



## SCIENCE SPOTLIGHT WITH JANINE MADDOCK

In our daily lives, we all encounter numerous machines ranging from coffee makers to cars that perform specific tasks. Each machine is made from many different parts that individually serve little purpose; however, when the parts are specifically assembled, the result is a complex, functioning unit. The Maddock lab is interested in how complex machines are assembled inside of bacteria. As is true for most machines, the timing and order in which the individual parts (usually proteins) of intracellular machines are put together are critical for the ultimate function-

ing of the macromolecular complex. Moreover, it is often important that these complexes are located at specific places in the cell in order to function properly. The Maddock lab studies both the assembly and spatial organization of multiprotein complexes.



Janine Maddock

The most complicated macromolecular machine in the cell is the ribosome. This RNA-protein complex is responsible for making all bacterial proteins. How the ribosome is assembled in the cell is unclear, but we do know that the ribosome is composed of 2 stable multiprotein-RNA complexes or subunits. The Maddock lab is focusing on defining how the larger subunit is assembled. In addition to the 2 RNAs and 33 proteins found in the mature large ribosomal subunit, the Maddock lab has found that at least 20 more proteins required for its assembly. Thus, the challenge is to define the temporal order that every ribosomal protein assembles onto the ribosome and the role that each of these assembly factors plays in this process.

In pursuing these studies, the Maddock lab recently discovered that, contrary to the textbooks, not all ribosomes are identical. Most proteins are synthesized from one type of ribosome, but some proteins require specialized ribosomes. This finding underscores the



The Maddock Lab

notion that although the basic process of protein synthesis is similar for all proteins, there are key differences for some proteins under specific conditions.

Although bacteria are relatively simple compared to cells of plants and

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## MESSAGE FROM THE CHAIR

The past academic year was an exciting one for MCDB. The first external review of the Department took place in November 2008, when an advisory committee of truly outstanding scientists and educators from among the most prestigious academic institutions in the country visited us. Their report lauded the outstanding accomplishments of the Department and also conveyed to the College and the University the critical importance of the unique research and educational missions of MCDB and the need to address deficiencies in infrastructure in the aging Kraus Natural Science building. The Federal Recovery and Reinvestment Act (aka stimulus funding) has provided an opportunity to address some of these facility needs. In July of this year the University selected ours as the sole application to the Natural Science Foundation's Academic Research Infrastructure Program – we submitted a proposal for \$8.5 million of funding to upgrade and renovate core research facilities in Kraus. We will hear in early spring of next year whether our application will be funded.

We had great success with faculty recruiting, and three new assistant professors joined MCDB in September – Blaise Boles, Ori Shafter and Andrzej Wierzbicki. Blaise was recruited in the Presidential Junior Faculty Initiative cluster hire in Microbial Ecology; this is a joint program with our sister department EEB, Epidemiology in the School of Public Health, and Microbiology & Immunology in the Medical School. In addition, Kwoon Wong, who is jointly appointed in Ophthalmology & Visual Sciences and was recruited last year but delayed starting his appointment, will arrive in January. Finally, we applaud the five MCDB faculty members who were promoted and/or received tenure this year – Amy Chang, Matt Chapman, Jonathan Demb, Anuj Kumar, and Janine Maddock.

Despite the difficult funding climate for research in these times of economic constraints, many MCDB faculty members were successful at obtaining new grant funding. I also want to bring your attention to our outstanding group of undergraduate and graduate students and postdoctoral trainees, some of whose accomplishments are noted in this issue. Finally, let me thank you for your continued interest and support of MCDB.

## THE SEVENTH ANNUAL PRISCILLA CONNELL MEMORIAL LECTURE

The Seventh Connell Lecture held on Friday, September 19<sup>th</sup>, 2009, featured Dr. Cori Bargmann, Torsten N. Wiesel Professor, Laboratory of Neural Circuits and Behavior at the Rockefeller University. Dr. Bargmann presented her talk on “50 Years of Solitude: How Genes and Environment Regulate a Circuit for Social Behavior.”

By combining genetics with *C. elegans* behavior, Dr. Bargmann has found a gene that determines whether a worm prefers to eat alone or socially, and another gene

that allows them to discriminate among different odors. More recently, work by Dr. Bargmann led to the discovery that the worms



**Cori Bargmann**

she studies are capable of learning and later remembering to reject a novel food that makes them ill. Her work has also shown that signaling between neurons that occurs at the synapse can feed neural differentiation and generate sensory diversity in the olfactory system.

Dr. Bargmann is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, and she has won numerous awards for her work on the worm *C. elegans*.

*This lecture was made possible from a generous endowment by Mr. Paul Connell, in loving memory of his wife Priscilla Harrison Connell. Priscilla Connell was a renowned nature photographer whose work has appeared in Sierra Club and Audubon Society magazines and calendars, as well as other notable publications. She won the Roger Tory Peterson award for her breathtaking simplicity in capturing the beauty of nature.*

### ROWENA MATTHEWS COLLEGIATE PROFESSOR



**Professor James Bardwell** was appointed as a Rowena Matthews Collegiate Professor, effective September 1<sup>st</sup>, 2009.

### COLLEGIATE PROFESSORSHIP INAUGURAL LECTURE



**Professor Eran Pichersky** presented his Collegiate Professorship Inaugural Lecture on Wednesday, November 19<sup>th</sup>, 2008, for his appointment to the Michael M. Martin Collegiate Professorship in Molecular, Cellular and Developmental Biology.

## FACULTY NEWS

**Amy Chang** was awarded tenure.

**Matthew Chapman** was promoted to Associate Professor with tenure. He received the 2009 Class of 1923 Memorial Teaching Award from LSA and recently was interviewed by MicroWorld Radio "Bacteria and Alzheimer's Therapies." Listen to the interview at: <http://www.mcdb.lsa.umich.edu/chapmaninterview.php>

**Steven Clark** was elected LSA Faculty Ombuds.

**Gyorgyi Csankovszki's** article "Three distinct condensin complexes control *C. elegans* chromosome dynamics" was featured in *Current Biology*.

**Jonathan Demb** was promoted to Associate Professor with tenure. He also received a Research to Prevent Blindness Career Development Award, 2004-2009.

**Robert Denver** was the Plenary Lecturer, 24th meeting of the European Society for Comparative Endocrinology, Genoa, Italy (2008) and will co-chair the symposium "Stress Adaptation in Vertebrates" at the International Conference on Comparative Endocrinology in Hong Kong (2009).

**Cunming Duan** was the Keynote speaker at the Symposium "Fish Growth: Contributions, Trends, and Tools", 8th International Congress on the Biology of Fish (2008) Portland, Oregon and delivered the Distinguished Schweppe Seminar at the University of Texas, Marine Science Institute (2009).

**Ursula Jakob**, "Clean results: U-M researchers learn how bleach kills bacteria," Science Friday interview with Ira Flatow on Friday, November 14th, 2008. Listen to the interview at: <http://www.mcdb.lsa.umich.edu/jakobNPR.php>

**Daniel Klionsky** was named a Fellow of the American Association for the Advancement of Science.

**Anuj Kumar** was promoted to Associate Professor with tenure.

**Janine Maddock** was promoted to Professor.

**Laura Olsen** was elected to the Rackham Graduate School Executive Board.

**Eran Pichersky** was the Plenary Lecturer at the Banff Conference on Plant Metabolism (2008).

**Tzvi Tzfira** received the 2009 Young Scientist Award from the Society for In Vitro Biology.

**Yangzhuang Wang** received an anonymous gift of \$25,000 from the Michigan Alzheimers Disease Research Center to support his research project "Structural and Functional Defect of the Golgi in Alzheimer's Disease."

**Patricia Wittkopp** was featured in *The Scientist* as a "Scientist To Watch." She also received the Henry Russel Award.

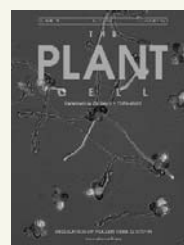
**Haoxing Xu** was named a 2009 Sloan Research Fellow.

## POSTDOCTORAL FELLOW AND GRADUATE STUDENT NEWS

**Luay Almassalha**, an undergraduate student with John Schiefelbiem, received the "Best Student Poster Award" at the 2008 Annual Meeting of the Society for Mathematical Biology in Toronto, Canada.

**Abdulrahman M. El-Sayed**, a 2007 Biology major, was selected as a Rhodes Scholar for 2009.

Graduate student **Zhao Qin**, a member of the Raymond Lab, was awarded a Rackham Predoctoral Fellowship.



**Amy Szumlanski**, a member of the Nielsen Lab, had a figure featured on the cover of *The Plant Cell*.

Neuroscience major **Eszter Zavodszky** was awarded the Churchill Scholarship by the The Winston Churchill Foundation of the United States.






*Janine Maddock continued from page one*

animals, they do have specialized cellular regions that are dedicated for specific functions. The Maddock lab has been exploring why some multiprotein complexes are found at specific cellular locations. In some cases, the nature of the spatial localization is clear. For instance, in cell division, it is critical that the necessary proteins are assembled at the middle of the cell such that equally sized daughter cells are produced once the cell splits. In other cases, the nature of the asymmetric localization is unclear. Historically, the Maddock lab has focused on a polar protein complex necessary for cells to swim towards

food and away from repellants. These studies have revealed that minor protein modifications that occur as cells adapt to their environment are responsible for the protein localization of the complex, which highlight the dynamic nature of some cellular complexes.

More recent studies have focused on identifying all of the protein complexes that are asymmetrically distributed in the cell. In order to ultimately model how a cell functions, it is important to know which complexes work in isolation and which may communicate with each other. To accomplish this goal, high throughput studies that examine many proteins simultaneously, called proteomics, have been used. Many new asymmetrically localized proteins and protein complexes have been identified. The challenge ahead is to determine how and why these proteins reside at specific cellular addresses. 

## WELCOME NEW FACULTY



Assistant Professor **Blaise Boles** comes to us from the Department of Microbiology at University of Iowa, where he has been a NIH and American Heart Association postdoctoral fellow with Professor Alex Horswill. Blaise's broad research interests lie in investigating the microbial ecology of the mammalian upper respiratory track. Current work is focused on elucidating molecular mechanisms, host-factors, and poly-microbial interactions that influence the ability of *Staphylococcus aureus* to colonize and disseminate from mammals.



Assistant Professor **Orie Shafer** joined the department September 1<sup>st</sup>, 2009. Orie comes to us from the Department of Anatomy and Neurobiology at Washington University Medical School in St. Louis where he conducted post-doctoral research with Professor Paul Taghert. Orie's research investigates the neurobiological and genetic basis of biological timekeeping in the fly *Drosophila melanogaster*.



Assistant Professor **Andrzej Wierzbicki** has joined us from Washington University in St. Louis where he was a postdoctoral research associate. He received his Ph.D. from the University of Warsaw, Poland. Dr. Wierzbicki uses plant experimental systems to study the mechanisms of non-coding RNA involvement in regulation of genome activity.

## STAFF NEWS



**Patrick Flannery** joined the department as Department Administrator in January 2009.

**Chris Psujek** was awarded the Kay Beattie Distinguished Service Award. This achievement-based award is presented to an employee with more than 15 years of service at the University and recognizes exceptional staff contributions to the success of the College of Literature, Science, and the Arts.



**Mary Carr** was recognized as a staff mentor for participating as a Faculty/Staff Mentor in the University Mentorship program for the Fall 2008 semester.

# The Student Global Initiative Fund

Perhaps most startling among the many facets of globalization is the sheer speed with which the world is changing. Today's plans will be outdated or insufficient for tomorrow's challenges, so LSA students must be flexible. So too must our programs grow and adapt. In response to this demand, the college has created a central strategic fund for the distribution of resources to projects within LSA that address the current and ever-changing needs of our students.

Contributing to this fund will be most effective through a 1:2 gift match for which President Coleman has allocated resources. Gifts must be endowments between \$25,000 and \$500,000 to qualify for the match. This presidential fund is limited and will be available only until depleted. Expendable contributions to the LSA Student Global Initiative Fund are welcome but not eligible for the match. More information is available at: [www.mcdb.lsa.umich.edu/globalpriorities.php](http://www.mcdb.lsa.umich.edu/globalpriorities.php).

Funding priorities for MCDB and detailed descriptions are available at: [www.mcdb.lsa.umich.edu/gifts.php](http://www.mcdb.lsa.umich.edu/gifts.php).

## NEW GRANTS

**Akaaboune, Mohammed** The Dynamics of Synaptic Component at the Neuromuscular Junction of Living Animals, *NIH*

**Cadigan, Kenneth** Transcriptional Activation by Wnt Signaling, *NIH*

**Chang, Mikyung (Cadigan, Kenneth)** Predoctoral Fellowship, Second Cis-Regulatory Element, Helper Sites, in Wnt/ $\beta$ -cat Signaling Pathway, *AHA - Midwest Affiliate*

**Collins, Catherine** The Functional Relationship Between APP and JNK Signaling, *UM MADRC*

**Jakob, Ursula** Analysis of Hsp33 - A Redox Regulated Chaperone, *NIH*

**Reichmann, Dana (Jakob, Ursula)** Postdoctoral Fellowship, Architecture and Design of the Redox Regulated Chaperone Machinery, *EMBO*

**Kuwada, John** Genetic Analysis of Neuromuscular Junction Formation, *NIH*

**Maddock, Janine** In vivo Assembly of the Large Ribosomal Subunit, *NIH*

**Maddock, Janine** High Throughput Approaches to Define the Spatial Organization of Proteins in *E. coli*, *NSF*

**Pichersky, Eran** Improvement of Tomato Fruit Flavor through the Introduction of Genes for High-Impact Aroma Compounds, *USDA*

**Pichersky, Eran** The Molecular and Biochemical Basis of Terpenoid Aroma Formation in Tomato, *BARD*

**Pichersky, Eran** ERC: Center for Biorenewable Chemicals, *NSF*

**Raymond, Pamela** New Neurons in the Retina, *NIH*

**Schiefelbein, John** Positional Signaling in Arabidopsis Root Epidermis Development, *NSF*

**Tzfira, Tzvi** Zinc-Finger-Mediated Gene Targeting in Plant Cells, *CPBR (Consortium for Plant Biotechnology Research), Dow AgroSciences*

**Tzfira, Tzvi** Optimization of Biomolecular Fluorescence Complementation Proves for New Imaging Functions, *NIH*

**Tzfira, Tzvi** Molecular Mechanisms Involved in Suppression of RNA Silencing by an F-Box Like Protein V2 of TYYLCV, *US-Israel BSF*

**Tzfira, Tzvi** Controlling Early Stages of DNA Repair for Gene Targeting Enhancement in Plants, *BARD*

**Weinthal, Dan (Tzfira, Tzvi)** Vaadia-BARD Postdoctoral Fellowship, Finger Nucleases Mediated Gene Targeting in Plant Species, *BARD*

**Wang, Yanzhuang** Upiquitin and Cell Cycle Regulation of Golgi Membrane Dynamics, *NIH*

**Xu, Haoxing** TRPV Calcium Channels and Axonal Damage, *National Multiple Sclerosis Society*

**Xu, Haoxing** The Muclipin Ion Channels, *NIH*

## IN MEMORIAM

**Dr. Robert Storer**, age 93, passed away December 14<sup>th</sup>, 2008. Dr. Storer's interests have centered on the biology of grebes, including their behavior, anatomy, fossil history, and parasites and how it can be used to elucidate the evolutionary history of the group. Dr. Storer received his Ph.D. degree from the University of California (Berkeley) in 1949 and

joined the Department of Zoology the same year.

**David Bay** passed away February 21<sup>st</sup>, 2009 at the age of 60. He worked as a photographer in the biology department at the University of Michigan for more than 34 years. He assisted many professors and graduate students with pictures and manuscripts for the advancement of science.



# POSTDOCTORAL FELLOWS WHERE ARE THEY NOW?

**Marianne Amenta** works at the CNRS in Marseille, France as a Research Scientist.  
*Mentor – Ursula Jakob*



**Yonghe Ding** is a postdoctoral fellow at the Mayo Clinic.  
*Mentor – Cunming Duan*



**Sylvia Grommen** is a PostDoctoral Fellow at Catholic University, Leuven, Belgium.  
*Mentor – Robert Denver*

**Avner Levy** is at the Institute of Plant Science, Rehovot, Israel.  
*Mentor – Tzvi Tzfira*



**Fang Hu** is Associate Professor of Biology, Central South University in China (Hunan Province).  
*Mentor – Robert Denver*

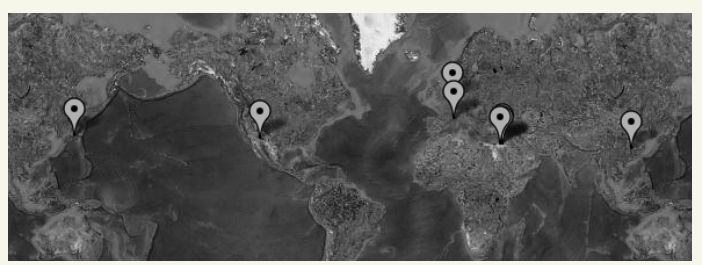
**Mary Dafny-Yelin** is a Research Scientist at Migal Technologies in Israel.  
*Mentor – Tzvi Tzfira*



**Mwafaq Ibdah** has a position at Fruitarom, Inc., a company that creates food flavors, in Israel.  
*Mentor – Eran Pichersky*



**Takao Koezuka** is a PostDoctoral Fellow at the University of Kyoto, Japan.  
*Mentor – Eran Pichersky*



## PH.D. DEGREES GRANTED

**Xuan Wang** (Mentor Matthew Chapman) “The Determinants of Bacterial Amyloid Nucleation and Polymerization.”

**Yang Cao** (Mentor Daniel Klionsky) “Analysis of the Molecular Components and Different Steps of Autophagy-Related Pathways in *Saccharomyces cerevisiae*.”

**Elisabeth Ashman-Epstein** (Mentor Matthew Chapman) “Assembly, spatial distribution and secretion activity of the curlin secretion lipoprotein, CsgG.”

**Hui Li** (Mentor Kenneth Cadigan) “Genetic and Molecular Characterization of Apoptosis Regulation in *Drosophila*.”

**Hongxia Ren** (Mentor Cunming Duan) “Investigating how insulin-like growth factor (IGF) system regulates myogenesis.”

**Nike Bharucha** (Mentor Anuj Kumar) “Study of Filamentous Growth in *saccharomyces cerevisiae* and the Related Human Fungal Pathogen, *candida albicans*.”

**Nicola Harrison-Lowe** (Mentor Laura Olsen) “Plant stress responses: The autophagy and senescence pathways.”

**Wei-Lien Yen** (Mentor Daniel Klionsky) “Analysis of the Molecular Mechanism of Autophagosome Formation in *saccharmyces cerevisiae*.”

**Mikyung Chang** (Mentor Kenneth Cadigan) “Target gene selection in the Wnt/Wingless signaling pathway.”

**Ryan Frisch** (Mentor Robert Bender) “The Role of the Nitrogen Assimilation Control Protein (NAC) in the response of *klebsiella pneumoniae* to nitrogen limitation.”

**Congcong He** (Mentor Daniel Klionsky) “Molecular Mechanisms of Autophagosome Formation.”





# 2009 UNDERGRADUATE HONORS RECIPIENTS

## Biology

**Kahli McDonald**, Cyanobacterial Dynamics of Ford Lake, MI.

## CMB

**Richard Watson**, GSK3 $\beta$  and  $\beta$ -catenin Modulate Radiation Cytotoxicity in Pancreatic Cancer.

## High Honors

### Biology

**Laura Shefner**, Comparing the pigmentation development in *Drosophila americana* and *novamexicana* sister species.

**Peter Tang**, Invertebrates in Mountain White-Crowned Sparrow (*Zonotrichia leucophrys oriantha*) Nests.

### CMB

**Stefanie Deeds**, The flagellar sigma factor FliA transcriptome links motility to c-di-GMP signaling and to a putative GTPase in uropathogenic *Escherichia coli*.

**Brian Nadeau**, Regulatory Role of C5a Receptors on IL-17A Release during Systemic Inflammation.

**Gloria Shan**, Inhibition of Notch signaling in T cells prevents immune-mediated bone marrow failure.

**Mounica Vallurupalli**, Epitope presentation to detect human autoantibodies to CTL2/SLC44A2.

### Microbiology

**Alaina Ritter**, Does Chronic Atmospheric Nitrogen Deposition Alter the Composition of Microbial Communities in Soil?

### Neuroscience

**Duy Kevin Duong**, Longitudinal Evaluation of the *Hdb*<sup>(CAG)<sup>200</sup></sup> Knock-in Mouse Model of Huntington's Disease.

**Ian Hsu**, Cross-assembly of P2X2 Concatamers.

**Danish Javed**, The Critical Role of FGF in Seizures.

**Eric Mills**, A technique for measuring intracellular ion pools using sub-cellular fractionation and specialized mass spectrometry (ICP-MS/ICP-AES) applications for mucopolidosis type-IV disease.

**Eszter Zavodszky**, Characterization of CHIP, a ubiquitous ligase involved in neurodegenerative disease.

## Highest Honors

## Honors

### Biology

**Katie Holmes**, Transfection by electroporation of *mif* and *mif-like* morpholinos in the developing inner ear of zebrafish.

### CMB

**Christopher Dobson**, The Role of PTS2 Cargo Proteins in PEX7 Import into Peroxisomes.

**Grace Liu**, Associations between Huntingtin interacting protein 1 (H1P1) and receptor tyrosine kinases in cancer.

**Amanda Paulson**, p53 Mediated Suppression of Normal and Malignant Mammary Stem Cell Self-renewal.

**Nicholas Streicher**, Histone H3 Methylation in *C. elegans* Dosage Compensation.

**Suellen Yin**, Real-Time Measurement of Human Complement Bactericidal Against *Klebsiella pneumoniae*.

**Jasmine Zeng**, Regulation of adipogenesis by microRNA-378/422b and RNAi associated proteins Dicer and Ago2.

### Neuroscience

**David Altschuler**, Cry2 Expression in the Cortex and Suprachiasmatic Nucleus During Puberty in *Octodon degus*.

**Lauren Dayton**, The Effects of Iron Deficiency at Infancy on Working Memory Among Preadolescents.

**Rachel Diehl**, The Tg(*ccnb1:mcherry*) transgenic zebrafish line: using a novel red-fluorescent protein to label proliferating cells during retinal development and regeneration.

**Joshua Emrick**, Cortical and Hippocampal EEG Show Different Simultaneous Sleep States after Learning.

**Casey Lwo**, Effects of RFRP-3 on Luteinizing Surge and Sex Behavior in Female Rats.

**Katherine MacDuffie**, Investigating Working Memory Distortions in Alzheimer's Disease.

**Lauren Schwartz**, Fetal lead exposure and hyperactivity at 24 months of age.

**William Stone**, The Influence of Emotional Valence on Commitment Decisions.

**Melissa Si Hui Tan**, The Effects of Maternal Separation and Single Prolonged Stress on CRH Protein and Glucocorticoid Receptor Expression in the Brain.

**Alexander Wiltschko**, Opposing Effects of Amphetamine and Eticlopride on Striatal Fast-Spiking Interneuron Firing.

**Mary Winters**, How Sweet It Is: Glucose Effects on Executive Function.



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