

October 20, 2005
Volume 1, Issue 1

BioSphere



In this issue:

- **In Memoriam:
Dr. Mary P.
Edmonds**
- **Department
Expands into
New Building**
- **Department
Outreach
Programs
Continue to
Grow**
- **Faculty
Profiles: Drs.
Graham Hatfull
and Tony
Schwacha**
- **Record
Number of
Graduate and
Undergraduate
Student
Awards
Announced
this Year**

The Department of Biological Sciences at the University of Pittsburgh
A234 Langley Hall
Pittsburgh, PA 15260
(412) 624-4266
biochr@pitt.edu
www.pitt.edu/~biology

Welcome from the Chair: Prof. Graham Hatfull

Welcome to the inaugural issue of BioSphere, the newsletter of the Department of Biological Sciences at the University of Pittsburgh.

Biosphere is a direct descendent of Biota, the newsletter active when I arrived in 1988, but which ceased circulation shortly thereafter. A lot has happened since then, in all areas of the Department! We have said goodbye to some faculty and welcomed many others, we developed new research and graduate programs and created many new opportunities for undergraduates, and

we have worked closely with the local K-12 science community. Along with these activities and our continued expansion, we are also updating and enlarging our facilities. This new age of discovery in the biological and biomedical sciences is a particularly exciting and challenging time, but as a broad-based biology department we are ideally positioned to contribute to this discovery and to educate the next generation of scientists who will shape this important field. We look forward to sharing

with you some of the numerous department activities in the pages of this newsletter, and we look forward to your comments and suggestions for future issues. Enjoy!



We're on the Web!

See us at:

www.pitt.edu/~biology

In Memoriam: Dr. Mary P. Edmonds



“A woman whose tenacity for RNA research spanned over five decades made all of this possible.”

When **Mary P. Edmonds** died of complications related to a heart attack on April 16, 2005, we lost a kind friend, gracious colleague, and mentor. But there is reason to celebrate the life of an inspired scientist whose seminal research virtually jump-started current RNA research in both 3' end-processing and splicing.

Mary was born in Racine, Wisconsin, 82 years ago, earned a B.A. at Milwaukee-Downer College in 1943, an M.A. at Wellesley College in 1945, and a Ph.D. at the University of Pennsylvania in 1951. In 1955, she began her long career in Pittsburgh as a research associate and remained in the research track for many years. She was named Associate Professor of Biochemistry in 1971 and promoted to Professor of Biological Sciences in 1976. Mary was named Professor Emeritus in 1992 but remained active at Pitt and elsewhere until quite recently. She regularly attended

seminars and happily agreed to give guest lectures to our graduate students in the Core Course up until last year. Mary was always happy to offer advice to Faculty, students, and post-docs, and it brightened our day when we encountered and chatted with Mary at the mailboxes or in the hallways.

As a biochemist, Mary characterized an enzyme that added A's to the 3' ends of RNA and then showed in a PNAS paper in 1971 that eukaryotic mRNAs were made with these tails *in vivo*. Two other groups shared in that discovery by publishing back-to-back articles in the same journal. Mary subsequently showed that some viral RNAs also contained polyA packaged in their virions. As a result of these papers, the field took off. This growth was based not only on the importance of the 3'-end-addition reaction but also on the ease with which the polyA tail itself provided a convenient hook to grab mRNAs out of the cell and study their dynamics. The enzyme

Mary studied in a joint effort with Marv Wickens in 1990 was shown to be the nuclear polyA polymerase. In the years since 1971, the significance of the polyA tail and the vital function it serves in mRNA transport, stability, and translation has become clear. We now know that the amounts of the enzymes involved with the cleavage-polyadenylation reactions vary with a number of physiological parameters, thereby regulating not only the amount of pre-RNA processed into message but also the choice among polyA sites on complex transcripts, which themselves can influence stability and translation. The polyA tail is also a focus for binding by a number of factors that interact with the translational apparatus, modulating mRNA expression and decay. A woman whose tenacity for RNA research spanned over five decades made all of this possible. (cont.)

Dr. Mary P. Edmonds, cont...

Mary Edmonds' continued work on the chemical composition of polyA mRNA set the stage for the elucidation of the mechanism of nuclear pre-mRNA splicing. In the early 1980s, her work with graduate student John Wallace demonstrated the presence of branched nucleotide structures in nuclear polyA mRNAs. The Edmonds lab also noted a key feature of the biology of branched trinucleotides—they were enriched in nuclear, but not cytoplasmic, mRNA. These observations led Mary to propose that branched

trinucleotides might be integral components of the intermediates involved in pre-mRNA splicing. The timing of the Wallace and Edmonds 1981 publication could not have been better. In the subsequent months, papers from the Maniatis and Sharp labs described the lariat intron product and intermediate of the nuclear pre-mRNA splicing reaction, which soon thereafter were shown to have a branched adenosine trinucleotide with 2'-5' and 3'-5' linkages.

For her major contributions to RNA

processing, Mary Edmonds was elected to the National Academy of Sciences in 1991 and received several honorary doctorates from various colleges. We will remember her quiet grace, keen scientific insight, and unwavering determination.

(Thanks to Drs. Paula Grabowski, Craig Peebles, and Christine Milcarek, who published a similar version of this article in the September issue of RNA – Ed.)

“Mary Edmonds was elected to the National Academy of Sciences in 1991 and received several honorary doctorates from various colleges.”

A Mary P. Edmonds Graduate Student Award Fund has been established that will honor the contributions to the Department of Biological Sciences and the pioneering research of the late Mary P. Edmonds. More information about this fund, and how one can make a gift or pledge to this fund, can be found online via our website (www.pitt.edu/~biology).

Department Expands into New Building!

“...lab space will increase by 20-25% upon occupation of the new ~50,000 square foot wing.”

The Department is thrilled that we are nearing completion of the Life Sciences Annex, a newly constructed building that connects to Langley and Clapp Hall. The Annex is located on Tennyson Ave. on the southwest side of the Clapp-Langley-Crawford (CLC) complex. The new building will provide research and research support facilities for the Departments of Biological Sciences and Neuroscience. The Department of Biological Sciences' research lab space will increase by 20-25% upon occupation of the new ~50,000 square foot wing. As this issue of BioSphere goes to press, Faculty

assigned to the new wing are moving their laboratories into these new spaces, which includes the offices and laboratories of Drs. Gerard Campbell, Debbie Chapman, Paula Grabowski, Susan Gilbert, Jeff Hildebrand, and Beth Stronach. At the same time, major renovations are beginning in existing parts of the CLC complex. There's a lot of bustle and noise, and CLC residents enjoy unusual opportunities to interact with the workers and observe

how buildings work from the inside out. It's reminiscent of studying anatomy, as we learn about how steel girders (skeletons), plumbing (circulation), and wiring (the nervous system) constitute our facilities. In particular, we marvel at the complexity of the pipe works. When it's all done, we'll have beautiful state-of-the-art spaces that will better facilitate the many and diverse activities of our Department, and support our growth into the future.



Before...



After...

Meet Our Faculty: Tony Schwacha

At nearly 1 A.M. Tony Schwacha left his wife's side at the hospital and strode through the Molecular and Cellular Biology Department at Harvard towards discovery. Leaning in close to the phosphorimager, the 3rd-year graduate student noted something never observed previously: Double Holliday junctions had formed between homologous chromosomes in yeast. As we now know, these structures result in gene conversion or an exchange of chromosome segments when the junctions are resolved, which is an essential step during meiosis. Tony's discovery was unique and that night it was his alone (although it would soon be published in *Cell*). As Tony now puts it: "This was an important piece of data, and for that moment I was the only person in the world that knew it. It's a very bitter-sweet thing that highlights the introspective aspect of science. For the most part, you are the only person who appreciates what you have discovered for a

long time... Those sorts of moments are when research is particularly worthwhile."

These days Tony Schwacha is one of the newest Faculty in the Department and in addition to running his research laboratory he teaches Introduction to Biochemistry. Tony's research, which he began as a post-doctoral research fellow with Steve Bell at MIT, is on one of the most fundamental questions in biology; how do organisms maintain their DNA? Specifically, Tony studies the minichromosome maintenance complex (MCM), a protein cluster essential for DNA replication. The complex assembles on DNA and may act as a rotary pump. Tony examines MCM in yeast, a model system amenable to genetic, biochemical and molecular tools. Because the replication machinery is conserved Tony's studies in yeast may be directly applicable to a wide range of organisms, and defects in the fidelity of DNA replication can lead to

diseases such as cancer. Indeed, research in the Schwacha lab is funded by a prestigious grant from the American Cancer Society.

DNA replication in complex organisms is commonly studied by determining what parts of a system are essential *in vitro*. To complement these *in vitro* attacks, Tony and his graduate student, Matt Bochman, have been developing assays to examine the MCM's interactions with DNA and to observe DNA replication in living yeast.

Tony owes his start in science to his undergrad mentor Robert A. Bender at the University of Michigan who gave him "an intellectually rigorous start" in research and pointed him in the right direction. From there Tony went on to Harvard and worked with National Academy of Science member Nancy Kleckner before he moved on to his post-doc at MIT. (cont.)



"for that moment I was the only person in the world that knew [the result]. It's a very bitter-sweet thing that highlights the introspective aspect of science."

Outside of his dedication to science Tony is a devoted father who looks forward each night to seeing his children, Alec and Kira. "My kids are the best thing that ever happened to me. They are wonderful little guys. I

might not say this when they are 13 but right now they are absolutely wonderful!" One of his favorite things about the Department is how family friendly it is, and the lifestyle in the city of Pittsburgh is not unlike Tony's first

home near Grand Rapids Michigan. In fact, when asked whether he still leaves his family at 1 AM to travel to lab, Tony replies, "Not if I want to come home again!"

Meet Our Faculty: Graham Hatfull



"everyone who walks into a biology lab can participate in some way."

Graham Hatfull, Chair of the Department of Biological Sciences since 2003, is a man on the run: Graham supervises a bustling laboratory that includes over fifteen permanent members, and the Hatfull group hosts a large, fluctuating population of undergraduates and high school students. High school students are not a common feature of University-level research but this Howard Hughes Medical Institute Professor and Eberly Family Professor of Biotechnology has made it his mission to involve students in hands-on science as early as possible. "You can inspire

someone in biology because you can show them that they can be a part of the process ... everyone who walks into a biology lab can participate in some way."

The focus of Graham's research is to unlock the secrets of the bacterium *Mycobacterium tuberculosis*, a pathogen that infects one-third of all people on the planet and is the most lethal single infectious agent. Specifically, the Hatfull lab uses viruses that infect *M. tuberculosis* and its close cousin, *M. smegmatis* to investigate DNA recombination and

gene expression with an eye toward developing new research tools. The viruses that infect these organisms are called Mycobacteriophage. The Hatfull lab is also studying Mycobacteriophage diversity, and this is where the "younger" students enter the picture: These students can go anywhere, take a soil sample, and discover previously unknown Mycobacteriophage. Has this mission been successful and led to "real" scientific discovery? In a 2003 publication in *Cell*, one of the premier journals in biology, four high school students were listed (cont.)

as co-authors on a paper from the Hatful lab. However, Graham is quick to add: “If you think of your accomplishments in science, the greatest accomplishments have to be in the training and the nurturing of students... If I have created and environment in which students can flourish, then I have been successful.”

Graham also believes strongly that it is vital to involve undergraduates in research, and the creation of a successful research environment requires the social aspects that one can develop within the laboratory setting. “Science is fundamentally a social activity. Often it is not individuals who have ideas. Ideas are really generated when you are talking to people about what you are doing, teaching people how to do things, talking about why your experiment didn’t work today... That is the stuff of science, the socializing.”

As chair of the Department, Graham has overseen remarkable expansion over the last three years. At a time when research dollars are increasingly difficult to obtain the Department of Biological Sciences is funded at its highest level ever (~\$7 million per year). Graham believes our success in this arena is a direct result of the quality of our Faculty. “Our research programs flourish on the expertise of the individuals, the core strength of the faculty members”. In addition, Graham has had to manage the never-ending duties of coordinating the transfer of six research laboratories into the new Life Sciences Annex (see article on p. 4), and the shuffling of other research laboratories within the Clapp-Langley-Crawford complex as existing facilities are renovated. In fact, Graham’s office had to be uprooted from 234 Langley Hall and moved temporarily into the 4th floor of

Langley Hall. But, as Crystal Petrone, Graham’s administrative assistant attests, “it went really smoothly”.

Does Graham find time for anything other than his multi-faceted life in the Department? Graham and his wife, Kate—a professor at Washington and Jefferson College—are the proud parents of two teenage boys, Roger and Fred, and finds some time for gardening, house-repairs, and the Pirates.

So, if you see Graham sprinting through the halls, be sure to wave, but if you find him with a beer in-hand at one of our many social functions, be sure to interact with him and participate in the generation of new scientific ideas!

“If I have created and environment in which students can flourish, then I have been successful.”

Record Number of Graduate and Undergraduate Student Awards Announced



Ivy McManus award winners Jill Bisceglia (top) and Amy Mucka (bottom).

At the Department of Biological Sciences' Annual Kickoff, several Graduate Student awards were announced. The first award presented was the Ivy R. McManus Award. Supported by an endowment by former faculty member Dr. Ivy McManus, this award honors outstanding Graduate Students upon completion of their first year. This year we were pleased to announce that the award went to two very deserving students, Amy Mucka from the Chapman lab and Jill Bisceglia from the Grabowski lab.

The second prize presented was the Stanton C. Crawford Award. Endowed by Stanton Crawford, former Professor of Zoology and Chancellor of the University, the award is given to a student who has demonstrated superb teaching abilities over several years. The honoree this year was Cassie

Majetic from the Ashman lab.

The third set of awards announced was for National Science Foundation Dissertation Improvement Grants, which are given to more senior graduate students. This is a highly competitive national program and we were delighted to announce that three students received "DIGS": Anthony Baumert (from the Carson lab), and Jason Hoverman and Nancy Schoeppner, both from Relyea lab.

The final awards announced for Graduate Students were the Mellon Fellowships. Endowed by the Mellon Foundation, these are highly prestigious fellowships that honor the very best graduate students at the University of Pittsburgh. Students that receive these fellowships are given financial support for a year to allow them the

time to focus on their research. This year four graduate students received the award: Alycia Bittner (from the Oke lab), Jason Hoverman (from the Relyea lab), Laura Marinelli (from the Hatfull lab), and Nancy Schoeppner (from the Relyea lab).

Generous gifts have allowed for the Department to provide awards for undergraduate research and scholarship: Research awards included the Samuel D. Colella Award, endowed in 2004, which were presented to Sarah Rogers (from the Arndt lab), Swarna Mohan (from the Grabowski lab), and Danielle Rosenberger (from the Relyea lab) for research in the Department completed during the summer term, the Ruth Zimmerman Ewald Scholarship, from a gift account created in 2000, which was awarded

Student Awards, cont...

to Imene Boumaza (from the Tonsor lab) to support her Fall Term botany research, and the Norman H. Horowitz Fellowship, established in 2000, which went to Katherine Petrie (from the Peebles lab).

Several awards for academic achievement are given to first-year students to encourage continued commitment to the Biological Sciences. The Ella P. Stewart Award endowed by the estate of Ella P. Stewart, class of 1916, recognized Lance A. Mabus. The Alison Bentley Kephart Award established in 1985 by Drs. Ronald and Marian Bentley, both faculty members in the Department of Biological Sciences, in remembrance of their daughter, Alison, went to Nancy L. Czaicki. The Outstanding Freshman Biology Award, established by the Department in 1986 to expand the Kephart's recognition of outstanding freshmen was given to Ashley J. Case, Christopher P. Cox, Mallory L. Troynacki and Alison M. Trude

Finally, Stephen Bailey, Amish Dave, Ryan Eberwine, Lindsay Heffernan, Brian Hoover, Jennifer Palus and Jacob Winkler received Richard T. Hartman Room & Board Scholarships to support them while taking classes at the Pymatuning Laboratory of Ecology (PLE). Dr. Hartman was a Professor in the Department of Biological Sciences and was Chair of the Department from 1971-1972 and was the Director of PLE from 1973-1987.

Undergraduate majors in the Department of Biological Sciences also garnered awards from other units at the University of Pittsburgh. One of two Alden Forbes Family Scholarships for Biology or Chemistry majors went to Sarah Rogers (from the Arndt lab). Fall Term Chancellor's Undergraduate Research Fellowships were given to Amin Afrazi (from the Jacobson lab), Matthew Burstein (from the Brodsky lab), Sarah Rogers (from the Arndt lab) and Pamela Soda

(from the Jacobson lab), and a Chancellor's Undergraduate Teaching Fellowship went to Amish Dave (who will work with Dr. Tony Bledsoe). The Christine J. Toretti Undergraduate Research Award went to Bryan Anderson (from the Carson lab), a Brackenridge Fellowship was won by Doug Placais (from the Brodsky lab), and two of seven USS Foundation Arts and Sciences Undergraduate Research Awards were granted to Jennifer Palus (from the Quinby lab) and Sarah Rogers (from the Arndt lab). Finally, David Schoppy (from the Gollin lab at the Medical School) won an Office of Experiential Learning Small Grant for travel to present his research at the 2005 American Association for Cancer Research Annual Meeting in Anaheim, California.



Ella P. Stewart award-winner, Mr. Lance Mabus (top) and Alison Bentley Kephart Award-winner, Ms. Nancy Czaicki (bottom), with Prof. Hatfull

Outreach: Twelve Years and Still Going Strong!

“An Inspiring Educational Opportunity!” says Hampton High School biology teacher Amy Foley of the Department of Biological Sciences’ Outreach Program. “The program has provided me and my students with current laboratory and experimental research experiences that are beyond the scope of the high school curriculum. The enthusiasm this program brings to the science classroom is electric!”

For over 12 years, hundreds of local teachers and over 18,000 of their students have participated in this outreach program. Summer Workshops for teachers, academic year science programs and student camps bring topics like PCR and cloning, sea urchin fertilization and development, and virus discovery into the classroom. We are committed to bridging the gap

between the scientists in our department and the local learning community to deliver current science content in a hands-on, inquiry-based form. Our commitment, embodied in several coordinated outreach programs, is designed to educate teachers and students about current science and acquaint them with the scientific community. “It is truly a unified effort by the Department,” says Dr. Alison Slinsky Legg, Outreach Coordinator, “We share a genuine desire to make current science understandable and current techniques accessible”.

This year, the Summer Workshops and Pitt-Kits program was funded by a generous gift from the H.J. Heinz Company. The gift allowed us to educate 45 teachers this summer through 3 workshops designed to update

teachers concept knowledge and curricular lab options. The 2005 workshops topics were:

Computing for Biologists - designed to help teachers understand and use technology in the classroom

DNA and Beyond – designed to illustrate the molecular details of gene expression through laboratories and lectures

Experimental Design – intended to help teachers conduct real science experiments using model systems and statistical analysis that is applicable to the high school classroom

The academic year “Pitt-Kits” program will provide teachers with the necessary resources and support to conduct the science experiments at their schools. (cont.)



“For over 12 years, hundreds of local teachers and over 18,000 of their students have participated in this outreach program.”

Outreach, cont...

"I find myself newly energized and I try to emulate the enthusiasm that Alison [Slinsky Legg] and her staff have for educating our students."

"With the seemingly exponential growth of information in the biological sciences, it becomes that much more difficult to keep up", explains Ray Greco, Biology teacher at Knoch High School in South Butler. "The summer workshops are indispensable!!! I find myself newly energized and I try to emulate the enthusiasm that Alison [Slinsky Legg] and her staff have for educating our students."



Dr. Slinsky Legg engaging elementary school students as part of the Department's Outreach Programs

We're on the Web!

See us at:

www.pitt.edu/~biology

This issue of BioSphere was brought to you by: Jeff Brodsky (Editor), Christine Berliner, Susan Godfrey, Heather Hendrickson, Rick Relyea, and Alison Slinsky Legg. Thanks also to Tom Harper. Comments on BioSphere can be addressed to jbrodsky@pitt.edu.
