

Department of Biological Sciences

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Note From The Chair: OMG! GMO!

The biology curriculum behind “frankenfish.” The history of human civilization is associated with the history of food production. Cultivation of crops in the Fertile Crescent- the Agricultural Revolution- allowed for human settlements and the rise of cities. Farmers may well have been manipulating the characteristics of those crops—planting seeds from varieties with the best crop yield, or the best drought resistance—for nearly as long as there has been agriculture. Ten thousand years later, in the 20th century, the human population was booming (from fewer than 2 million in 1900 to 6 million in 2000).

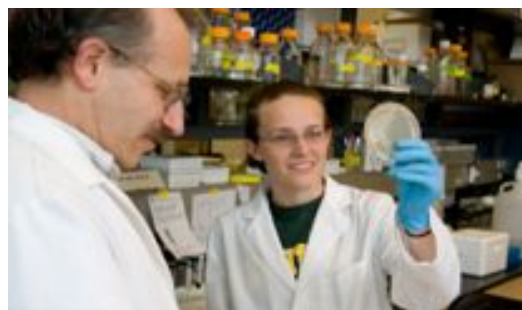
Another agricultural revolution, the “Green Revolution,” pushed to feed all those people by increasing crop yields. New grain varieties, commercial fertilizers and pesticides, and other innovations in farming created tremendous increases in food production. Now, a few decades later, as the benefits of the green revolution have plateaued and concerns over heavy use of fertilizers and pesticides have elevated, a new wave of crop development is moving forward. In what might be called the “molecular agricultural revolution,” modern biotechnology makes possible the directed transfer of genetic material between organisms of the same (“cisgenesis”) or of different (“transgenesis”) species. The result is that food scientists can intentionally incorporate particular traits into food organisms. The attractions of this approach are two-fold. First, new traits can be introduced much more quickly than by conventional methods of selective breeding. And second, through transgenesis, it is possible to incorporate traits that might never otherwise arise in a particular organism. For example, bacterial toxins introduced into the corn genome confer resistance to insect pests.

The products of such genetic manipulations are called Genetically Modified Organisms—GMOs. GMO plant-based foods have been in production for more than 15 years, since the “Flavr Savr” tomato in 1994. Today, genetically modified crop plants, including corn, soybeans, tomatoes, and others, are in widespread planting, incorporating pest or herbicide resistance, enhanced nutrients, or better shipping and storage characteristics. But so far, no GMO animal foods have been approved for market.

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Check out pictures from the campus woods walks this past fall on the Biology Facebook page!



Did You Know?

You can receive Biology degree credit for working in a WSU research laboratory. Contact an advisor to learn more!

Summer Research Opportunities

Many institutions across the country offer programs to support student research experiences during the summer. Learn about these opportunities at WSU's Undergraduate Research (UROP) site and the National Science Foundation's REU (Research Experiences for Undergraduates) program:

www.wright.edu/urop/research/summer.html
www.nsf.gov/crssprgm/reu/reu_search.cfm

Keep in mind that applications are sometimes due early in the year!

Chair's Note, continued... That is likely to change soon. These past months, the Food and Drug Administration has been evaluating whether it should approve production of AquAdvantage salmon for human consumption. This “variety” of salmon grows faster, larger, and more efficiently (adding more mass relative to food consumed) than “normal” salmon, and it could potentially contribute significantly to the production of high-protein foods for consumption by the still-expanding human population. As Biology majors, you should think about the science issues involved in developing AquAdvantage salmon for large-scale food production. The issues closely mirror the curriculum of a biology degree:

Molecular Biology: How to modify the target (Atlantic salmon) genome? The objective is to identify and introduce a desired set of genes. For AquAdvantage salmon, scientists generated a gene transfer construct that combined the gene for growth hormone (GH) from the Chinook salmon with a promoter derived from the antifreeze gene of another species, the ocean pout. In the salmon, that promoter is constitutive (active all the time), and the result is constant activation of the GH gene, promoting steady, vigorous growth, rather than seasonal GH activity normal for salmon.

Animal Physiology: Is the “new” fish really an improvement? The value of the GMO fish is its ability to grow efficiently and to convert food into body mass. Determining this capability requires measures of food consumption, energy contents of food and fish, growth trajectories and so on.

Genetics/Developmental Biology: How to keep the GMO fish from interbreeding with normal (wild-type) fish? The solution in this case is to make the GMO salmon all triploid female. Doing so requires knowledge of salmon biology, including that triploidy can be induced by stressing fertilized fish eggs, and that triploid fish do not produce gametes.

Human Biology: Is AquAdvantage salmon a good food for humans? One question, which also arises for other GMO foods, is whether the GMO salmon contain constituents that might be harmful to humans. For example, if non-salmon proteins are being produced, might they induce allergies in people who previously were *not* allergic to salmon? A second concern regards possible *lack* of a beneficial element in the GMO fish. Salmon is an excellent source of omega-3 and omega-6 fatty acids, considered protective against human heart disease. Are GMO fish equally rich in these fats?

Ecology/Conservation Biology: An important concern with any GMO is whether it might contribute to ecological problems. With GMO corn, for example, the inserted bacterial toxins that kill corn pests, but might also kill other, non-target insects. For salmon, concerns revolve around the possibility of farmed GMO fish escaping and mixing with wild salmon populations, interbreeding, and thereby changing the characteristics of the wild fish, such as their instincts to migrate back to breeding sites, or their ability to evade predators. An additional question of conservation biology concerns the initial context for developing GMO fish. That is, what is the demand for fish as human food? To what extent can wild populations of fish, including salmon, support those demands, and how much do we need farmed fish

including GMOs? The scientists who have developed AquAdvantage salmon have had to address all of these issues, and others. A document to that effect was presented to the Food and Drug Administration, which, this past September, concluded that AquAdvantage salmon *is* safe to eat. The approval process for bringing them to market is continuing forward, and GMO salmon may well hit the supermarket shelves before long.

Clearly, there is a lot of complex science behind GMO salmon. So perhaps it is not surprising that people hesitate to accept GMO foods, and may even express reflexive negative reactions. Indeed, the term “Frankenfoods” (or, for salmon, “Frankenfish”) is often used to describe GMOs.

If your friends or family ask you whether GMO salmon are a good idea—what would you say?

For more information, I recommend the briefing report submitted to the FDA, available from the FDA website.

For a more general discussion of history and future of the fishing industry, the book *Four Fish: The Future of the Last Wild Food*, by which includes a discussion of salmon, along with cod, bass, and tuna. Again, lots of “food for thought.”



Dr. David Goldstein
Chair, Dept. of
Biological Sciences

Good Luck Fall 2010 Graduates!

Roger Acharya	Randi Sansom
Megan Bush	Zara Shah
Venus Ebrahimian	Tammy Smith
Kevin Eshelman	Eric Woebbe
Danielle Hawker	
Alyssa Hotz	
Obonganam Joshua	
Mohammed Kassem	
Matthew Kemper	
Joshua Klepinger	
Alison Manning	
Timothy Morgan	
Samuel Priddy	
Kenney Reynolds Jr.	

Departmental Honors

Travis Rotterman

**Applications for
June graduation
are due March 1st.
See an advisor for
approval!**

WSU AMAZON TRIP TO PERU

Wright State students traveled to remote areas of Peru during the winter break for the Amazon Expedition course.



WSU student **Liz Ervin** stated, "These trips are an amazing opportunity to travel to and learn about the tropical rainforest biome. I have seen and experienced things I never thought I'd be

able to do... things I've always dreamt of seeing." The students observed numerous organisms including toucans, tarantulas, scorpions, macaws, red howler & spider monkeys. Students spend two weeks in the Amazon applying what they learned in the class during Fall Quarter. This is an incredible experience that you should consider next fall.

Did you Hear? Dr. Kate Excoffon learned that her NIH R15 proposal, entitled "Isoform-specific and regulation and localization of the coxsackie and adenovirus receptor in airway epithelia" is receiving funding! This will be a 3-year grant- **congratulations Dr. Excoffon!**

Lending a Helping Hand in a Time of Need

The Department of Biological Sciences was able to help a local family in need during this 2010 holiday season. The office and the departmental faculty and staff worked with St. Vincent dePaul (SVdP) to connect with a mother of four who had recently lost her job. Unable to support her family, she was forced to move in with her sister, who was also supporting her own family of two young children. Clothing, toys, food and monetary donations were collected and delivered to the family by Biology staff members. It was truly inspiring to witness all of the generosity from the Department. We want to thank St. Vincent dePaul for all that they do for the community including providing temporary housing and meals to those who are without homes.



Sharon Ochs, a WSU Biology alumnus, is the student president of the WSU chapter of SVdP. If you would like to get involved with this WSU student org., or to learn more please email: svdpsu@gmail.com This is a great way to get involved if you are looking for opportunities in community service, leadership and/or tutoring. The group is looking for volunteers to tutor elementary and middle school age students at both the Kettering and downtown Dayton facilities. What a great way to give back! **Shannon Romer**, a WSU bachelor and master's alumnus is the volunteer coordinator for SVdP. Please email her at shannon.romer@wright.edu. Biology Advisor **Courtney Smith**, a WSU bachelor and master's alumnus, coordinated this effort for the Dept. **Thanks to everyone involved!**

Jenny Papadakis is now an Advising Assistant in the College of Science and Mathematics!

Jenny joined the Department of Biological Sciences in 2009 and she began her journey in the CoSM office in January of 2011. She will be working with students as an Advising Assistant.



Jenny's dedication to students and to higher education is apparent in all that she does. When asked about her new position, Jenny stated that, "The transition from quarters to semesters brings unique opportunities and challenges to our University. I am excited to join the dynamic College of Science and Math advising team to ensure that we continue to provide an extraordinary level of support to each student during this transition." Jenny received her bachelor's degree in English from Wright State University and she will soon complete her Master's degree in Composition and Rhetoric. She teaches Developmental writing courses and enjoys spending time with her husband, Art, and her dog Prime.

Music and PhUn with WSU Biology Students



Kate Hastings (right) delighted the Bio Dept. with a musical performance at the Winter Break Potluck. Kate is a Biology student who is also pursuing a career in music. **Brittany Reinert** (pictured left) and **Danielle Hawker** participated in PhUn Week with **Dr. Lynn Hartzler**. Physiology Understanding (PhUn) Week aims to increase K-12 student awareness of physiology in their lives.



The Biology Club helped to raise awareness by hosting one of the Campus Woods Walks, which was led by **Dr. Runkle**. The fall hikes were very popular and nearly 80 people came to the hike that **President Hopkins** attended! This spring the club would like to create signs to help better mark the trails so that more people will take part in this tremendous campus resource. Great progress was made in restoring the bird blind and thanks go out to the freshman biology lab preps and to the other student and faculty volunteers for their time and hard work on this project! The following are some upcoming events offered by the Bio Club this winter: Welcome Back Trivia with Pre-Med Society, Res. Life Blood Drive Jan. 28th from 12-4 p.m. in the 2nd floor plaza of Honors Hall, a trip to either Newport Aquarium or COSI Science Center!

Biology Club Woods Project

Email **Ronak** at ghiya.3@wright.edu for info!



Winter Quarter Departmental Seminars

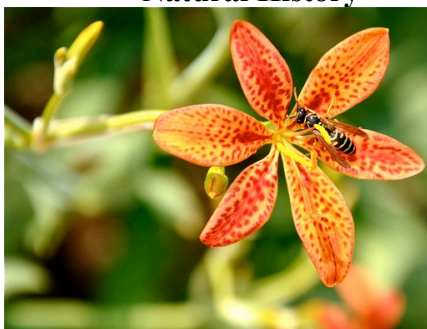
Seminars are held at 1:30 p.m. on Mondays in Room 129 Med. Sci. Students are encouraged to attend.

January 10	“Targeting replication of opportunistic pathogens” <i>Dr. S. Dean Rider, Wright State University</i>	Host: Dr. Krane
January 24	“Conservation genetics of Eastern Massasauga rattlesnakes” <i>Dr. Lisle Gibbs, The Ohio State University</i>	Host: Dr. Peters
January 31	“Probabilistic profiles and forensic DNA casework” <i>Dr. Alex Sinelnikov, Genetica, Inc.</i>	Host: Dr. Krane
February 7	“Plant metacommunity dynamics in a fragmented landscape” <i>Dr. Dave Rogers, University of Wisconsin</i>	Host: Dr. Rooney
February 14	“Not all cold hits are equal” <i>Dr. Simon Ford, Lexigen, Inc.</i>	Host: Dr. Krane
February 21	“Factors causing disturbances in Estonian forest ecosystems: observations & experiments” <i>Dr. Kalev Jogiste, Estonian University of Life Sciences</i>	Host: Dr. Rooney
February 28	“Gene control at the flip of a ‘switch’” <i>Dr. John Means, University of Rio Grande</i>	Host: Dr. Bubulya
March 7	“Development of cardiovascular control in embryonic reptiles” <i>Dr. Dane Crossley, University of North Texas</i>	Host: Dr. Hartzler

Spring 2011

Class Information

BIO 371	Intro to Bioinformatics
BIO 401-01	Ornithology
BIO 401-02	Intro to Immunology
BIO 401-03	Basic Cell Culture Techniques
BIO 401-04	Tropical Ecology
BIO 446	Advanced Cell
BIO 476/477	Human Parasitology
BIO 492-01	Field Ecology and Natural History



Mark Your Calendars!

Winter 2011 Schedule:

Jan. 3	Winter quarter classes begin
Jan. 7	Last day to register, add classes, or withdraw and receive 100% refund of fees in person
Jan. 9	Last day to register, add classes or withdraw and receive 100% refund using WINGS Express
Jan. 10	70% refund of fees begins
Jan. 17	Martin Luther King Jr. Day, WSU closed
Jan. 18	Last day to withdraw and receive 70% refund of fees
Jan. 21	Last Day for ALL students to drop a class without a grade
Feb. 18	Last day for ALL students to drop a class with a grade of “W”
Mar. 1	Last day to apply for June Graduation
Mar. 12	Last day of Winter Quarter classes
Mar. 14-19	Final exams for Winter Quarter

Bio Students Conduct Atlantic Ocean Research

Jaclyn Klaus and **Deepthi Nalluri** are current WSU Biology students who were part of a research team led by EES professor Dr. Chad Hammerschmidt. The team studied mercury levels in the Atlantic Ocean off the New England coast this past summer. Jaclyn said that this 2 ½ week trip "...was one of the best and most unique experiences of my life." The researchers collected samples to determine methyl mercury levels in air, water, plankton and sediment to determine how mercury ends up in the fish we consume. Dr. Hammerschmidt's lab is in the early stages of working on this issue by testing the specimens that were retrieved from the ocean bottom. Jaclyn commented that the benefits of her experience included incredible sunsets and dolphin watching. To read more, visit: <http://www.daytondailynews.com/news/community/Beavercreek/ws-student-researching-mercury-levels-in-the-atlantic-908088.html>

L.A. Times & WSU

Wright State University's professor emeritus of aquatic biology and toxicology, **Dr. Wayne Carmichael**, was recently featured in a story in the Los Angeles Times newspaper. The article focused on the recent unexplained deaths of California sea otters. The otter deaths were attributed to a type of cyanobacteria, *Microcystis*, which are the ancestors of modern bacteria and algae. Dr. Carmichael is the expert on *Microcystis*, which is found in every country in the world, and he stated that, "We find it everywhere you have nutrient enrichment: nitrogen and phosphorus in warm, stagnant water." This is an increasing problem due to the buildup of pollution and nutrients from expanding agriculture and modern industrial society. Cyanobacteria levels were not found at high enough levels to be dangerous to humans, but they were found in highly concentrated levels in the digestive tracks of contaminated shellfish- the preferred meal of the sea otter. Sea otters consume 25% of their body weight a day in shellfish, which creates perfect conditions for toxic poisoning. To read more, visit: latimes.com/news/local/la-me-sea-otters-2010923,0,3239917.story

Wright State University

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Need Advising?

If you need to schedule an appointment with an advisor, please call 937-775-4226 or email bioadvising@wright.edu. Make sure to include the name of the advisor you wish to meet with, along with your availability, and UID number.

Undergraduate Degrees:

Jacqui Neal
 Dr. Patti Roberts
 Courtney Smith

Graduate Degrees:

Laura Buerschen

Clinical Lab Sciences:

Bev Schieltz

The BioLogue is a quarterly student newsletter that contains important information for students in the Department of Biological Sciences. If you have questions or comments, please send them to Courtney at courtney.smith@wright.edu.