

Cell Biology News

Vol.4 (1) April 2011

IN THIS ISSUE

A Tribute to Barry and Judi Shur

New Faces in Cell Biology

Notable Articles and Commentaries

Books and Websites

Opus Cellula (Publications)

Cell Biology: Under the Lens

Graduate Student Corner

Life in the Department



EMORY
UNIVERSITY



A tribute to Barry and Judi Shur – Atlanta, Emory University and the Department of Cell Biology 1996 – 2010. We will all deeply miss Judi and Barry Shur who have been our friends, mentors and colleagues for the last 14 years. These were very special years due to Judi's and Barry's care for the Department and for each of us. Barry set a very high stand of scholarly achievement and professionalism, leading by example and treating everyone with dignity. Barry is a wise and enthusiastic mentor and generous leader with a great sense of humor. We will miss Judi and Barry, look forward to meeting again and wish them the best in their new Colorado home. Thank you Judi and Barry.



New Faces in Cell Biology

Alexa Mattheyses PhD.



Instructor in Cell Biology
Director of the ENNCF Microscopy and Image Analysis Core

The focus of my research is to develop novel fluorescence microscopy and data analysis techniques to answer questions in cell biology. I am especially interested in exploiting basic properties of light and fluorescence to investigate the dynamics and functions of proteins inside living cells. My background is very interdisciplinary, encompassing the development and application of novel and advanced microscopy techniques to a variety of biological questions including dynamics in endocytosis, mitochondrial membrane permeability in apoptosis, and the structure and function of the nuclear pore complex. Select examples of techniques and their applications from

my work include: polarized FRET to detect fast protein-protein interactions, fluorescence anisotropy to study orientation and organization of protein domains relative to a larger structure, and variants of TIRF microscopy to differentiate between protein dynamics and plasma membrane/vesicle dynamics. I plan to continue developing novel techniques to shed light on difficult biological problems.

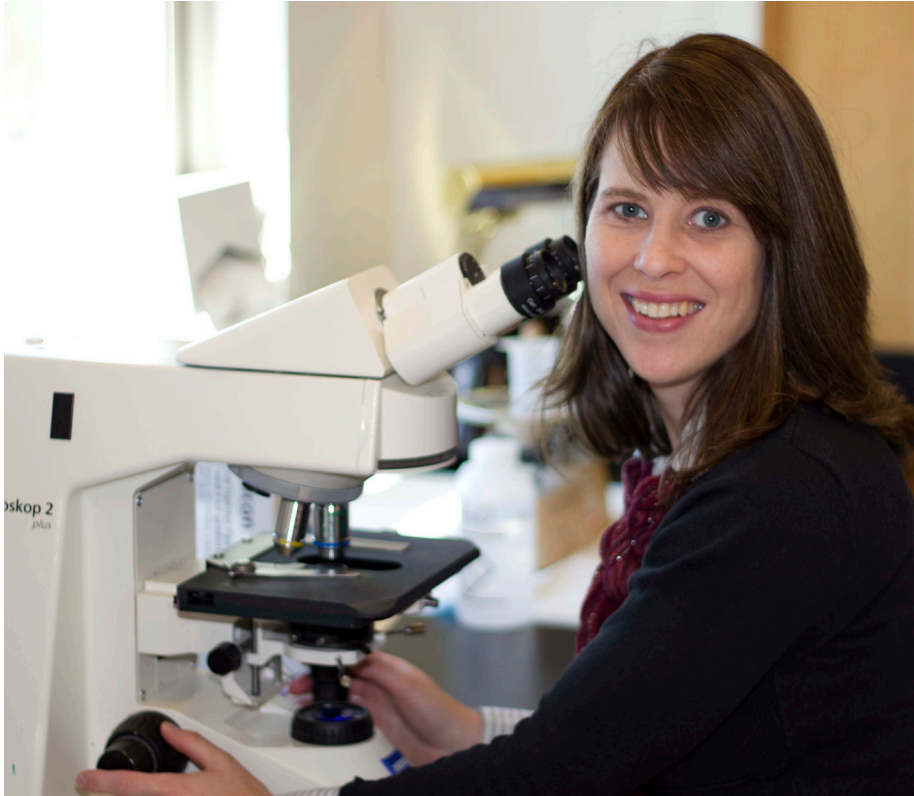
In addition, I am the technical director of the ENNCF Microscopy and Image Analysis Core located on the 4th and 5th floors of the Whitehead building. In this role I strive to provide researchers with the tools and knowledge they need to successfully conduct fluorescence microscopy experiments. This includes providing consulting, one-on-one trainings, and educational seminars. I am also spearheading efforts to bring new imaging technology to Emory with a special focus on TIRF and super resolution microscopy.



New Faces in Cell Biology

Maureen Wirschell PhD.

Research Assistant Professor



My research focus is to understand the regulation and assembly of cilia and the dynein motors using the model experimental system *Chlamydomonas reinhardtii*. In particular, studies of cilia in *Chlamydomonas* has pioneered our current understanding of human diseases/syndromes that are caused by ciliary defects; these pathologies are collectively called “ciliopathies” and include obesity, cardiovascular defects (developmental heart looping and left-right patterning defects), polycystic kidney disease and cell proliferation defects including cancer just to name a few. Thus, studies conducted using model organisms, like

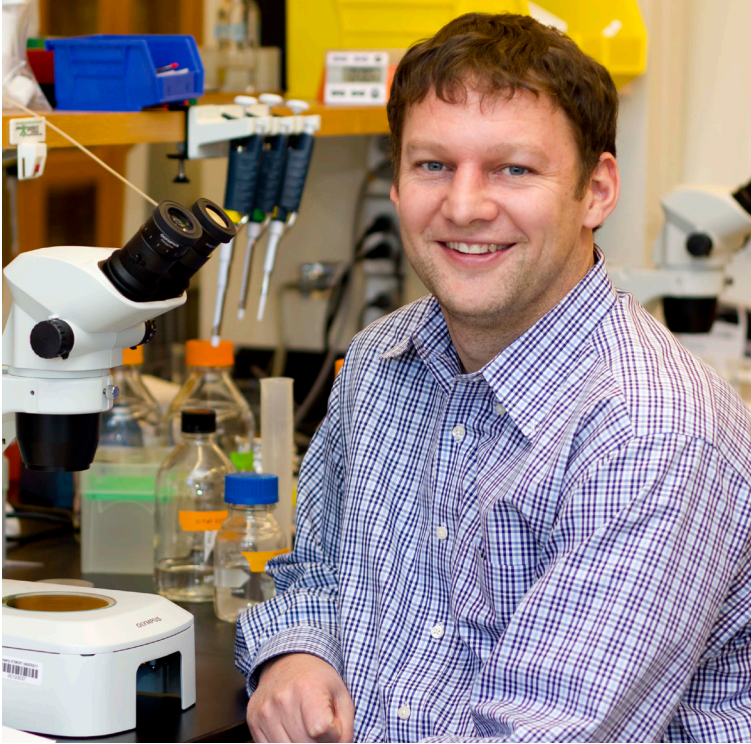


Chlamydomonas, can elucidate fundamental mechanisms for important biological processes; highlighting the importance of basic science in discoveries related to human health and diseases. My focus on cilia and the dynein motors began in graduate school when I worked with Dr. George B. Witman on assembly of the outer dynein arm—an important ciliary dynein that provides much of the power for ciliary movement. I continued my studies with Dr. Winfield S. Sale to study ciliary dynein assembly and regulation for my postdoctoral training. With Win, I continued my training as a scientist at the bench, but also Win helped craft my impression of what a mentor should be. These strengths will serve me well in my independent position here in Cell Biology. My home life revolves around my son, Ryan Lawrence, who is now almost 4 years old and my husband (and other child!), Roberto—who is not 4 years old but wishes he was! They both love cars, trucks, tractors and trains.

New Faces in Cell Biology

David Katz PhD.

Assistant Professor



Going back to the earliest days of biology, scientists have been aware of the extensive epigenetic reprogramming that must occur during the transition from gametes to the embryo. Recently, the field has even been able to marginally recapitulate this process; deriving stem cells from adult fibroblasts using the induced pluripotent stem cell process (iPS). However, the mechanisms of this reprogramming remain almost a complete mystery. As graduate student in Shirley Tilghman's lab at Princeton University, I studied the role of chromatin in regulating genomic imprinting. During these studies I became intrigued by how epigenetic mechanisms could function to completely reverse the transcriptional states of imprinted genes during each passage through the germline. This fascination pushed me towards postdoctoral work in the lab of Bill Kelly where we generated, in the worm *C. elegans*, the first direct evidence for an epigenetic reprogramming mechanism at fertilization.



Today, my lab is broadening these studies in both *C. elegans* and mouse to try and understand the function of epigenetics during changes in cell fate. We are interested in the idea that histone modifications can serve as a heritable transcription memory and we would like to understand how this memory is regulated in vivo and during stem cell therapeutics. We are also interested in the possibility that human disease could result from the inappropriate transmission of epigenetic memory.

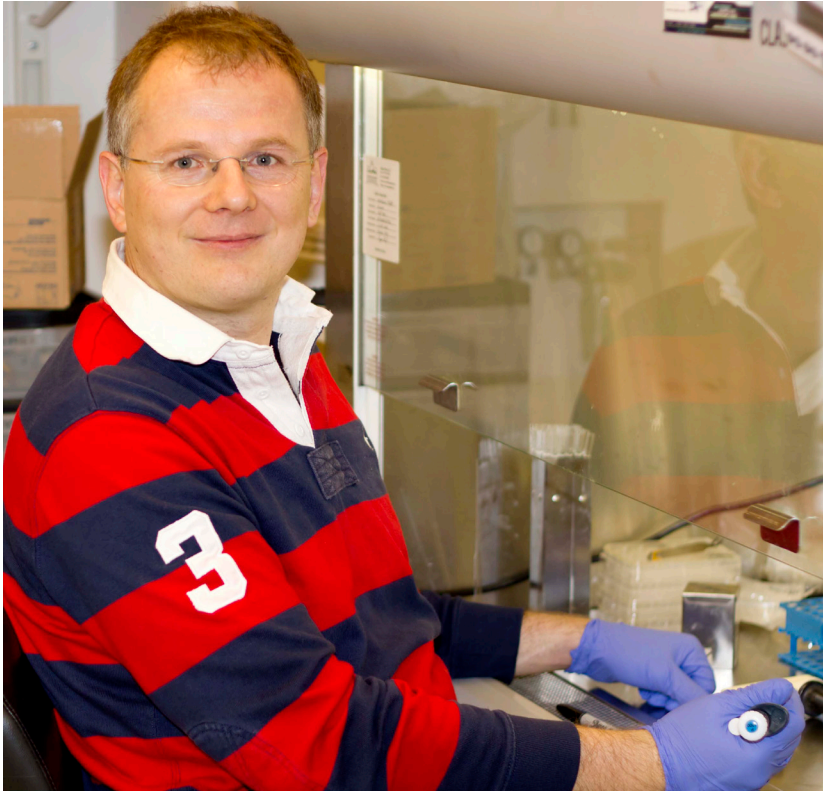
Since its inception last September, the laboratory has quickly grown to 5 members. We have enjoyed getting to know the Cell Biol-

ogy Department and are particularly proud to boast that we recently annihilated the Moberg Lab in the NCAA March Madness pool. Outside of the Cell Biology Department (but not too far) I am married to Tamara Caspary in the Human Genetics Department. We spend most of our time with our soon to be 4 year old twins, Simon and Anna, who enjoy encouraging me to score goals during my other passion, playing soccer.

New Faces in Cell Biology

Wilfried Rossol PhD.

Research Assistant Professor



I was first introduced to real bench work at the Research Institute of Molecular Pathology (IMP), where I did my graduate research on the cell cycle of the yeast *Saccharomyces cerevisiae*. After I received my PhD in Genetics from the University of Vienna, I felt the desire to work on something more directly disease-related. I chose the Institute for Clinical Neurobiology of the University of Würzburg for my postdoctoral training, where I developed a keen interest in how deficiencies in neuronal mRNA processing may underlie the development of several devastating neurodegenerative diseases. I took the opportunity to move to Emory to work as Instructor and now Research Assistant Professor with Gary Bassell, who has been always been a great mentor for my transition into an independent research position with my own research funding.

Gary and I share an interest in the role of mRNA transport and local translation in neurons and their dysfunction in neurological diseases.

One of my main projects is to study the biological role of the spinal muscular atrophy (SMA) disease protein SMN in the development and maintenance of motor neurons. More recently, I have also started a research program on the amyotrophic lateral sclerosis (ALS) disease protein TDP-43. These disorders are characterized by a very selective degeneration of motor neurons. It is one of the great unsolved mysteries in the field, how mutations in ubiquitous housekeeping genes can lead to the loss of a very specific subtype of neurons. Since I believe that the answer to this question lies in unique properties and requirements of this cell type, I have dedicated a lot of effort into establishing primary motor neuron cultures and compartmentalized cultures of stem cell-derived motor neurons. Together with my colleagues, I am also working on the development of high content screens to address the urgent need for effective drugs for the treatment for SMA.



Notable Articles and Commentaries

Advocating for the Cell

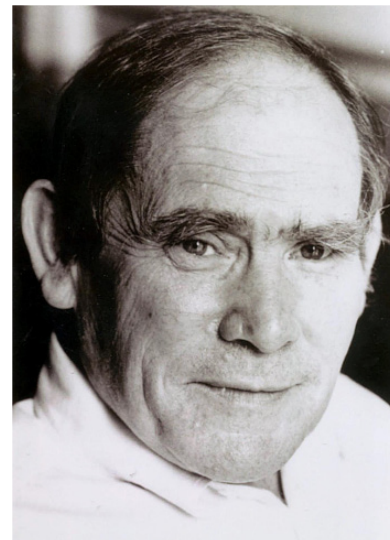
Sequences and consequences.

Philos Trans R Soc Lond B Biol Sci. 2010 365(1537):207-12.

This article by Sidney Brenner, 2002 Nobel Prize in Physiology or Medicine, discusses the concept that the right organization level to understand modern biology is the cell instead of systems biology, a novel discipline.

...”The genome must therefore form the kernel of any theory we construct but since transforming the information in a genome into the final living organism involves many complicated processes mediated by molecules specified in the genome, all of this will need to be known in considerable detail before we can read and understand genomes. There is no simple way to map organisms onto their genomes once they have reached a certain level of complexity. Thus while the genome sequence is central, it is a level of abstraction which is too cryptic to be used for the organization of data and the derivation of theoretical models. Proposals to base everything on the genome sequence by annotating it with additional data will only increase its opacity.

The correct level of abstraction is the cell. The cell is the fundamental unit of structure, function and organization of living systems—something we have known for 180 years. This is the key feature of what I have called Cellmap, a design for a biological information system that will allow us not only to handle the vast accumulation of data but also to generate and test hypotheses. Cellmap is at once a map of the molecules within cells and a map of the cells in the organism; for microbes the cell is also the organism. All of us started as a single cell that multiplied to produce more cells, which differentiated into many different cell types to make up the tissues and organs responsible for our physiological functions. In choosing the level of the cell we avoid the question of whether our analyses should be top-down or bottom-up; instead, our approach is middle-out, because from the vantage point of the cell we can look down on the molecules that constitute it and look up at the organism that contains it.”.....



A Call to Civility

Mol Biol Cell. 2011 Mar;22(5):525-7.

Any jackass can trash a manuscript, but it takes good scholarship to create one (how MBoC promotes civil and constructive peer review).

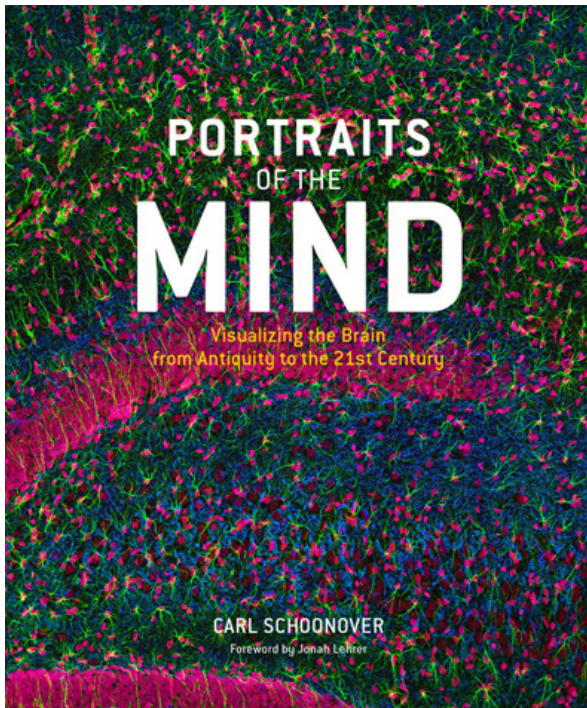
This article by David Drubin is a call to civility focused on reviewers. However, some of the recommendations extend to other areas of our professional life, such as how we educate our graduate students.

...”The title of this editorial is a variation on the observation of the late U.S. Congressman and Speaker of the House Sam Rayburn, that

“any jackass can kick down a barn, but it takes a good carpenter to build one.” These words apply as well to the peer review process as they do to politics. Authors pour their hearts, souls, and creative energies into performing experiments and reporting the results in manuscripts, yet reviewers often seem more intent on kicking down the barn than they are on trying to help the carpenter with its design and construction, or they demand the addition of an entire new wing to the original structure. Because publications are the most important currency for securing employment and research funds, and for a researcher’s scientific legacy, peer review issues are critical to all practicing research scientists..”.....



Books and Websites



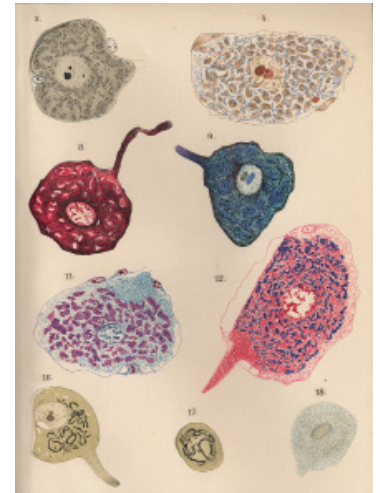
Portraits of the Mind follows the fascinating history of our exploration of the brain through images, from medieval sketches and 19th-century drawings by the founder of modern neuroscience to images produced using state-of-the-art techniques, allowing us to see the fantastic networks in the brain as never before. These black-and-white and vibrantly colored images, many resembling abstract art, are employed daily by scientists around the world, but most have never before been seen by the general public. Each chapter addresses a different set of techniques for studying the brain as revealed through the images, and each is introduced by a leading scientist in that field of study. Author Carl Schoonover's captions provide detailed explanations of each image as well as the major insights gained by scientists over the course of the past 20 years. Accessible to a wide audience, this book reveals the elegant methods applied to study the mind, giving readers a peek at its innermost workings, helping us to understand them, and offering clues about what may lie ahead.

"John Keats's insistence that truth is beauty is exemplified by Carl Schoonover's wonderful book Portraits of the Mind. Since one cannot understand the present without examining the past, this book offers a delightful and instructive way of accomplishing just that. I enthusiastically recommend this beautiful book both to students of brain science and to lovers of art."

-Eric R. Kandel, MD, Nobel Prize in Physiology or Medicine, 2000; University Professor at Columbia

Cajal's Butterflies of the Soul: Science and Art.

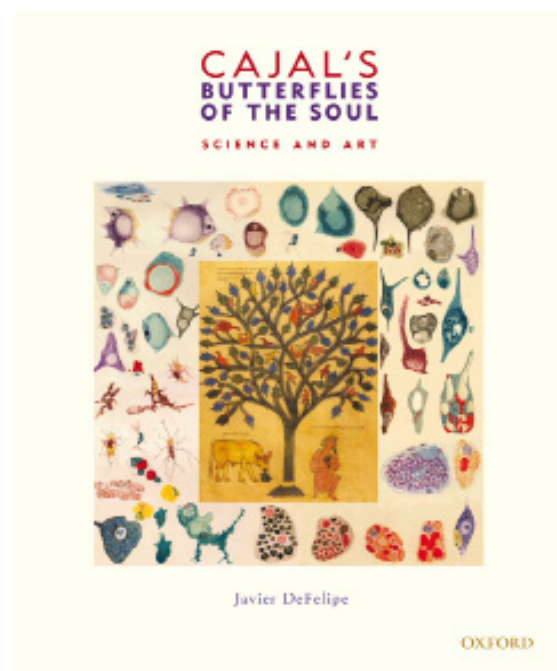
This book contains a large collection of beautiful figures produced throughout the nineteenth century and the beginning of the twentieth century and that represent some characteristic examples of the early days of research in neuroscience. Illustrated by his marvellous drawings, the studies of Santiago Ramon y Cajal (1852-1934) no doubt contributed more than those of any other researcher at the



time to the growth of modern neuroscience. Looking at the illustrations in this book readers will not only marvel at Cajal's drawings but they will also find that many of the other early researchers that studied the nervous system were also true artists, of considerable talent and aesthetic sensibility.

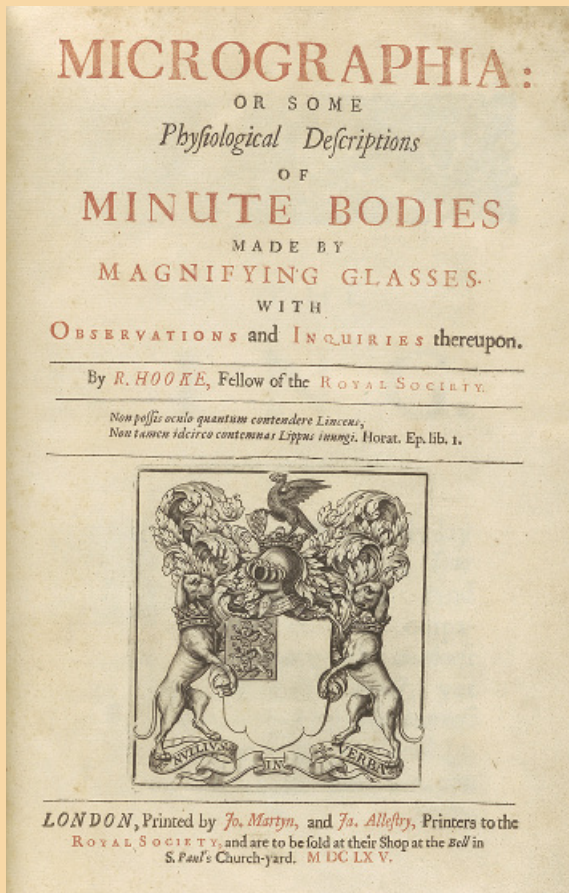
This book was edited by Javier DeFelipe, an internationally known interpreter of and translator of Santiago Ramon y Cajal's writings and member of the Instituto Cajal in Madrid, Spain. The curious title derives from Cajal's 'Recuerdos de Mi Vida, in which he wrote that "... my attention was drawn to the flower garden of the gray matter, which contained cells with delicate and elegant forms, the mysterious butterflies of the soul, the beating of whose wings may some day (who knows) clarify the secret of mental life."

Edward J. Fine



Books and Websites

The editors of the Cell Biology News recommend
<http://www.nlm.nih.gov/exhibition/hooke/hookesbooks.html>



Here you will find the coining of the word “CELL” used for the first time by Robert Hooke.

“Robert Hooke (1635-1703) was, by all accounts, a remarkably versatile scientist and a very, very, difficult man. He was an artist, biologist, physicist, engineer, architect, inventor and much else; a man who rubbed shoulders with many of the great minds of his time, and quarreled with most of them. Hooke had a knack of intuitively grasping great scientific truths without always understanding the hard science that lay beneath. This led him to claim credit for the discoveries of others, and also to a lifetime of very public controversy.

There was one accomplishment, however, that was Hooke’s crowning glory: *Micrographia: or some Physiological Descriptions of Minute Bodies made by Magnifying Glasses*, first published in 1665. It was a masterpiece; an exquisitely illustrated introduction to the previously unknown microscopic world. Hooke had opened the eyes of scientists and the public to a realm where the future of science would be found.”

Taken from <http://www.nlm.nih.gov/exhibition/hooke/hookesbooks.html>



Opus Cellula (Publications)

GARY BASSELL

High-Resolution Fluorescence In Situ Hybridization to Detect mRNAs in Neuronal Compartments In Vitro and In Vivo.

Swanger SA, Bassell GJ, Gross C.
Methods Mol Biol. 2011;714:103-123

The Survival of Motor Neuron (SMN) Protein Interacts with the mRNA-Binding Protein HuD and Regulates Localization of Poly(A) mRNA in Primary Motor Neuron Axons.

Fallini C, Zhang H, Su Y, Silani V, Singer RH, Rossoll W, Bassell GJ.
J Neurosci. 2011 Mar 9;31(10):3914-25.

Arc/Arg3.1 mRNA expression reveals a subcellular trace of prior sound exposure in adult primary auditory cortex.

Ivanova TN, Matthews A, Gross C, Mappus RC, Gollnick C, Swanson A, Bassell GJ, Liu RC.
Neuroscience. 2011 Feb 18.

The COPI vesicle complex binds and moves with survival motor neuron within axons.

Peter CJ, Evans M, Thayanithy V, Taniguchi-Ishigaki N, Bach I, Kolpak A, Bassell GJ, Rossoll W, Lorson CL, Bao ZZ, Androphy EJ.
Hum Mol Genet. 2011 Feb 22.

CPEB4 is a cell survival protein retained in the nucleus upon ischemia or endoplasmic reticulum calcium depletion.

Kan MC, Oruganty-Das A, Cooper-Morgan A, Jin G, Swanger SA, Bassell GJ, Florman H, van Leyen K, Richter JD.
Mol Cell Biol. 2010 Dec;30(24):5658-71.

Excess phosphoinositide 3-kinase subunit synthesis and activity as a novel therapeutic target in fragile X syndrome.

Gross C, Nakamoto M, Yao X, Chan CB, Yim SY, Ye K, Warren ST, Bassell GJ.
J Neurosci. 2010 Aug 11;30(32):10624-38.

Phosphorylation of zipcode binding protein 1 is required for brain-derived neurotrophic factor signaling of local beta-actin synthesis and growth cone turning.

Sasaki Y, Welshhans K, Wen Z, Yao J, Xu M, Goshima Y, Zheng JQ, Bassell GJ.
J Neurosci. 2010 Jul 14;30(28):9349-58.

High-efficiency transfection of cultured primary motor neurons to study protein localization, trafficking, and function.

Fallini C, Bassell GJ, Rossoll W. Mol Neurodegener. 2010 Apr 21;5:17.

Gross C, Yao X, Pong DL, Jeromin A and Bassell GJ. Fragile X Mental Retardation protein regulates protein expression and mRNA translation of the potassium channel, Kv4.2. Journal of Neuroscience, 2011, 31:15:5693-5698.

PING CHEN

Rack1 is required for Vangl2 membrane localization and planar cell polarity signaling while attenuating canonical Wnt activity.

Li S, Esterberg R, Lachance V, Ren D, Radde-Gallwitz K, Chi F, Parent JL, Fritz A, Chen P.
Proc Natl Acad Sci U S A. 2011 Feb 8;108(6):2264-9.

DAVID DUNLAP

Single-molecule approaches to probe the structure, kinetics, and thermodynamics of nucleoprotein complexes that regulate transcription.

Finzi L, Dunlap DD.
J Biol Chem. 2010 Jun 18;285(25):18973-8.

ARTHUR W. ENGLISH

Effect of Axon Misdirection on Recovery of Electromyographic Activity and Kinematics after Peripheral Nerve Injury.

Sabatier MJ, To BN, Nicolini J, English AW.
Cells Tissues Organs. 2011 Mar 17.

Effect of slope and sciatic nerve injury on ankle muscle recruitment and hindlimb kinematics during walking in the rat.

Sabatier MJ, To BN, Nicolini J, English AW.
J Exp Biol. 2011 Mar 15;214(Pt 6):1007-16.

H-reflex up-conditioning encourages recovery of EMG activity and H-reflexes after sciatic nerve transection and repair in rats.

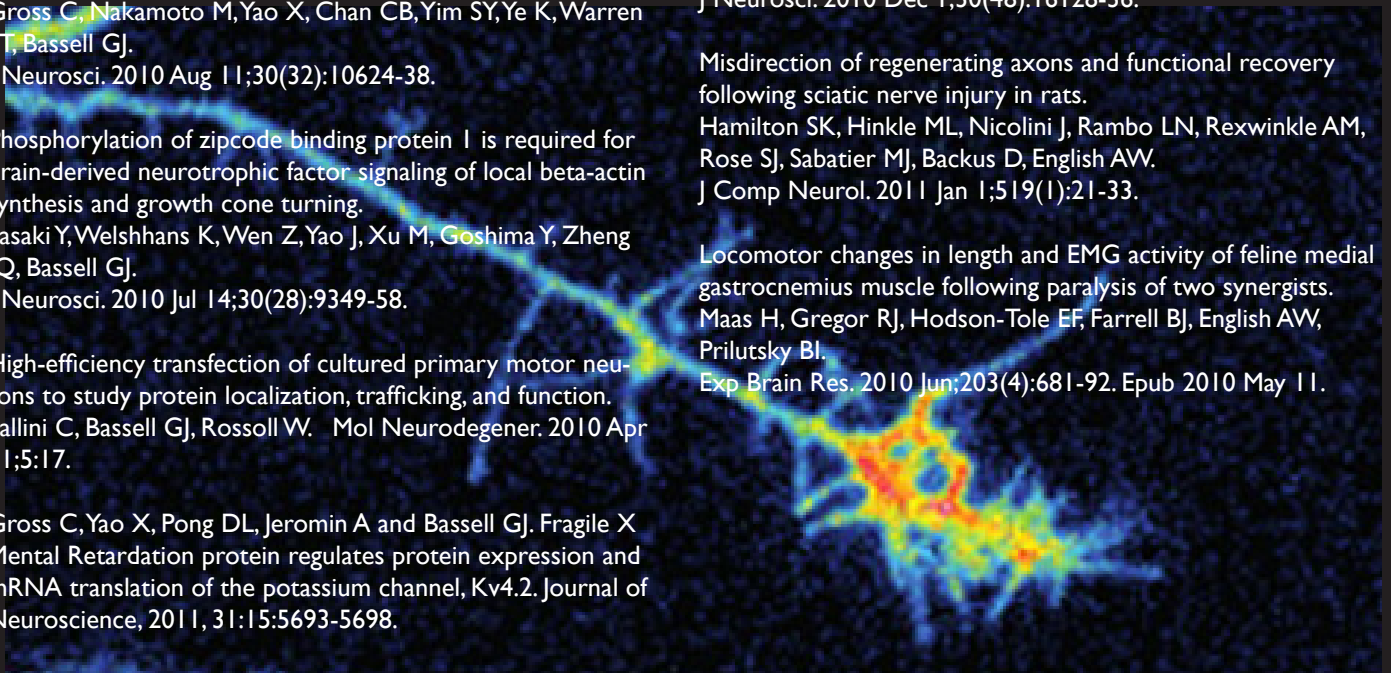
Chen Y, Wang Y, Chen L, Sun C, English AW, Wolpaw JR, Chen XY.
J Neurosci. 2010 Dec 1;30(48):16128-36.

Misdirection of regenerating axons and functional recovery following sciatic nerve injury in rats.

Hamilton SK, Hinkle ML, Nicolini J, Rambo LN, Rexwinkle AM, Rose SJ, Sabatier MJ, Backus D, English AW.
J Comp Neurol. 2011 Jan 1;519(1):21-33.

Locomotor changes in length and EMG activity of feline medial gastrocnemius muscle following paralysis of two synergists.

Maas H, Gregor RJ, Hodson-Tole EF, Farrell BJ, English AW, Prilutsky BI.
Exp Brain Res. 2010 Jun;203(4):681-92. Epub 2010 May 11.



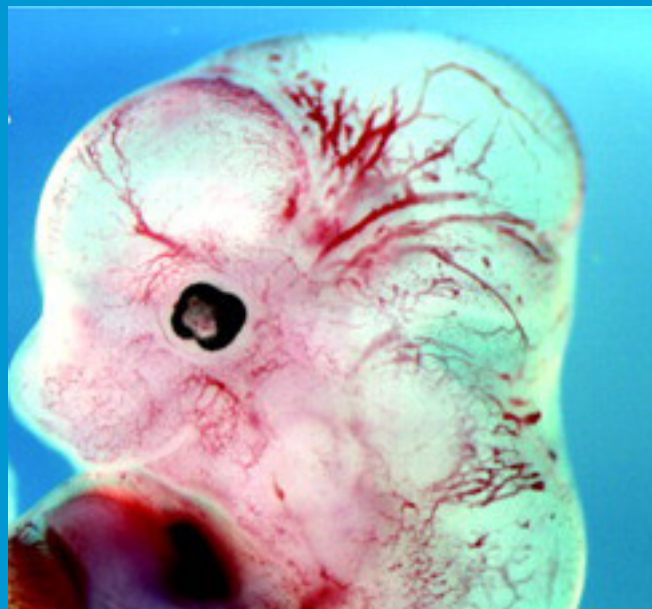
Opus Cellula (Publications)

ROBERT MCKEON

Targeted downregulation of N-acetylgalactosamine 4-sulfate 6-O-sulfotransferase significantly mitigates chondroitin sulfate proteoglycan-mediated inhibition.
Karumbaiah L, Anand S, Thazhath R, Zhong Y, McKeon RJ, Bellamkonda RV.
Glia. 2011 Mar 31. doi: 10.1002/glia.21170. 2.

Sustained delivery of activated Rho GTPases and BDNF promotes axon growth in CSPG-rich regions following spinal cord injury.
Jain A, McKeon RJ, Brady-Kalnay SM, Bellamkonda RV.
PLoS One. 2011 Jan 24;6(1):e16135.

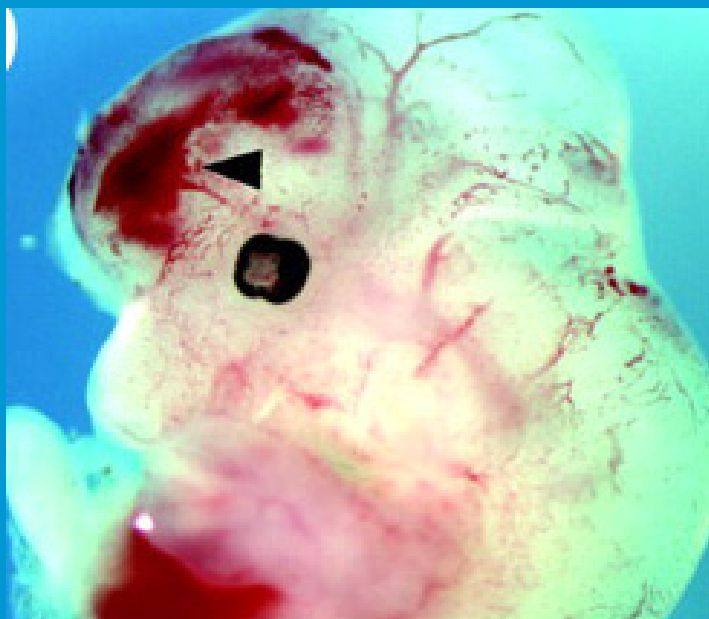
Sustained delivery of thermostabilized chABC enhances axonal sprouting and functional recovery after spinal cord injury.
Lee H, McKeon RJ, Bellamkonda RV.
Proc Natl Acad Sci U S A. 2010 Feb 23;107(8):3340-5.



MAUREEN POWERS

Nup98 regulates bipolar spindle assembly through association with microtubules and opposition of MCAK.
Cross MK, Powers MA.
Mol Biol Cell. 2011 Mar;22(5):661-72.

Nup98-homeodomain fusions interact with endogenous Nup98 during interphase and localize to kinetochores and chromosome arms during mitosis.
Xu S, Powers MA.
Mol Biol Cell. 2010 May 1;21(9):1585-96.



ANDREW KOWALCZYK

Desmosome disassembly in response to pemphigus vulgaris IgG occurs in distinct phases and can be reversed by expression of exogenous Dsg3.
Jennings JM, Tucker DK, Kottke MD, Saito M, Delva E, Hanakawa Y, Amagai M, Kowalczyk AP.
J Invest Dermatol. 2011 Mar;131(3):706-18.

Xenopus Kazrin interacts with ARVCF-catenin, spectrin and p190B RhoGAP, and modulates RhoA activity and epithelial integrity.
Cho K, Vaught TG, Ji H, Gu D, Papasakelariou-Yared C, Horstmann N, Jennings JM, Lee M, Sevilla LM, Kloc M, Reynolds AB, Watt FM, Brennan RG, Kowalczyk AP, McCrea PD.
J Cell Sci. 2010 Dec 1;123(Pt 23):4128-44.

p120-Catenin is required for mouse vascular development.
Oas RG, Xiao K, Summers S, Wittich KB, Chiasson CM, Martin WD, Grossniklaus HE, Vincent PA, Reynolds AB, Kowalczyk AP.
Circ Res. 2010 Mar 19;106(5):941-51.

Opus Cellula (Publications)

VICTOR FAUNDEZ

Clathrin-Dependent Mechanisms Modulate the Subcellular Distribution of Class C Vps/HOPS Tether Subunits in Polarized and Non-Polarized Cells.

Zlatic SA, Tornieri K, L'hernault SW, Faundez V.
Mol Biol Cell. 2011 Mar 16.

Tissue non-specific alkaline phosphatase is activated via a two-step mechanism by zinc transport complexes in the early secretory pathway.

Fukunaka A, Kurokawa Y, Teranishi F, Sekler I, Oda K, Ackland ML, Faundez V, Hiromura M, Masuda S, Nagao M, Enomoto S, Kambe T.
J Biol Chem. 2011 Mar 14.

On the endosomal function and gene nomenclature of human SPE-39.

L'Hernault SW, Faundez V.
Nat Genet. 2011 Mar;43(3):176.

An AP-3-dependent mechanism drives synaptic-like microvesicle biogenesis in pancreatic islet beta-cells.

Suckow AT, Craige B, Faundez V, Cain WJ, Chessler SD.
Am J Physiol Endocrinol Metab. 2010 Jul;299(1):E23-32.

Endosomal recycling regulates Anthrax Toxin Receptor I/Tumor Endothelial Marker 8-dependent cell spreading.

Gu J, Faundez V, Werner E.
Exp Cell Res. 2010 Jul 15;316(12):1946-57.

Isolation of labile multi-protein complexes by in vivo controlled cellular cross-linking and immuno-magnetic affinity chromatography.

Zlatic SA, Ryder PV, Salazar G, Faundez V.
J Vis Exp. 2010 Mar 9;(37). pii: 1855. doi: 10.3791/1855.

Hermansky-Pudlak protein complexes, AP-3 and BLOC-1, differentially regulate presynaptic composition in the striatum and hippocampus.

Newell-Litwa K, Chintala S, Jenkins S, Pare JF, McGaha L, Smith Y, Faundez V.
J Neurosci. 2010 Jan 20;30(3):820-31.

A biochemical and functional protein complex involving dopamine synthesis and transport into synaptic vesicles.

Cartier EA, Parra LA, Baust TB, Quiroz M, Salazar G, Faundez V, Egaña L, Torres GE.
J Biol Chem. 2010 Jan 15;285(3):1957-66..

CRISS HARTZELL

ADF/cofilin-mediated actin dynamics regulate AMPA receptor trafficking during synaptic plasticity.

Gu J, Lee CW, Fan Y, Komlos D, Tang X, Sun C, Yu K, Hartzell HC, Chen G, Bamburg JR, Zheng JQ.
Nat Neurosci. 2010 Oct;13(10):1208-15.

Bestrophin-2 mediates bicarbonate transport by goblet cells in mouse colon.

Yu K, Lujan R, Marmorstein A, Gabriel S, Hartzell HC.
J Clin Invest. 2010 May 3;120(5):1722-35.

Bestrophins and retinopathies.

Xiao Q, Hartzell HC, Yu K.
Pflugers Arch. 2010 Jul;460(2):559-69.

Inhibition of AMPA receptor trafficking at hippocampal synapses by beta-amyloid oligomers: the mitochondrial contribution.

Rui Y, Gu J, Yu K, Hartzell HC, Zheng JQ.
Mol Brain. 2010 Mar 26;3:10.

Chloride channels: often enigmatic, rarely predictable.

Duran C, Thompson CH, Xiao Q, Hartzell HC.
Annu Rev Physiol. 2010 Mar 17;72:95-121.

HARISH JOSHI

A novel microtubule-modulating agent induces mitochondrially driven caspase-dependent apoptosis via mitotic checkpoint activation in human prostate cancer cells.

Aneja R, Miyagi T, Karna P, Ezell T, Shukla D, Vij Gupta M, Yates C, Chinni SR, Zhau H, Chung LW, Joshi HC.
Eur J Cancer. 2010 Jun;46(9):1668-78.

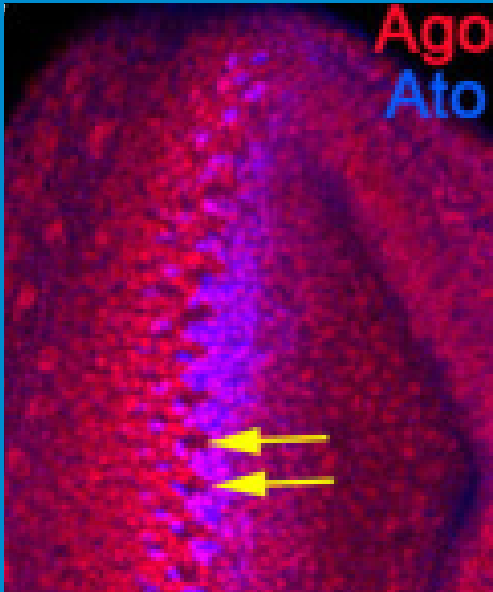
Recent patents reveal microtubules as persistent promising target for novel drug development for cancers.

Bughani U, Li S, Joshi HC.
Recent Pat Antiinfect Drug Discov. 2009 Nov;4(3):164-82.

Non-toxic melanoma therapy by a novel tubulin-binding agent.

Aneja R, Asress S, Dhiman N, Awasthi A, Rida PC, Arora SK, Zhou J, Glass JD, Joshi HC.
Int J Cancer. 2010 Jan 1;126(1):256-65.

Opus Cellula (Publications)



KEN MOBERG

Notch-dependent expression of the archipelago ubiquitin ligase subunit in the *Drosophila* eye.

Nicholson SC, Nicolay BN, Frolov MV, Moberg KH. *Development*. 2011 Jan;138(2):251-60.

A *Drosophila melanogaster* model of classic galactosemia.

Kushner RF, Ryan EL, Sefton JM, Sanders RD, Lucioni PJ, Moberg KH, Fridovich-Keil JL.

Dis Model Mech. 2010 Sep-Oct;3(9-10):618-27.

UDP-galactose 4' epimerase (GALE) is essential for development of *Drosophila melanogaster*.

Sanders RD, Sefton JM, Moberg KH, Fridovich-Keil JL.

Dis Model Mech. 2010 Sep-Oct;3(9-10):628-38.

Crumbs regulates Salvador/Warts/Hippo signaling in *Drosophila* via the FERM-domain protein Expanded.

Robinson BS, Huang J, Hong Y, Moberg KH.

Curr Biol. 2010 Apr 13;20(7):582-90.

WIN SALE

Distinct roles of Ialpha and Ibeta heavy chains of the inner arm dynein II of *Chlamydomonas* flagella.

Toba S, Fox LA, Sakakibara H, Porter ME, Oiwa K, Sale WS.

Mol Biol Cell. 2011 Feb;22(3):342-53.

Tubulin glutamylation regulates ciliary motility by altering inner dynein arm activity.

Suryavanshi S, Eddé B, Fox LA, Guerrero S, Hard R, Hennessey T, Kabi A, Malison D, Pennock D, Sale WS, Wloga D, Gaertig J.

Curr Biol. 2010 Mar 9;20(5):435-40.

SUBHABRATA SANYAL

NFAT regulates pre-synaptic development and activity-dependent plasticity in *Drosophila*.

Freeman A, Franciscovich A, Bowers M, Sandstrom DJ, Sanyal S.

Mol Cell Neurosci. 2011 Feb;46(2):535-47.

A new genetic model of activity-induced Ras signaling dependent pre-synaptic plasticity in *Drosophila*.

Freeman A, Bowers M, Mortimer AV, Timmerman C, Roux S, Ramaswami M, Sanyal S.

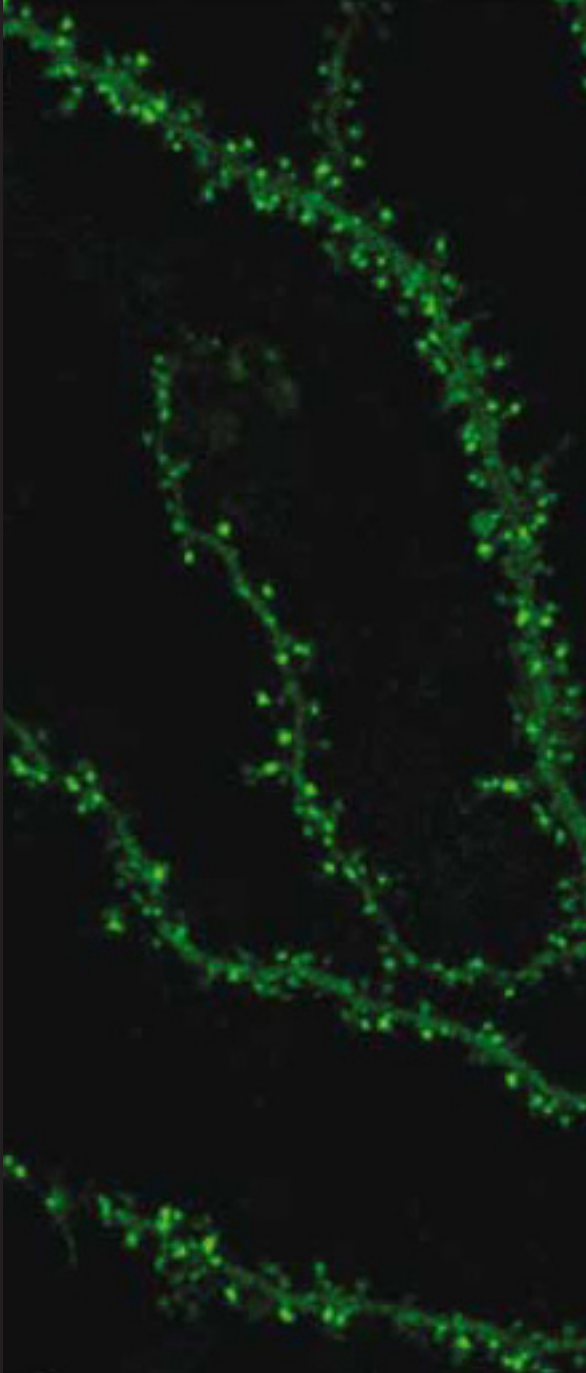
Brain Res. 2010 Apr 22;1326:15-29. Epub 2010 Feb 26.

ALEXA MATTHEYSES

Fluorescence anisotropy reveals order and disorder of protein domains in the nuclear pore complex. Mattheyses AL, Kampmann M, Atkinson CE, Simon SM. *Biophys J* 2010 Sep 22;99(6):1706-17

New and Notable: *Biophys J* 2010 Sep 22;99(6):1685-86

Opus Cellula (Publications)



JAMES ZHENG

PSD-95 alters microtubule dynamics via an association with EB3.

Sweet ES, Previtara ML, Fernández JR, Charych EI, Tseng CY, Kwon M, Starovoytov V, Zheng JQ, Firestein BL.

J Neurosci. 2011 Jan 19;31(3):1038-47.

ADF/cofilin-mediated actin dynamics regulate AMPA receptor trafficking during synaptic plasticity.

Gu J, Lee CW, Fan Y, Komlos D, Tang X, Sun C, Yu K, Hartzell HC, Chen G, Bamberg JR, Zheng JQ.

Nat Neurosci. 2010 Oct;13(10):1208-15.

Distinct 3'UTRs differentially regulate activity-dependent translation of brain-derived neurotrophic factor (BDNF).

Lau AG, Irier HA, Gu J, Tian D, Ku L, Liu G, Xia M, Fritsch B, Zheng JQ, Dingledine R, Xu B, Lu B, Feng Y. Proc Natl Acad Sci U S A. 2010 Sep 7;107(36):15945-50.

Phosphorylation of zipcode binding protein 1 is required for brain-derived neurotrophic factor signaling of local beta-actin synthesis and growth cone turning.

Sasaki Y, Welshhans K, Wen Z, Yao J, Xu M, Goshima Y, Zheng JQ, Bassell GJ.

J Neurosci. 2010 Jul 14;30(28):9349-58.

Inhibition of AMPA receptor trafficking at hippocampal synapses by beta-amyloid oligomers: the mitochondrial contribution.

Rui Y, Gu J, Yu K, Hartzell HC, Zheng JQ.

Mol Brain. 2010 Mar 26;3:10.

DAVID KATZ

Katz, D.J., Edwards, M.T., Reinke, V., Kelly, W.G. A. C. elegans LSD1 demethylase contributes to germline immortality by reprogramming epigenetic memory. 2009. Cell, 137: 308-320.

-Comment in: Cell, 137: 203-205.

Kelly, W.G. and Katz, D.J. The Wisdom of Weismann: Epigenetic Erasure Mechanisms and Germ Line Immortality. 2009. Cell Cycle, 8:2131-2.

Cell Biology: under the lens.

Papers Featured as Special Interest by Editorial Boards

GARY BASSELL

The Survival of Motor Neuron (SMN) Protein Interacts with the mRNA-Binding Protein HuD and Regulates Localization of Poly(A) mRNA in Primary Motor Neuron Axons.

Fallini C, Zhang H, Su Y, Silani V, Singer RH, Rossoll W, Bassell GJ. *J Neurosci.* 2011 Mar 9;31(10):3914-25.

Phosphorylation of zipcode binding protein 1 is required for brain-derived neurotrophic factor signaling of local beta-actin synthesis and growth cone turning.

Sasaki Y, Welshhans K, Wen Z, Yao J, Xu M, Goshima Y, Zheng JQ, Bassell GJ.

J Neurosci. 2010 Jul 14;30(28):9349-58.

Gross C, Nakamoto M, Yao X, Warren ST and Bassell GJ. Excess PI3K subunit synthesis and activity as a novel therapeutic target in fragile x syndrome. *Journal of Neuroscience.* 2010, 30(32):10624-10638.

MAUREEN POWERS

Nup98 regulates bipolar spindle assembly through association with microtubules and opposition of MCAK.

Cross MK, Powers MA. *Mol Biol Cell.* 2011 Mar;22(5):661-72.

ALEXA MATTHEYSES

Fluorescence anisotropy reveals order and disorder of protein domains in the nuclear pore complex. Mattheyses AL, Kampmann M, Atkinson CE, Simon SM. *Biophys J* 2010 Sep 22;99(6):1706-17

New and Notable: *Biophys J* 2010 Sep 22;99(6):1685-86

VICTOR FAUNDEZ

Clathrin-Dependent Mechanisms Modulate the Subcellular Distribution of Class C Vps/HOPS Tether Subunits in Polarized and Non-Polarized Cells.

Zlatic SA, Tornieri K, L'hernault SW, Faundez V. *Mol Biol Cell.* 2011 Mar 16.

An AP-3-dependent mechanism drives synaptic-like microvesicle biogenesis in pancreatic islet beta-cells.

Suckow AT, Craige B, Faundez V, Cain WJ, Chessler SD.

Am J Physiol Endocrinol Metab. 2010 Jul;299(1):E23-32.

Hermansky-Pudlak protein complexes, AP-3 and BLOC-1, differentially regulate presynaptic composition in the striatum and hippocampus. Newell-Litwa K, Chintala S, Jenkins S, Pare JF, McGaha L, Smith Y, Faundez V.

J Neurosci. 2010 Jan 20;30(3):820-31.

DAVID KATZ

Katz, D.J., Edwards, M.T., Reinke, V., Kelly, W.G. A. C. elegans LSD1 demethylase contributes to germline immortality by reprogramming epigenetic memory. 2009. *Cell*, 137: 308-320.

ANDREW KOWALCZYK

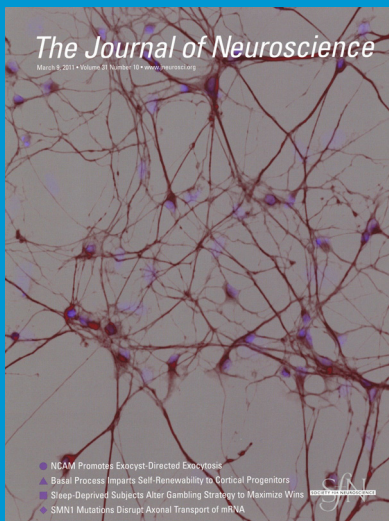
Desmosome disassembly in response to pemphigus vulgaris IgG occurs in distinct phases and can be reversed by expression of exogenous Dsg3. Jennings JM, Tucker DK, Kottke MD, Saito M, Delva E, Hanakawa Y, Amagai M, Kowalczyk AP.

J Invest Dermatol. 2011 Mar;131(3):706-18.

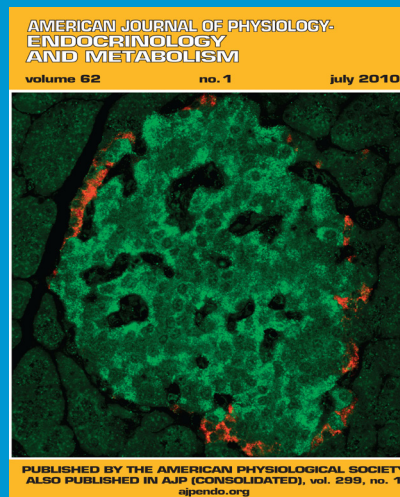
Cell Biology: under the lens.

Journal Covers

GARY BASSELL



VICTOR FAUNDEZ



ANDREW KOWALCZYK



Cell Biology: under the lens. MilliPub Faculty Marla Luskin

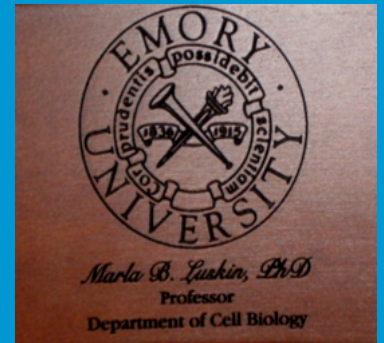


Marla Luskin PhD

In honor of Professor Marla Luskin's retirement, we took Marla her new Chair from the Department. It turns out we delivered it on her birthday. She really enjoyed the gift and the engraving! We also enjoyed a 1982 Sonoma Chateau St. Jean dessert wine that Marla has carried from the Salk Institute in San Diego, to Stanford, to Washington University and then on to Emory University. We congratulate Marla for her stellar career and wish her the best for her retirement and as Professor Emeritus.

Dr. Marla Luskin, a neuroscience pioneer: with landmark scientific contributions and great achievement, she brought great recognition to Emory University.

Dr. Luskin achieved wide recognition very early in her career for her landmark studies that described the presence of neural progenitor cells in the adult central nervous system. Contrary to what was widely accepted at the time, Dr. Luskin showed the adult CNS contains stem cells that are capable of dividing and producing new functional neuronal cells. During her many years at Emory, Dr. Luskin's laboratory extensively characterized the migratory and proliferative capacity of these cells; the ability of neurotrophins, such as BDNF, to induce marked expansion of this stem cell population; and their potential therapeutic application in neurodegenerative disorders. Dr. Luskin's pioneering work was well supported by extramural awards from the National Institutes of Health and the National Science Foundation, among other agencies. Her work always appeared in top-tier journals, with her 1993 Neuron paper earning her a MilliPub award, granted to those papers that surpass the 1,000 citation mark, during its inaugural year at Emory University School of Medicine. Dr. Luskin was a widely sought speaker at prestigious institutions and international meetings. She now aims to move back to her native California to be near her family.



Cell Biology: under the lens. Maureen Powers is awarded the Dean's Teaching Award



Maureen Powers received the Dean's Teaching Award to recognize her contributions to medical education and as an outstanding faculty member in the School of Medicine.

The first Discovery phase of the new medical school curriculum was implemented in 2010, during which students participate in research. Students will give presentations on their work on Research Day in April, 2011. Maureen Powers was acknowledged by Dean Lawley in the State of the School Address 2010 for "putting Discovery together and eliciting 300 ideas for research projects from faculty".

The Graduate Student Corner

The Indispensible Cilium – 15th BCMB Symposium, 2011

by Rasagnya Viswanadha

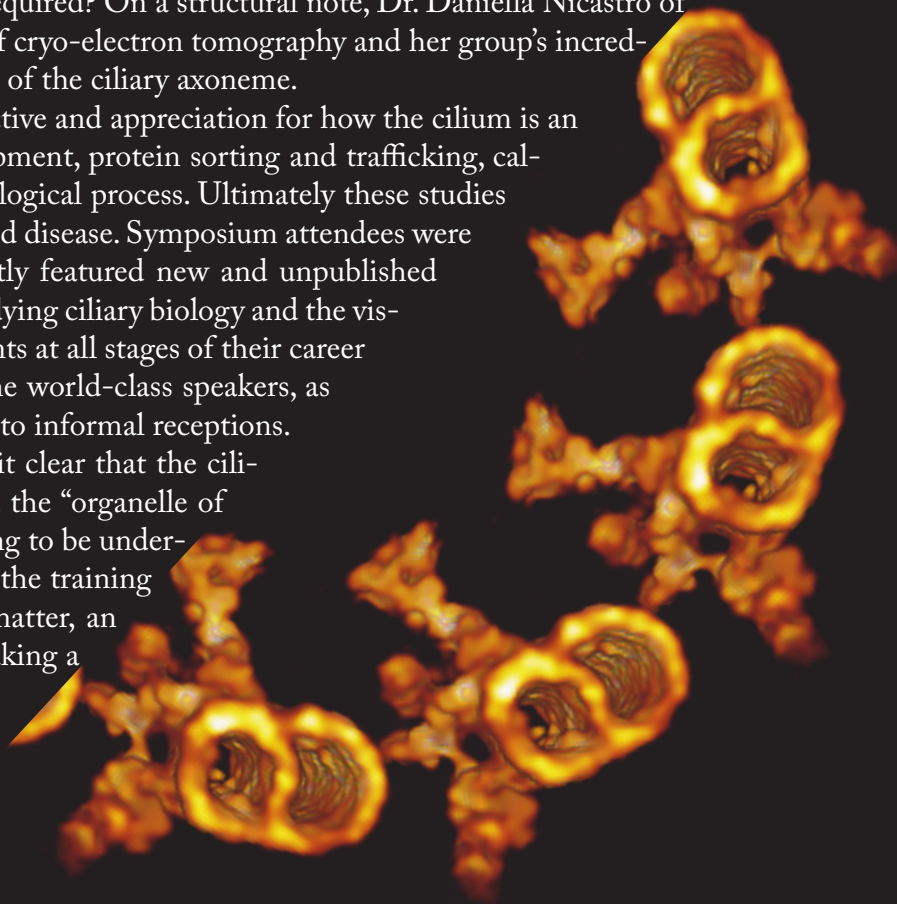
Each year pre-doctoral students supported by the Biochemical, Cell and Molecular Biology (BCMB) Training Grant organize a symposium on a topic of common interest that features leading scientists on national and international levels. This year's symposium centered on "The Indispensible Cilium," an organelle with well-established roles in motility and sensory functions and emerging roles in signaling, cell differentiation, and growth.

Our own Dr. Winfield Sale delivered an introductory talk that highlighted the history of ciliary biology. Throughout, Dr. Sale emphasized the contributions of the invited speakers that have revolutionized our understanding of ciliary functions in normal human health and development. The keynote speaker was Dr. Susan Dutcher of Washington University in St. Louis, an expert geneticist who exploits the genetic advantages of *Chlamydomonas* to study basal body biology. Dr. Dutcher mesmerized the audience with brilliant electron micrographs of basal bodies in *Chlamydomonas* along with new data on the essential role of the centriole for normal cell function.

A thrilling aspect of this symposium was the wide variety of model systems and experimental techniques presented. Dr. Max Nachury of Stanford University and Dr. Kirk Mykytyn of Ohio State University illustrated the use of biochemical and immunocytochemical approaches to identify and characterize the role of the BBSome coat machinery in transporting ciliary membrane proteins. Dr. Martina Brueckner of Yale University is a pediatric cardiologist whose study of children with left-right axis defects led her to identify the link between ciliary function and heart development. Dr. Brueckner presented her recent explorations of this link using human genetics and model systems such as the mouse and frog, *Xenopus tropicalis*. Dr. Maureen Barr of Rutgers University introduced a surprising kinesin motor in *C. elegans* that transports ciliary cargo in an IFT-independent manner, which raises the question: is IFT always required? On a structural note, Dr. Daniella Nicastro of Brandeis University described the utility of cryo-electron tomography and her group's incredible advances in resolution of the structure of the ciliary axoneme.

The audience gained a new perspective and appreciation for how the cilium is an excellent model to study organelle development, protein sorting and trafficking, calcium signaling and other fundamental biological process. Ultimately these studies lend valuable insight into human health and disease. Symposium attendees were treated to hour-long talks that prominently featured new and unpublished data, a boon to both local investigators studying ciliary biology and the visiting speakers. In addition, graduate students at all stages of their career had ample opportunity to interact with the world-class speakers, as conversations flowed from formal lectures to informal receptions.

Ultimately, this symposium made it clear that the cilium is not a vestigial organelle but instead the "organelle of the decade" whose biology is only beginning to be understood. Each of the speakers congratulated the training grant students on choosing the subject matter, an opportune topic at a time when cilia are taking a center stage in the biological sciences.



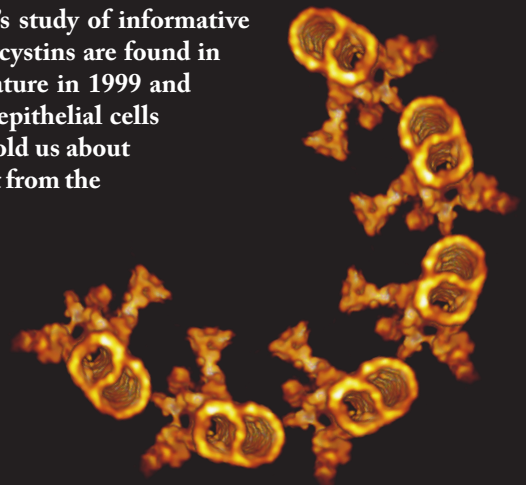
The Graduate Student Corner



Susan Dutcher, Ph.D. Professor, Genetics, Washington University School of Medicine, St. Louis: Susan is well known for her contributions to genetics in yeast and *Chlamydomonas*, two very powerful model systems, and pioneering studies on the centriole and its role as the ciliary basal body. The work also has revealed conserved genes important for regulation of the dynein motors, and a number of conserved, essential genes important for ciliary assembly and for control of cell cycle. She is also a leader in use of bio-informatics for discovery of essential conserved genes, the work resulting in a notable genomic paper in *Cell* in 2004 that contributed to an understanding of a link between Bardet Beidl Syndrome (BBS) and cilia.

Martina Brueckner, M.D. Professor and Clinical Pediatric Cardiologist, Yale University School of Medicine: Martina is well known for her pioneering discovery of ciliary genes important for normal function of the embryonic node and role in Left Right patterning and cardiac morphogenesis. Failure in ciliary assembly or function can result in a wide range of birth defects including left-right patterning and heterotaxy in heart development. Her work is highlighted in a notable paper in *Cell* in 2003 showing the role of cilia in normal pattern formation in mammals. Her current focus includes the role of cilia in heart development and ciliary genes, which when defective, result in failure in heart morphogenesis.

Maureen Barr, Ph.D. Associate Professor, Genetics, Rutgers University: Maureen's study of informative mutant strains in *C. elegans* provided some of the very first indication that the polycystins are found in cilia. Maureen's results were published in a highly cited and important paper in *Nature* in 1999 and provided one of the first glimpses that cilia are a critical signaling center in kidney epithelial cells and that failure in the cilium will result in polycystic kidneys. In her talk, Maureen told us about new genes important for ciliary assembly that may work in parallel to and independent from the "canonical IFT" machinery that assembles and maintains the cilium.



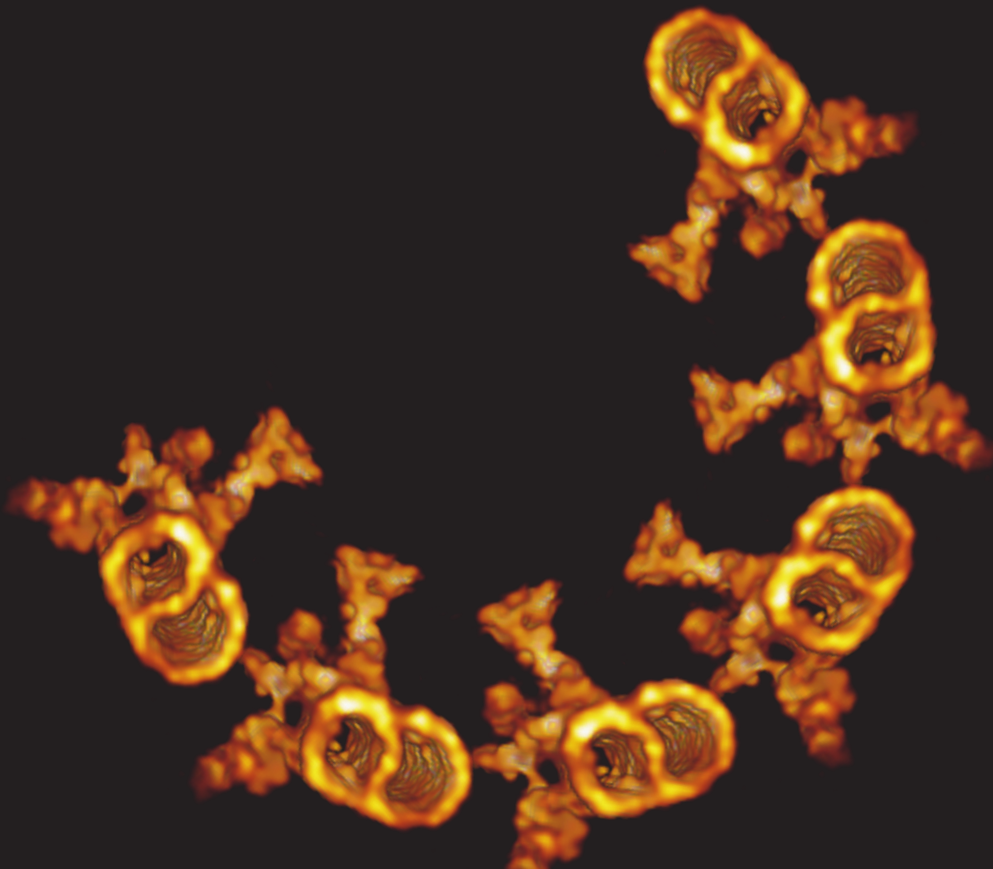
The Graduate Student Corner

Max Nachury, Ph.D. Assistant Professor, Molecular and Cellular Physiology, Stanford University: Max's postdoctoral work led to discovery of a protein complex called the BBSome, a complex of proteins including many of those encoded by the Bardet Biedl Syndrome genes. The BBSome plays the central role in transport and targeting ciliary membrane proteins and is defined in two outstanding papers in *Cell* 2007 and 2010. The work also led to the unexpected enzyme alphaTAT1 responsible for tubulin acetylation. Tubulin acetylation is a conserved and common posttranslational modification of microtubules in cilia and other cellular compartments important for normal function of cilia and sensory cells including photo receptors.

Daniela Nicastro, Ph.D. Assistant Professor, Biology, and Brandeis University: Dany is one of the world's experts in development and application of cryo electron microscopy (EM) tomography, an emerging series of technologies and computational approaches that has revolutionized structural biology of proteins, organelles and cells. Dany has used these combined approaches to define entirely new views of the ciliary axoneme and the dynein motors. Notable publications include her *Science* paper in 2006 and her *J. Cell Biology* paper in 2010 that define important details of the dynein motors and, for the first time, define the "nexin" structure that performs as the inter-microtubule links and is part of the DRC (dynein regulatory complex). An important feature of Dany's presentations is her outstanding instruction of how the technology is used and the critical evaluation of structural data from cryo EM tomography.

Kirk Mykytyn, Ph.D. Associate Professor, Pharmacology, Ohio State University Medical Center: Kirk is a leader in the study of ciliary based signaling that, when defective, results in a wide range of human diseases that can affect most organ systems and tissues. This includes normal function of the brain and nervous system. One of the great surprises from the work is discovery that several types of receptors are located in ciliary membranes including cilia found on neurons. In certain diseases such as BBS, membrane receptors fail to become properly targeted to the ciliary membrane. This results in a failure in normal signaling and consequent neuronal, cognitive and / or neuropsychiatric disorders. The work also led to an important discovery on a ciliary targeting sequence published in an important paper in *Mol. Biol. Cell* in 2008.

Brad Yoder, Ph.D. Professor, Cell Biology, University of Alabama, Birmingham (not in the picture): Brad and about a dozen of his students and postdoctoral fellows participated in the symposium. Brad is credited as one of the pioneers in discovering that the cilium is critical to the normal function of the kidney and that the polycystins are localized to the cilium. These discoveries are founded on studies of mutant mice that form a cystic kidney due to failure in a gene required for ciliary assembly, and is published in an important series of papers including a *Mol Biol. Cell* paper in 2001. Brad's lab has gone on to identify and characterize a wide range of diseases that result when cilia fail - the "ciliopathies".



The Graduate Student Corner



The symposium graduate student organizers and their faculty advisors, Drs Tamara Caspary and Win Sale

New Stars in the Sky

PhD Dissertation Defenses 1/1/2010 – 4/1/2011

Christine M. Chiasson, "Cellular mechanisms for the regulation of VE-cadherin endocytosis", Andrew P. Kowalczyk, Ph.D.

Sarah C. Nicholson, "The archipelago growth suppressor limits apoptosis via the Rb/E2f pathway and is transcriptionally regulated by the Notch receptor", Kenneth H. Moberg, Ph.D.

Lei Xing, "Localization, mechanisms and functions of SMN and hnRNP-Q1", Gary J. Bassell, Ph.D.

Maria Fernanda Chacon-Heszele, "The vertebrate Planar Cell Polarity pathway regulates convergent extension and hair cell polarization independently in the cochlea", Ping H. Chen, Ph.D.

Rebecca G. Oas, "p120-catenin in vascular development and endothelial adhesion strengthening", Andrew P. Kowalczyk, Ph.D.

Candice A. Elam, "Regulation of ciliary motility by phosphorylation: an axonemal PP2A B-subunit is required for PP2A localization and ciliary motility", Winfield S. Sale, Ph.D.

Life in the Department

GRANTS

Criss Hartzell, NIH, 4/1/2011 – 3/31/2015
“Regulation of Calcium Activated Chloride Channels”

Chi Wai Lee (Zheng Lab), Muscular Dystrophy Association, 2/1/11 – 1/31/2014
“The Mechanism of Postsynaptic AChR Endocytosis in Myasthenia Gravis Pathogenesis”

Christina Gross (Bassell Lab), FRAXA, 5/1/2011 – 4/30/2013
“Genetic and Pharmacologic Manipulation of P13K Activity in FXS: Assessing the Potential Therapeutic Value”

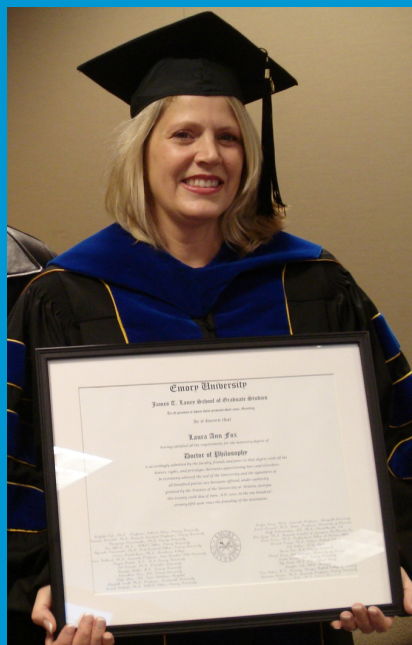
Autism Speaks Trailblazer Award to G. Bassell and C. Gross
“PI3K/mTOR signaling as a novel biomarker and therapeutic target in autism”
06/01/11-05/31/12

Use of the Cayuse System Becomes Mandatory

Since February, 2011 when Emory began implementation of the Cayuse 424 system for submission of electronic grant applications to federal granting agencies, use of the system has been on a voluntary basis. Based on the successes of the system to date, effective for grant deadlines on and after June 5, 2011, use of the Cayuse 424 system will be mandatory for all federal applications for which it is available, including proposals to NIH. Proposals to the National Science Foundation may be submitted using either Cayuse 424 or Fastlane. Detailed information on the system can be found on OSP's website at: <http://www.osp.emory.edu/electronic/cayuse424/index.cfm>. Prior to beginning a federal grant proposal, please contact Linda Jordan, linda.jordan@emory.edu, for important information on the departmental process for initiating applications and using Cayuse 424.

The Bassell lab appears to hold the department record for current births. We welcome:
Avery Lynn Jasnow was born to Kristy Welshhans on January 22, 2011 at 5 lbs 12 oz.
William Bohan Xing was born to Xiaodi Yao and Lei Xing on January 24, 2011 at 8 lbs.
Natalia Leyla Rowe born to Latoya Rowe on March 19, 2011 at 6 lbs 13 oz

The Bassell lab thanks Jocasta Odom for volunteering to speak about her position and lab research to high school students.



The Department and Emory University celebrated Laura Fox Goharioon's 25 years of dedicated service. We also celebrated the awarding of Laura her doctoral degree in Cell Biology for stellar research contributions. Congratulations and thank you, Laura.

Life in the Department

Our Department 2010



Cell Biology News Editorial Board

Faculty

Alexa Mattheyses
Maureen Wirschell
David Katz
Andrew Kowalczyk
Victor Faundez

Graduate Students

Ben Nanes
Pearl Ryder
Rasagnya Viswanadha

Contact Us

vfaunde@emory.edu

Contributors

Linda Jordan
Dorothy Brown