Candace Levensgood**, **Danielle Lambert**, **Kara Dalling-Blake**, **Sheena Ravenal**, **Eileen Wolf**, and **Becky Ames**. The following winners of the student poster contest were members of the Anatomy and Physiology II class: Second prize: Black Lung, A Coal Miner's Disease, **Stacey Martz** and **Drew Hampton**. Third Prize: Glaucoma: Looking Out, Looking In, **Vicki Albertus**, **Tracy Matthews**, **Todd Gray**, and **Bonnie Vandermark**. Honorable Mention: Living With Lupus, **Dawn Hagenbuch** and **Danielle Salisbury**; Alzheimer's Disease: Forgotten Dreams, **Abigail Garman**, **Lauren Foley**, **Patricia Roy**, and **Breanne Connors**; and Sleep Apnea, **Julie Sunday**, **Katie Huff**, **Danielle Lambert**, and **Candace Levensgood**.



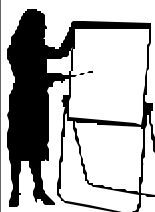
Pre-professional Committee Updates

The committee wishes all pre-professional students a rewarding, relaxing, and rejuvenating summer. Remember summer is a great time to job-shadow. Many students also choose to do their volunteer work during the summer. Rising seniors are reminded to submit their completed application packets to the committee by the start of the fall semester.

BAHS Faculty and Students attend Commonwealth of Pennsylvania University Biologists Meeting



Undergraduates **Emily Bray, Jennifer Kruk, Michael Kaminsky, and Eric Horstick** and **Drs. Kevin Williams and Judy Kipe-Nolt** of the Department of Biological and Allied Health Sciences recently attended the 2044 Annual Meeting of the Commonwealth of PA University Biologists at Indiana University of PA. The keynote presentation was delivered by Dr. John Kopchick, Ohio University College of Osteopathic Medicine, on *Growth Hormone, Football, Dirty Shorts, Mini-mice, and a New Drug*. Emily Bray presented a paper with co-authors Dr. Kipe Nolt and graduate student **Connie Wilson** entitled *An Evaluation of Anaerobic Digestion of Animal Manure: Biogas Production Quality and Quantity*. Emily's research was conducted for her Honors Independent Study Project and she received a second prize award in the category of undergraduate platform presentation in zoology, ecology, and evolution. Eric Horstick, J. Humbert, A. Kempinski, J. Robishaw, and C. Hansen presented a poster entitled *Cloning and Sequencing of Fish Heterotrimeric G-protein Gamma Subunits*. Eric received a first prize award in the category of undergraduate poster presentations in cell and molecular biology. Michael Kaminsky, Eric Horstick, and C. Hansen presented a poster entitled *Effect of Temperature on G-protein Signalling Pathways*. Mike received a second prize award in the category of undergraduate student poster presentation. Jennifer Kruk and G. Davis presented a poster on the *Molecular Genetic Analysis of the Hardy Kiwi*. Jenn's work represents the results of her research in the course "Methods in Biotechnology."



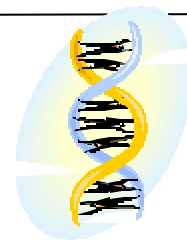
Students and Faculty to Present Posters at the College of Science and Technology Research Day

The following posters will be contributed by BAHS faculty and students at the College of Science and Technology Research Day held on April 29 in Hartline Science Center:

- **Kevin Brace** and James Parsons. "The anti-microbial effects of various teas."
- **Julia Fabrega-Climent** "Effects of Naphthalene on Early Development of the Green Sea Urchin *Strongylocentrotus droebachiensis* (Echinodermata:Echinoidea)"
- **Eric Horstick**, Jasper Humber, Anna Kempinski, Janet Robishaw, Carl Hansen. "Bioinformatic assembly of zebrafish RGS proteins."
- **Eric Horstick**, Jasper Humbert, Anna Kempinski, Janet Robishaw and Carl Hansen. "Identifying orphan G-protein coupled receptors in developing zebrafish."
- **Michael Kaminsky, Eric Horstick**, and Carl Hansen, "G protein alpha subunit expression in G-protein signaling pathways."
- **Jennifer Kruk** and George Davis. "Molecular genetic analysis of the hardy kiwi."
- **Inna Nechipurenko, Eric Horstick, Katy Parise**, John Hranitz, Cynthia Venn. "Design and screening of cytochrome oxidase I primers for gooseneck barnacles in the tropical pacific ocean."
- **Robert Ray** and Carl Hansen. "Optimizing transfection procedures in Chinese hamster ovary cells."
- **Stacy Rogers, Neema Chandel, Robert Ray, Jennifer Kruk, Ryan Smith, Eric Horstick and Carl Hansen**. "G-protein alpha subunit expression during zebrafish development."
- **Bethany Rovnack** and Cynthia Surmacz. "Comparing the effectiveness of various treatments on bone density in post menopausal women."
- **Andrea Schmidt** and James Parson. "The antimicrobial effects of capsicumannum."
- **Valarie Van Cleef, Laura Halon, Krissie Tofts**, Kristen Brubaker and John Hranitz. "Characterization of HSP 70 and HSP90 expression in highly thermotolerant alfalfa leaf cutter bees, *Megachile apicalis*."
- **Erica Weiskircher**, Judith Kipe-Nolt, and Kevin Williams. "Chromatic adaptation in cyanobacteria."
- **Constance Wilson** and Judith Kipe-Nolt. "Anaerobic digestion of animal manure: An evaluation of odor reduction and temperature control."

National DNA DAY

The National Institutes of Health has designated April 30, 2004 as National DNA to celebrate the description of the double helix by Watson and Crick in April 1953 and the completion of the Human Genome Project in April of 2003. **A variety of curricular materials, online videos and webcasts, and genetics education modules are available at their website at www.genome.gov/DNAday**



STUDENT RESEARCH PROFILES

INNA NECHIPURENKO

Mentor: Dr. Hranitz

BioSynthesis: What are you investigating in your research project?

INNA: My ultimate goal is to study gene flow among various barnacle populations in the tropical Pacific ocean. My immediate goal is to develop a protocol for amplifying mitochondrial DNA sequences from cytochrome c oxidase.

BioSynthesis: What do you think are the benefits of doing an independent research project?

INNA: I have learned various techniques and procedures that are not taught in traditional classes. I have also gained insight into what scientific research is really like. It has reinforced many of the concepts I learned in classes.

BioSynthesis: What did you find the most challenging aspects of conducting research?

INNA: TIME MANAGEMENT! It was quite challenging to balance my classes, work, and research.



AMY RISEN

Mentor: Dr. Surmacz

Research in Biology

BioSynthesis: What are you investigating in your research project?

AMY: I have been investigating the lethal and sublethal responses of *Lumbriculus variegatus* to water pollutants. *Lumbriculus*, a segmented blackworm, has been used as a model organism for toxicology studies since it is an important link in aquatic food chains. I chose to investigate two anthropogenically derived water pollutants, methyl tertiary butyl ether (MTBE) a gas additive and the alternative de-icers, calcium acetate and potassium acetate. The sublethal responses evaluated were fragmentation (a stress response), pulse rate, and tactile response.

BioSynthesis: What have you determined so far?

AMY: I have determined the lowest dose causing an effect and the dose causing mortality for each toxicant. It was interesting to discover that the sensitivity of the sublethal responses varied. For example, with MTBE the pulse rate is increased first, followed by an increase in fragmentation, and then a decrease in tactile response. For calcium acetate, increased fragmentation and decreased tactile response occur first followed by an increase in pulse rate. The next step will be to explore the underlying biological mechanisms responsible for these responses. The work that I've done has opened up a new direction for research with *Lumbriculus*.

BioSynthesis: What do you think are the benefits of doing an independent research project?

AMY: This project has given me the opportunity to develop a hypothesis and a protocol, collect results, and compare my findings to other research being conducted. That sounds like what several of our lab manuals say is expected for a day in class, but it is much different for a year long project. I think that doing research at the undergraduate level is necessary if you plan to continue with graduate school. The experience of independent research will help me in developing my thesis project.

BioSynthesis: What did you find the most challenging aspects of conducting research?

AMY: The most challenging aspects of the *Lumbriculus* research have been anticipating the variables affecting the behavior of the organism and the behavior of the chemicals in the water, and that everything takes longer than expected!



RACHEL RADEL**Mentor: Dr. Kevin Williams, Research In Biology***BioSynthesis:* What are you investigating in your research project?

RACHEL: I am studying the effects of pH and aluminum on silver maples.

BoSynthesis: What do you think are the benefits of doing an independent research project?

RACHEL: I am learning techniques that would be useful in a job. I am also gaining experience in formulating hypotheses, designing and performing experiments, and interpreting results.

BioSynthesis: What did you find the most challenging aspects of conducting research?

RACHEL: It was difficult to collect and cultivate specimens. and was challenging to design the experiments.

**ANDREA SCHMIDT****Mentor: Dr. James Parsons, Research In Biology***BioSynthesis:* What are you investigating in your research project?

ANDREA: I investigated the antimicrobial effects of capsaicin, the heat component of chili peppers, on Gram positive bacteria, Gram negative bacteria, and a eukaryotic dermatophyte.

BioSynthesis: What have you determined so far?

ANDREA: Of the 33 varieties of peppers I tested, none of them affected Gram negative bacteria. The fungus, however, was inhibited by some, though not all.

BioSynthesis: What do you think are the benefits of doing an independent research project?

ANDREA: I enjoyed gaining new skills and experiences outside of class and traditional labs. I enjoyed exploring a topic I was interested in. I got an idea of what a future career in microbiology would be like. I think this was a great experience since I want to pursue an advanced degree in microbiology.

BioSynthesis: What did you find the most challenging aspects of conducting research?

ANDREA: Grinding all those peppers! (Don't breathe!) I learned that a carefully developed plan will simplify the experiment, to be prepared, and to be excited!

**MICHAEL KAMINSKY****Mentor: Dr. Carl Hansen, Methods in Biotechnology***BioSynthesis:* What are you investigating in your research project?MIKE: I am trying to determine if there is a change in the level of G-protein expression in *Fundulus heteroclitus*, a eurythermal fish that has been acclimated at two different temperatures (5 C and 25 C). I am isolating cell membranes by ultracentrifugation and then suspending their G-proteins in cholate. I will use SDS-Page and western blotting to see if specific alpha sub-units are present. I will then compare the types of alpha subunits in the *Fundulus* at the two different temperatures.*BioSynthesis:* What do you think are the benefits of doing an independent research project?

MIKE: An independent study research project has given me an opportunity to apply what I learned in the classroom to the real world. I feel that the type of skills you gain during a research experience can give you an edge when applying to graduate or medical school.

BioSynthesis: What did you find the most challenging aspects of conducting research?

MIKE: The most challenging part of conducting research is the time requirement. You must juggle research with our other classes that you are taking.



STUDENT RESEARCHERS

ERICA WEISKIRCHER

Mentor: Dr. Kevin Williams, Research In Biology

BioSynthesis: What are you investigating in your research project?

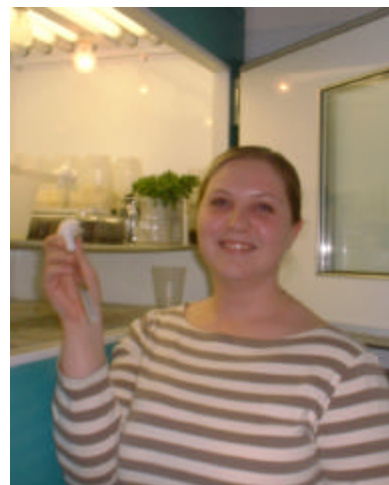
ERICA: I am trying to develop two labs that focus on microbial physiology for Integrated Physiology Lab. One of the projects involves working with the fungus *Neurospora crassa*. I am trying to determine if nitrogen concentration affects asexual or sexual reproduction. The second project examines chromatic adaptation in cyanobacteria.

BioSynthesis: What do you think are the benefits of doing an independent research project?

ERICA: Learning how to troubleshoot! I now have much more respect for those who develop labs. It is not as easy as one would think.

BioSynthesis: What did you find the most challenging aspects of conducting research?

ERICA: TIME—there seems to not be enough time in the day for class, research, etc. Although I am busy, I am enjoying this rewarding experience.



KEVIN BRACE

Mentor: Dr. James Parsons, Research In Biology

BioSynthesis: What are you investigating in your research project?

KEVIN: I am investigating the anti-microbial effects of various teas.

BioSynthesis: What have you determined so far?

KEVIN: I have determined that the teas I used only inhibited staphylococcus, a gram + organism. The teas had no effect on fungus or *E. coli*, a gram - organism. I found that green teas had the greatest anti-microbial activity.

BioSynthesis: What do you think are the benefits of doing an independent research project?

KEVIN: I liked doing this project because I got hands-on experience working in the field of microbiology. I gained experience in using the autoclave, making media, and using aseptic techniques.



JENNIFER KRUK

Mentor: Dr. Davis, Methods in Biotechnology

BioSynthesis: What are you investigating in your research project?

JENN: I am using DNA fingerprinting techniques to identify molecular markers in the Hardy Kiwim *Actinidia arguta*. This information will help kiwi breeders to identify and select cultivars with the desired characteristics more efficiently.

BioSynthesis: What have you determined so far?

JENN: Using these techniques, we found obvious polymorphisms among kiwi varieties that will be very useful in cultivar identification. (Also, I learned that pouring 5% agarose gels is nearly impossible!)

BioSynthesis: What do you think are the benefits of doing an independent research project?

JENN: An independent study project has not only taught me a lot of useful lab techniques, but it has provided me with opportunities to develop skills in problem solving and time management. When you have a lab as part of a class, the experiment is planned for you and most likely it works as planned. This is completely different in an independent study research project. Although it can be frustrating to get unexpected results, you learn to deal with it and to explore other approaches.



KATY PARISE

Mentor: Dr. John Hranitz

Honors Independent Study I and II

BioSynthesis: What are you investigating in your research project?

KATY: I am studying the correlation between heterozygosity and fitness in a population of collared lizards, *Crotaphytus collaris*.

BioSynthesis: What have you determined so far?

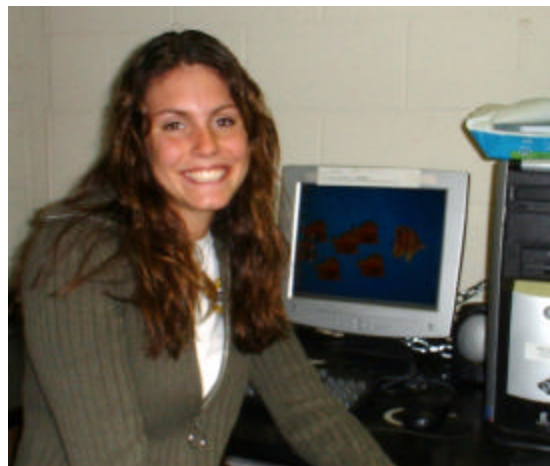
KATY: Heterozygosity does not affect overwintering survival. On the other hand, heterozygosity at one locus (esterase) was correlated with one measure of body symmetry (number of femoral pores). This correlation between heterozygosity and symmetry is interesting because it suggests that the species is under sexual selection.

BioSynthesis: What do you think are the benefits of doing an independent research project?

KATY: This project has opened doors for me. The skills that I have developed and the experiences that I have had will guide me in my selection of graduate schools and in my future research endeavors. My research has also kept me updated on current topics in molecular biology.

BioSynthesis: What did you find the most challenging aspects of conducting research?

KATY: The most challenging aspect of conducting research is in recognizing it as a trial and error process. Sometimes things don't work and you need to stop and re-evaluate your plan. Research is an ongoing process and there may be setbacks.



BETHANY ROVNACK

Mentors: Dr. Cindy Surmacz and OB/GYN Associates

Research In Biology

BioSynthesis: What are you investigating in your research project?

BETHANY: The goal of my research is to compare the effectiveness of various treatments on bone density in two groups of postmenopausal women, those on Hormone Replacement Therapy (HRT) and those not receiving this therapy. This research was conducted in collaboration with Dr. Kowalski and Ms. Niglio, PA-C, at OB-GYN Associates, Bloomsburg Hospital and was approved by BU's Human Subjects Committee. HRT has been prescribed to postmenopausal women to relieve the symptoms of menopause. In HRT, estrogen is used alone or in combination with progesterone. HRT use is currently controversial because of recent clinical trials that show that the incidence of breast cancer, heart attack, blood clots, and strokes was higher in women on HRT. On the other hand, HRT helps to improve bone density and to prevent osteoporosis. The relative risks and benefits of HRT to each patient must be carefully considered. As a consequence of the potential adverse effects of HRT, alternative approaches are being considered to prevent or slow down osteoporosis.

BioSynthesis: What have you determined so far?

BETHANY: An examination of bone scans from patient records has revealed no significant differences in bone loss from the spine or hip between 36 postmenopausal women on HRT and those on other therapies for osteoporosis.

BioSynthesis: What do you think are the benefits of doing an independent research project?

BETHANY: This independent project has helped me to understand clinical research. I am able to apply the knowledge and skills I have been taught in class and lab. I have gained exposed to clinical techniques and had the opportunity to interact with patients and physicians. This will help me in the future.

BioSynthesis: What did you find the most challenging aspects of conducting research?

BETHANY: The most challenging aspect of conducting research is time management!



The Reading Lamp: Current Topics in Evolutionary Biology

George Chamuris, Professor



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

The transition from lobe-finned fishes to tetrapods (limbed vertebrates) continues to intrigue biologists and paleontologists. Research on this topic is active; recent fossil finds coupled with new genetic discoveries of how body plans become organized during embryological development (the *hox* genes) have provided unprecedented resolution to our understanding of this important transition. Tetrapods (Amphibians, Reptiles, Birds, and Mammals), together with coelacanths and lungfishes, are referred to as lobe-finned vertebrates (the Sarcopterygians) (Fig. 1). Even the lobe-finned fishes have bones in their fleshy limbs (Fig. 3). These limbs are used by extant species both to prop up the body in station-keeping, and to enable a walking-like type of locomotion.

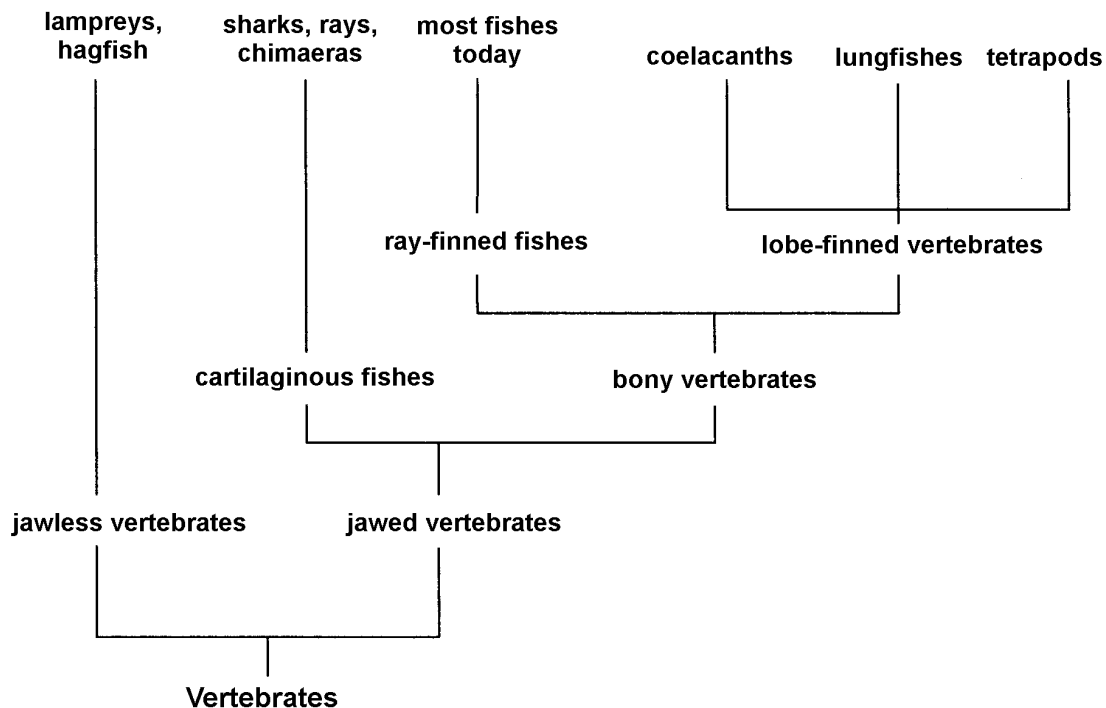
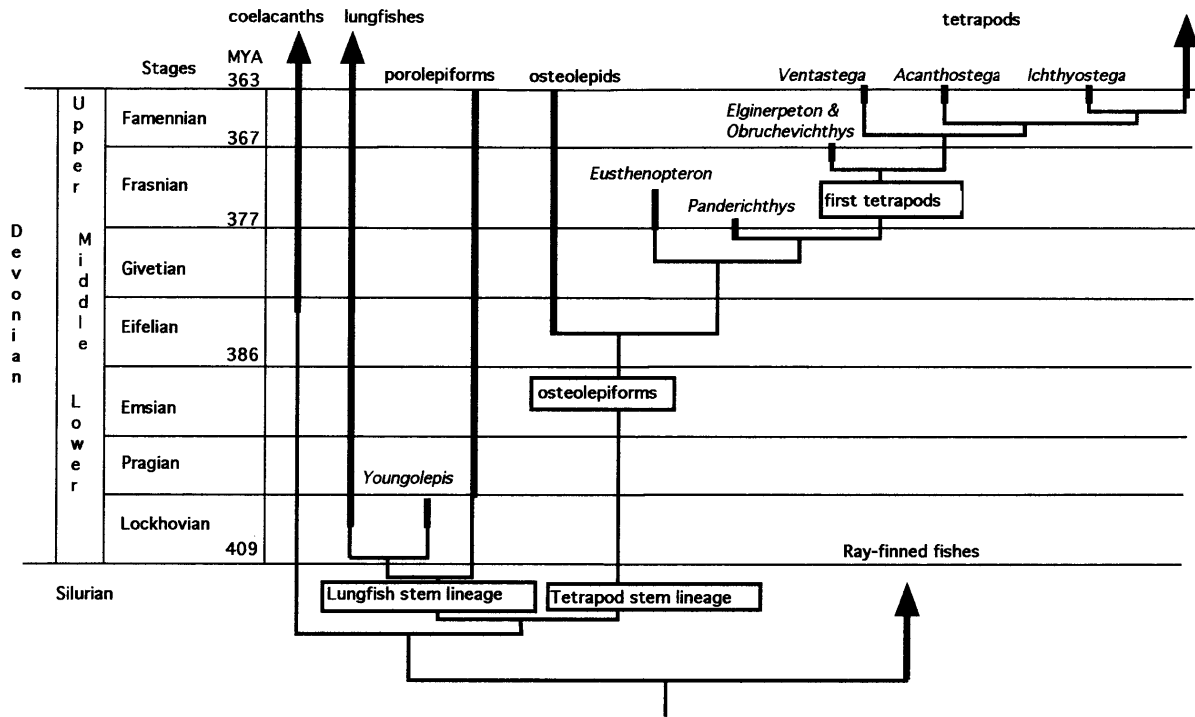


Fig. 1. Phylogeny of Extant Vertebrates (modified from Clack, 2002). Used with permission.

The transition between the extinct Sarcopterygian fish and land-dwelling tetrapods took place in the Upper Devonian (ca. 370 million years ago). Transitional genera include *Panderichthys* (more fish-like) and *Acanthostega* (more amphibian-like, but still primarily aquatic) (Fig. 2). *Panderichthys* did not have well-developed digits, and *Acanthostega* had limbs terminating in eight digits (Fig. 3). The discovery of *Acanthostega* with eight-digit limbs forced us to revise our view that five digits is the ancestral condition in vertebrates. The five-digit plan survived, but was not the original plan (see Clack, 2002).

Fig. 2. Devonian transition between fish and tetrapods (Clack, 2002). Used with permission.



An article published in the 2 April 2004 issue of *Science* describes an analysis of a new fossil humerus and puts forth a revised interpretation of the tetrapod limb origin (Shubin et al., 2004). The fossil humerus, collected in north central Pennsylvania from late Famennian (Upper Devonian) deposits, has shared features with the extinct, transitional taxa *Acanthostega*, *Ichthyostega*, and *Tulerpeton*. The authors placed the specimen (ANSP 21350) as transitional between *Panderichthys* and *Acanthostega*. They concluded that critical shifts in bone shape and muscle attachment, key to the evolution of tetrapod limbs with digits, occurred prior to the invasion of land. Thus, the fossil evidence suggests that the first vertebrates to invade land in the Devonian were preadapted anatomically for that transition.

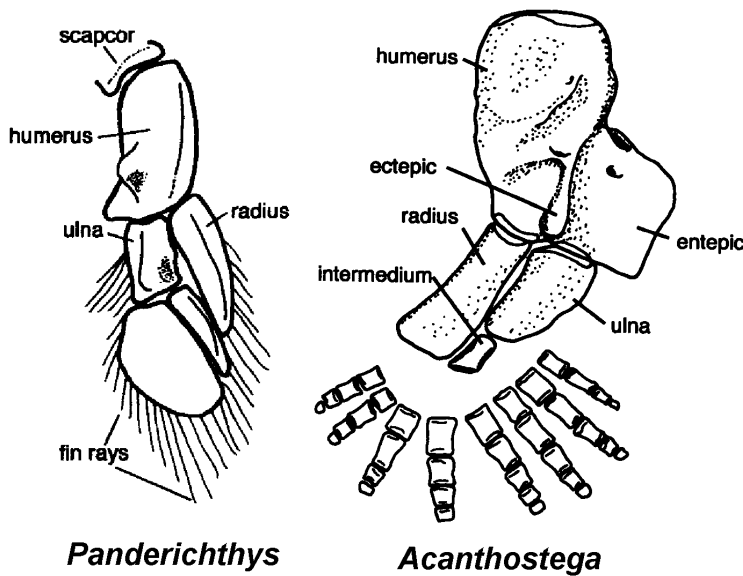


Fig. 3. Comparison of *Panderichthys* and *Acanthostega* forelimbs (Clack 2002). Used with permission.

Clack, J. 2002. *Gaining ground: The origin and evolution of tetrapods*. Indiana University Press, Bloomington and Indianapolis. 369 p.

Shubin, N.H., E.B Daeschler, and M.I Coates. 2004. The early evolution of the tetrapod humerus. *Science* 304:90-93.

THE BU MASTERS PROGRAM

The Department of Biological and Allied Health Sciences offers both a Masters of Science degree (M.S.) and a Master of Education (M.Ed.) in Biology. Our master's program in general biology provides opportunities for course work and research at the supraorganismal, organismal, cellular, and molecular levels of biology. The program prepares students for admission to doctoral programs or professional schools and also enhances the knowledge and experience of high school biology teachers. For more information, contact the graduate program coordinator, **Dr. Carl Hansen** (123 HSC).

Graduate Student Research Feature

AMY MUDRY

Thesis Mentor: Dr. Carl Hansen

BioSynthesis: What are you investigating in your thesis research?

AMY: I am investigating the role of the G protein subunit alpha Q in the Wnt signaling pathway in primary and metastatic colon cancer cells. To do this, I am evaluating the transcriptional activity of Wnt signaling using a variety of T Cell Factor responsive reporter constructs such TOPFlash and FOPflash that contains luciferase genes.

BioSynthesis: What have you determined so far?

AMY: My results suggest that the G alpha Q pathway does interact with the Wnt signaling pathway.

BioSynthesis: What do you think you have learned from this experience?

AMY: This experience motivated me to look beyond class work and to start thinking as a scientist. I had the opportunity to read and learn about a specific topic in detail and to design my own experiments. My thesis research has taught me much about the nature of science and I have found it to be very rewarding.

BioSynthesis: What did you find the most challenging aspects of conducting research?

AMY: The most challenging part was getting started. With any new project, there are always bugs that need to be worked out. I spent most of my summer trying to work out those bugs! But once I started getting reproducible results, it made all the frustrations disappear!



Updates

Holly Richendrfer has recently presented the results of her directed study research to the Department of Biological and Allied Health Sciences. Her project was entitled "Effects of spine removal and regeneration on feeding, growth, and activity of *Strongylocentrotus droebachiensis* (Echinodermata, Echinoidea) in culture." **Dr. Klinger** is Holly's mentor. Richendrfer

The following graduate courses will be offered fall semester 2004: Vertebrate Systems Physiology (50.474), Microbial Physiology (50.478), and Current Topics: Behavioral Ecology (50.489).

Alumna to be President of the AACR

Lynn McCormick Matrician 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 the University of Arizona where she earned a Ph.D. in molecular biology in 1982. Dr. Matrician 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. Matrician joined the faculty at Vanderbilt University in Nashville, TN. She is presently the Ingram Distinguish Professor of Cancer Research and chairperson of the Department of Cancer Biology at Vanderbilt University School of Medicine. She has served as Associate Director for Education and Training at the Vanderbilt-Ingram Cancer Center and the Program Leader for the Host-Tumor Interaction Program and the Breast Cancer program. Dr. Matrician has been elected president of the American Association for Cancer Research (AACR) for the 2004-05 term. (*AACR News*, Spring 2004, www.aacr.org)