

Biology Department Newsletter

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A Note From the Chair



Dear Friends,

The end of the semester was again a very busy time in the department. Our Frontiers in Life Sciences symposium was a great success thanks to the work of the faculty committee. Once again the field class in the tropical rain forest of Costa Rica was a great experience for the students. Staff went on immersion trips, students presented their research at symposia, new faculty research was undertaken and grants received. This high level of activity in many areas is a hallmark of the department and continues to make it a very exciting environment for students, faculty and staff.

I very much appreciate everything you all do to make all aspects of the department's mission thrive. Thanks again to all of you who regularly respond to the special requests for help that I make. So much of what we do would not be possible without your good-natured willingness to contribute your time to special projects.

It's been another highly successful academic year. Best wishes for a productive and enjoyable summer.

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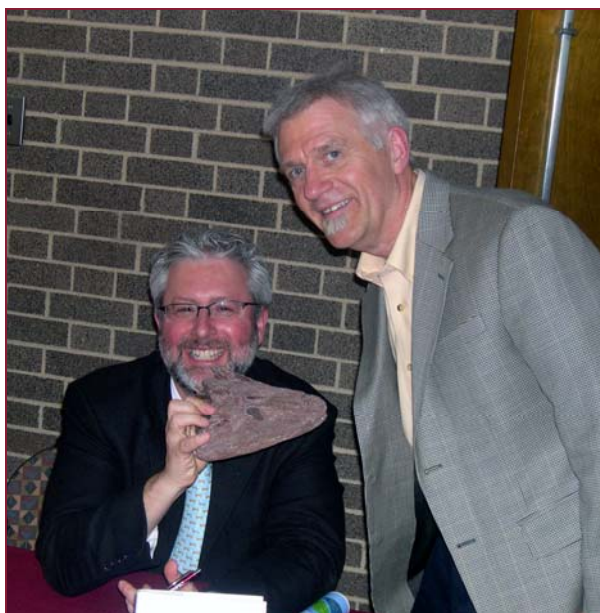
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Tiktaalik Comes to Lake Shore



Loyola's own Dr. William Kroll (right) poses beside keynote speaker Dr. Neil Shubin who is showing off a head molding of *Tiktaalik roseae*, a creature that lived 375 million years ago.

Galvin Auditorium was packed to near capacity when Dr. Neil Shubin of the University of Chicago and the Chicago Field Museum came to speak at the 2009 Frontiers in Life Sciences Seminar. Dr. Shubin delivered a talk entitled "Using Fossils and Genes to Find Your Inner Fish" that dealt with his discovery of the fossils of *Tiktaalik roseae*, a "fishapod" that lived around 375 million years ago and whose discovery has helped to shed light on the point in evolutionary history where life on earth moved from out of the water and onto the land.

Dr. Shubin spoke engagingly about the personal history that led him on the Arctic expedition that resulted in the discovery of *Tiktaalik roseae*. He spoke as well about the implications that such a discovery has on the field evolutionary biology and what that can tell us about our selves. (cont. p. 4)

Biology in Costa Rica

Dr. Robert Hamilton has taken another Natural Resource Conservation class to the rain forest in Costa Rica.

Dr. Robert Hamilton and Dr. Robert Morgan led a class of Loyola students (Fig. 1) to the Las Cruces Biological Station in Costa Rica over the spring break in the first week of March, 2009. Las Cruces is a 300 hectare pre-montane rain forest near the town of San Vito in southwestern Costa Rica. It is 1,200 meters above sea level and gets about 4 meters of rain each year. Las Cruces is home to the Wilson Botanical Garden (Figs. 2 & 3) which is considered to be the premier botanical collection of Central America. The WBG features diverse plantings of tropical and subtropical ornamentals, unusual plant families as well as rare and endangered plants from Costa Rica. It is said to include 1,000 genera and over 212 plant families. The station is owned and operated by the Organization of Tropical Studies (OTS). OTS is a consortium of Universities from the U.S., Europe and Central America with the main office located at Duke University in Durham, N.C. OTS owns and manages three biological stations in Costa Rica: La Selva, Palo Verde and Las Cruces. These stations are visited by many tourists, researchers and students every year.

The Natural Resource Conservation course (Biol. 393) has been offered every other year since 2000. Students have to pay extra for the spring break trip associated with the course. Airfare and station fees (fees include housing, three meals a day and access to all trails and facilities) account for most of the cost. The meals are basic and good (especially if you like beans and rice) and served family style at Las Cruces.

The objective of the trip was to observe the valuable “living resources” of Costa Rica’s rain forests. Costa Rica is a country about the size of West Virginia and is one of the most biologically diverse countries in the world. The Costa Rican government has set aside about 30% of the country as nature preserves and ecotourism ranks 3rd behind coffee and bananas in importance to the economy.

On the way from San Jose to Las Cruces our group stopped at the Mirador de Quetzales (Figs. 4 & 5). The Mirador stop is a cloud forest at about 2,650 m (8,530 ft.) and is home to a small population of the Resplendent Quetzals, beautiful, rare and endangered birds (Fig. 6). It is the national bird of Guatemala and was worshiped by the ancient Aztecs. After a difficult hike on steep up and down muddy trails, we found and photographed several Quet-





Each student selected a rain forest organism to concentrate on while at Las Cruces. Niche aspects were studied on site for their specific organisms with an oral presentation and a paper due after returning to the class room at Loyola. The students covered a lot of the trail system at Las Cruces (oh, to be 21 again) and took digital images of their target species as well as many other plant and animal species. Students were aware that collection and removal of specimens is not permitted at OTS stations and that the only way to “bring ’em back” is in film or digital format. Organisms studied included: Bats, Monkeys, Toucans, Tanagers, Lizards, Frogs, , Stingless bees, etc. (Figs. 7-12). Two students concentrated their efforts on biodiversity in relation to forest fragmentation and restoration.

Two side trips were taken from Las Cruces. One was a visit to a coffee co-opt (Coope Pueblos), and one of many small coffee farms in the co-opt. The owner of one of the farms led us on a walking tour and talked about all aspects of operating an eco-friendly and totally sustainable coffee farm (Fig. 13). During the tour of the distribution center we were treated to cups of fresh coffee. Wow, what a difference “fresh” makes...delicioso! You can order coffee direct at a good price (since they cut out the “middle man”) by going to > coopepueblos@yahoo.com<. The second side trip from Las Cruces was a trip to the Ballena National Park on the coast of Golfo Dulce (Fig. 14) near the town of Golfito. After observing many shore birds and Iguanas and frolicking for some time in the ocean waves, the students were excited to locate a group of nine howler monkeys with a single alpha male (Fig. 15) close by in the coastal forest (Fig.13-15 on p. 9).

All (including the professors) returned to Chicago with a better appreciation and understanding of the living resources of the tropical rainforest. We sure miss the Costa Rican weather (its April 15th here in Chicago and still in the 40s). It was sunshine and upper 80s at Las Cruces each day with only one brief period of light rain. The weather in San Jose was perfect as well with temperatures in the upper 70s and low 80s. The students didn’t even need the boots and rain panchos that I insisted they drag along with them. Oh well (as they say), better safe than sorry.

Note: Thanks are due to Biology Chairman Jeff oering for his past and present support of this special course and its valuable field component.

The Tree of Life...One Fish at a Time.

By Dr. Terry Grande



Euteleosti specimens in the Grande Lab.



The fish group Euteleosti comprises the majority of all fishes living today. The diversity among these fishes is enormous from the pikes, pickerels and salmons to the coral reef fishes to tuna and marlin. It is estimated that this group contains over 346 families; 2,935 genera and over 17,000 species of extant fishes. The fossil record dates back to the Early Cretaceous at least.

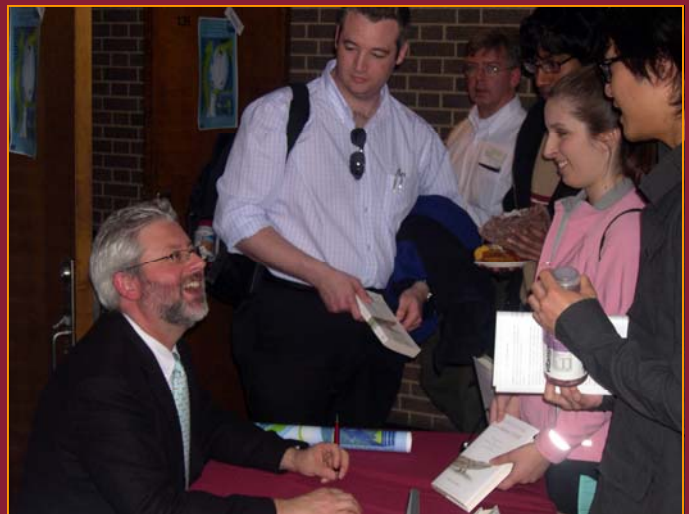
This project funded by the National Science Foundation is a collaborative effort of five research laboratories charged with investigating the evolutionary relationships of euteleosti fishes. Each laboratory approaches the problem from a different aspect incorporating morphology, development, molecular biology and paleontology into a common data base that will eventually be accessible to all researchers and the public.

Our project is only the second fish Tree of Life project (AToL) by NSF. Other funded AToL projects included one for birds, mammals, reptiles, amphibians, angiosperms, and spiders. The overall goal of the NSF is to eventually build the Tree of Life of all living things. At the end of our five year project we will incorporate our results into the AToL of life where anyone can come to better understand the evolution of all life.

Our AToL is a collaboration of five primary laboratories (e.g., Loyola University, University of Kansas, University of Nebraska, Field Museum of Natural History). My laboratory will take a developmental approach to the problem, we will examine the development of the skeletal system in a subset of the Euteleosti, so we can better understand how bone and cartilaginous structures change within a lineage and between lineages.

(Shubin, continued from p. 1) Touching on many of the themes addressed in his book *Your Inner Fish*, Dr. Shubin discussed tracing the history of life on sea's movement to life on land by way of anatomical transformation, and finally making a case for research science as a vocation. He framed all of these points in the context of his own biography speaking of how his times as a young new assistant professor at the University of Pennsylvania picking fossils out of the exposed rock on the side of the highway would one day lead him to the Canadian Arctic and eventually *Tiktaalik roseae*.

Dr. Shubin closed his talk discussing the rewards of working as a research scientist. He emphasized how much science tells us about what it means to be human, and how there can be no better argument for science than that.



Dr. Shubin chats with students and signs autographs outside Galvin Auditorium after his presentation.

Staff Immersions



This year, two Loyola Biology Department staff members, Jerome Lucas and Brian Norton, participated in University sponsored Immersion programs to observe both domestic Jesuit outreach programs, as well as those abroad. Jerome was chosen to accompany a group of Loyola staff and faculty to Vietnam. Jerome, now an Animal Care Technician for the Loyola Biology Department. From 1966 - '67, Jerome worked as a reconnaissance medic for the U.S. Army stationed in the Vietnamese town of Plây Ku.

Lucas found the return to the country where he had the most intense experiences of this youth one of overwhelming emotion. While touring the Vietnam's ancient capital of Hue, Jerome was introduced to a group of men who turned out to be former North Vietnamese soldiers. The men had served at An Khe, an area Jerome also served. As Jerome told Loyola Magazine, "It was gut-wrenching for me. There was a possibility that I had aimed my rifle at these guys."

Back in the United States, Office Assistant had an emotional experience of his own when he spent a week down in New Orleans with a Loyola Immersion group in association with Operation Helping Hands, a division helping with Hurricane Katrina relief. Norton along with seven other faculty and staff members spent a week in New Orleans up on ladders and inside crawl spaces, painting, chipping, drilling and hanging in the interior and exterior of houses damaged in the storm. The days were spent working helping to get displaced families back in their homes, and the nights were very often spent with survivors of the storm, listening to them tell their stories.

Three years after the storm much work still needs to be done in the Gulf region, and Brian will return in May 2009. "The one thing all of the Katrina survivors stressed to our group is that New Orleans is coming back, slowly but surely, because of the generosity and dedication of volunteers. It was a great and humbling experience and I hope to go back," he says.

Both men are grateful to Loyola University for the wonderful opportunities they have been given. Each hopes that the experience will enrich their daily lives with a greater appreciation for the work we all do here at Loyola.



Meet the Putonti Lab



(Above) Dr. Catherine Putonti

(Below) Taking a break from computation to mug for the camera: (from left) Biology Major Jennifer Cox, Bioinformatics major Maguerite Hoving, and Bioinformatics and Biology major, Vinnie Reynoso.

Catherine Putonti has gotten confused for an undergraduate more than once. Perhaps its her youthful appearance, her youthful taste in indie rock, or her admittedly excessive use of the word “Dude.”

However, Dr. Putonti’s work in Bioinformatics just might go a bit over the average ‘dude’s” head. Dr. Putonti’s lab works in the field of computational biology which, among other things, works to help close the gap between the rate biological data becomes available and the rate at which that data is analyzed.

“The primary focus of our laboratory is examining pathogenic organisms in an effort to better understand the mechanisms of pathogenicity and pathogen-host interactions,” says Dr. Putonti. Essentially, the lab has been focusing on determining how disease causing microorganisms relate to the organisms that carry them and what such relationships might tell us about the nature of infectious disease.

For example, Dr. Putonti has been doing this type of research in relation to Malaria. “With Kim and Stefan [Drs. Williamson and Kanzok, respectively] we’re looking at malarial genes and comparing them to their host human and their vector mosquitoes on the DNA level,” says Putonti.

This is just one of several experimental and computational projects being conducted by Dr. Putonti and her students.

The malarial project is a computational project. The Putonti Lab also has been working on computational and experimental projects in relation to bacteriophages. This work actually extends back to when Dr. Putonti was doing her PhD work at the University of Houston before coming to Loyola in 2007. “Eukaryotic viruses like West Nile and the flu and stuff like that—they can’t just create genes that will specifically interact with human genes..” Dr. Putonti says, “...they tend to take on small, minor changes as a way of adapting to their host.” Part of what Dr. Putonti’s lab is doing is attempting to take a well adapted phage

and change its codon bias.

These are just two of the many projects that Dr. Putonti and her team have in the works. With such workload a team of dedicated students, one can rest assured that the dudes in the Putonti lab will be keep pumping out fascinating work for a long time to come.



Cox, Hoving and Reynoso demonstrate how working in the Putonti Lab involves a lot more than just computation.

In Case You Missed It...



Congratulations are also in order for Dr. Hunter Cole (formerly Dr. Hunter-O'Reilly) on her marriage to Kevin Cole. The couple was married Saturday, November 1, 2008 at Grand Canyon National Park in Arizona. The Biology Department wishes the Coles every happiness.

Dr. Hunter Cole (left) with her husband standing before the Grand Canyon on the day of their wedding.

Dr. John Kelly and his wife Eva were blessed with the birth of their first child, Liam. Liam was born September 16, 2008. Congratulations to the Kelly family on their new addition.



Liam Kelly at the Biology Department Annual Holiday Party.

The Biology Department held its annual Holiday Party on December 16, 2008. Food, drink and holiday cheer was shared by all.

1) (from Left) Sema Taheri and Yizette Yackle pose while Dr. Hamilton gets caught mid bite. 2) Santa once again made an appearance this year. The rosy-cheeked one can be seen here with Alice, daughter of Dr. Emma Rosi-Marshall. 3) Everyone was delighted that Dr. Ian Boussy came out for the festivities.



Frontiers in Life Sciences Symposium 2009

Graduate Student Poster Presentations

The Characterization of Cacterial Cave Isolates with Respect to Denitrification. Omar Jawaid and Dominic Castignetti.

Detention of an unprecedented endogenous retroviral-like protein in soybean. Garen Gaston and Howard Laten.

Reconstructing retrotransposons from dense alignments of BAC-end sequences in Genbank. LS Mogil, LN Wright, E Gouvas, EB Badal, and HM Laten.

Investigating the Evolution of Interactomes. Monica Micek and Catherine Putonti.

Phylogenomics in the Next Generation Sequencing Technology Era. Christopher Bun and Catherine Putonti.

Impacts of Cattail (*Typha x glauca*) Invasion Over Time in Great Lakes Area Wetlands. Mark E. Mitchell, Pamela Geddes, Daniel Larkin, and Nancy C. Tuchman.

Changes in West Copper River Delta Pond Food Webs Following Tectonic Uplift and Implications for Future Habitat and Waterfowl Management. Ryan Van Duzor and Martin Berg.

Analysis of Illicit Drugs and Metabolites in Wastewater Sampled at an Educational Institution. Milie Parkara and Paul Chiarelli.

Microbial Diversity Between Chicago Beaches Along Lake Michigan. Christopher Stanton, Naureen Shakir, Salma Javeed, Scott Adams, Vinicio Reynoso, and Catherine Putonti.

Hidden Treasures in Archived Invertebrate Collections: Exploring Past Resource Use from Preserved Gut Contents. Kathryn L. Vallis and Emma J. Rosi-Marshall.

Potential resource competition between juvenile suckers and non-native minnows in the Colorado River below Glen Canyon Dam. S.E. Zahn, E.J. Rosi-Marshall, C.V. Baxter, M. Yard, T. Kennedy, W.F. Cross, and R.O. Hall.

The Development of Denitrifying Biofilms in Urban Streams. S.M. Hell, A. Daley, K. Kalscheur, J. Saliba, M. Sullivan, R. Bednarczyk, S. Kufta, S. Bigley, K. Gray, C. Peterson, and J.J. Kelly.

Reconstructing the History of a Great Lakes Coastal Wetland with Pollen Analysis. Lane Vail, and Nancy C. Tuchman

Linkage among Algal/bacterial community structure, organic exudates and denitrification potential in stream biofilms.

Allison D. Daley, S.M. Hell, K. N. Kalscheur, M. Sullivan, S. L. Kufta, J.S. Saliba, R. Bednarczyk, S. Bigley, K. A. Gray, J.J. Kelly, and C. G. Peterson

Effect of Elevated Atmospheric CO₂ on Terrestrial Nitrogen-Cycling Microbial Communities.

Jonathan Winkelman, Teagan Walter, Malachy Sullivan, Joseph Gil, Nancy Tuchman, and John Kelly

Organization of the 21-II Region of Human Chromosome 21. William Ziccardi, Jeffrey Doering, and Catherine Putonti

Eleven *Plasmodium falciparum* genes may play vital roles in gametocytogenesis induction.

Carolyn Bazzoli, Belinda Morahan, and Kim Williamson

Recombinant expression and purification of two putative antioxidant proteins of the rodent malaria parasite *Plasmodium berghei*. James J Tasch, Anna Wilewska, and Stefan M. Kanzok.

Expression profiles of putative antioxidant genes in the mosquito stages of the rodent malaria parasite *Plasmodium berghei* using quantitative real time PCR. Colin McMahon, Linda Russo, and Stefan Kanzok

For a list of the Spring 2009 Undergraduate poster presentations visit <http://www.luc.edu/biology/pdfs/posters.pdf>

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Preparing People to lead extraordinary lives

Submission Guidelines

The newsletter will be used to promote and be devoted to covering the activities, seminars and events; initiatives and developments; faculty, student and staff awards. Creative works by our Departmental members, announcements and profiles will be covered.

The newsletter is circulated within the department and will be made available on the Internet via the Biology website.

Authors/contributors should keep in mind that readers may not specialize in their particular area of work.

Articles vary in length between about 50 and 600 words.

We welcome photographs and images to accompany articles; please provide captions when submitting the photographs/images. Either hard copy or digital formats of the images are acceptable.

Articles may be submitted by any method; however, the preferred transmittal is electronic format via e-mail; bnor-to1@luc.edu

The Department of Biology newsletter is prepared and edited by Audrey Berry, Pam Bradley, Brian Norton and Jeff Doering.

New Arrivals!

Lydia Clare Cole was born 6 lbs., 8oz., 19.5" long at 1:31am, April 26 2009 to Hunter Cole and Kevin Cole.

James Collin Feeney was born 11 lbs. 13 1/2 oz. on April 30, 2009 to Emma and Tim Feeney.

Congratulations to all our new mommies and daddies.

Congratulations Honored Colleagues!

Hunter Cole and Jutta Heller have been promoted to Lecturer.

Arden Davidson, Bill Kroll, and Ray Ulbrich have each been promoted to Senior Lecturer. Marty Berg and Terry Grande were both promoted to Professor and Emma Rosi-Marshall was promoted to Associate Professor with tenure. Stefan Kanzok was also nominated for the Sujack Teaching Excellence award this year. It's great to see the College recognize their distinguished accomplishments.



Fig 13-15 continued
from Page 3.

