UNIVERSITY of ROCHESTER

THE DEPARTMENT OF BIOLOGY NEWSLETTER

OPEN READING FRAME

In This Issue

Congratulations Class of 2013

"Biology was the glamour science of the second half of the twentieth century, just as physics was the glamour science of the first half. What is glamour science? It is one that captures the public interest and serves it well. No other science has contributed as much to our understanding of ourselves (evolution and development), our relationship to our planet (ecology), or offers more promise for improving the quality of human life in the twenty-first century (genetics, molecular medicine, genetic engineering)."

- Martin A. Gorovsky, Rush Rhees Professor Emeritus

Editors: Marianne Arcoraci, Cheeptip Benyajati, Xin Bi, Brenna Holik
Available Online at: www.rochester.edu/College/BIO/newsletter.html

Message from the Chair

Dear Students, Families, Alumni, Friends and Colleagues,

From the entire Department of Biology at the University of Rochester, congratulations to the graduating Class of 2013!!! It is our distinct pleasure to share the feelings of joy, pride and accomplishment that accompany such a milestone. We also acknowledge the hard work, determination and effort that were required to reach this day. We also wish each of you continued realization of your goals, dreams and potential. We hope that you will continue to keep us informed as you continue to the next phase of your lives and that you remember that you will always be a member of our Departmental community.

This year we have 204 students graduating with degrees in areas that are covered under the umbrella of the Undergraduate Program in Biology and Medicine. These include majors earning a B.A. in Biology, or a B.S. in Molecular Genetics, Cellular and Developmental Biology, Ecology and Evolutionary Biology, Microbiology, Neuroscience or Biochemistry. Our majors continue to be very popular and strong. Details regarding Department of Biology research, faculty and courses can be found at the Departmental webpage (http://www.rochester.edu/College/BIO/index.php). The strength of the Department of Biology is exemplified by the strength of our undergraduates. The graduating class of 2013 is no exception.

Remarkably, also 50% of all UPBM majors performed independent research. This very high percentage illustrates the commitment of both students and faculty to research and the importance of this discipline to understanding current Biology. We, as a department, are particularly pleased and gratified that we can offer our students the opportunity to experience research firsthand in world-class laboratories. It is not only a wonderful experience for our undergraduates but also for our talented graduate students, who often mentor their junior colleagues, and for the faculty members. Working one on one with undergraduates is one of the most satisfying experiences in academia. We are committed to maintaining such individual attention and opportunities as part of the Rochester experience.

Congratulations to Dr. Rich Glor, who in the summer of 2012, was promoted to Associate Professor with tenure. Our joy at Rich's attaining this position, is now overshadowed by our sadness that he will be leaving us to take a position at University of Kansas as Associate Professor in the Department of Ecology and Evolutionary Biology, and Associate Curator in the Herpetology Division of the KU Biodiversity Institute. This is the type of job (or more exactly THE job) that Rich has dreamed of since he was a teenager. We hope that Rich will stay in touch and remain part of our Departmental culture and family. The Department is also pleased to announce that Dr. Vera Gorbunova was promoted to Full Professor in 2012. Vera continues to be a strong and important member of our Department and we are excited and pleased that she has achieved this level of recognition.

I would remind the Class of 2013 that transitions can be exciting, difficult and demanding. Make sure you take time to reflect, to enjoy and to rejoice in all of your accomplishments and growth. Also, make sure that you keep in touch as you will be missed.

Best wishes,

Gloria Culver

Dr. Gloria Culver
Professor and Department Chair

Biology Department Diploma Ceremony 2013

One Hundred and Six Biology Department Majors Graduate on Sunday May 19th, 2013

The Department of Biology will be holding the 2013 Diploma Ceremony on Sunday, May 19th, 2013 at 1:30 p.m. in the Palestra at the Goergen Athletic Center. Approximately 82 students will be participating in this year's event.

The Biology Department's senior class is made up of 106 students including those who are participating in U of R's Take-5 and various fifth-year programs. These students have chosen to major in one of the following biological science tracks: Bachelor of Arts in Biology (BA BIO), Bachelor of Science in Cell and Developmental Biology (BS BCD), Bachelor of Science in Ecology and Evolutionary Biology (BS BEB), and Bachelor of Science in Molecular Genetics (BS BMG). This year's senior class consists of 65 women and 41 men. Fifteen students have earned double majors.

Dr. Gloria Culver, Professor of Biology and Department Chair, will begin the festivities by welcoming graduates and guests.

This year's faculty speaker is Dr. Elaine Sia.

The Biology Department class of 2013 will be represented by two student speakers, Hilary Dietz (BMG) and Jared Hilton (BCD). The class speakers are chosen by department faculty for excellence in academics, research, and for service to the department. Hilary Dietz will be introduced by Dr. Danielle Presgraves and Jared Hilton will be introduced by Dr. Michael Welte.

Dr. Cheeptip Benyajati, the Director of the Undergraduate Program in Biology and Medicine, will present: The Ayman Amin-Salem Memorial Prize, The Janet Howell Clark Prize, The Donald R. Charles Memorial Prize, and the students who have earned Degrees with Distinction in Research. Dr. Benyajati will also dedicate a special tribute to the seniors who served as teaching assistants and workshop leaders in Biology Department courses.

The Ayman Amin-Salem Memorial Prize is a college-wide award that was named after an alumus from the class of '87 who died in a car accident. His family established this fund in his memory. The prize is intended for a member of the senior class who best evidences the qualities of good character and good citizenship, such as decency, reliability, responsibility, and congeniality. The recipients of this year's Ayman Amin-Salem Memorial Prize is Jared Hilton (BCD), Yoel Kim (BMB), and Roshal Patel (BIO/HLP).

The Janet Howell Clark Prize is a college-wide award that is given to a woman in the senior class who has shown the greatest promise in creative work in Physics, Chemistry, Biology, or Astronomy and who has shown outstanding versatility in the mastery of allied fields. The recipient of this year's Janet Howell Clark Prize is Jyothi Purushotham (BMG).

The Donald R. Charles Memorial Prize is given annually by the Biology Department to students who show great potential, have exhibited excellence in science, and outstanding service to the Biology Department. The recipients for 2013 are: Leyla Akhverdiyeva (BMG/RUS), Jayson Baman (BMG), Katie Bredbenner (BMG/PHL), Christina Champagne (BIO), Benjamin Desch (BEB), Hilary Dietz (BMG), Jared Hilton (BCD), Matthew Erby (BMG), Mark Okimoto (BMG), Justin Roncaioli (BMG), and Andrea Stewart (BIO/PSY).

A Degree with Distinction in Research is an honor that recognizes a student for their outstanding accomplishments in scientific investigation. Students who apply for candidacy have developed a novel body of work to compose and successfully defend a senior thesis. Biology Department graduates who have earned honors in research are: Jayson Baman (BMG), Benjamin Desch (BEB), Emily Kraus (BEB), Olivia Morgan (BEB, SA), Dylan Sacks (BMG), and Michael Wallis (BEB). For more details about the Degree with Distinction in Research see page 6.

The ceremony will culminate in the awarding of diplomas. Personalized messages written by graduates will be announced as they walk across the stage to receive their diplomas. Dr. Cheeptip Benyajati will present the diplomas for the Bachelor of Arts in Biology, the Bachelor of Science in Cell and Developmental Biology, and Molecular Genetics. Dr. James Fry will present the diplomas for the Bachelor of Science in Ecology and Evolutionary Biology.

A reception will be held immediately following the ceremony in the Field House located in the Goergen Athletic Center.

The Undergraduate Program in Biology and Medicine (UPBM)

About the UPBM and the Bigger Picture

The Biology Department together with Departments of Biochemistry, Microbiology, and Neuroscience produce the framework of the Undergraduate Program in Biology and Medicine also known as UPBM. All together there are approximately 204 UPBM majors participating in graduation this year (117 women and 87 men).

The Undergraduate Program in Biology and Medicine combines the College of Arts and Sciences and the School of Medicine and Dentistry to provide courses for undergraduate students with lectures, laboratory work, specialty seminars and research experiences. The Program provides academic year opportunities to do independent research for credit as well as DeKiewiet Summer Fellowships which support summer research by outstanding University of Rochester undergraduate students.

The Program is made possible by the close proximity of the Medical Center and the River Campus and by the enthusiasm of the faculty for cooperative teaching aimed at providing the most up-to-date education in biomedical science.

Undergraduate Program in Biology and Medicine (UPBM)

Class of 2013 List of Graduating Seniors

Bachelor of Arts Biology (BA BIO):

Christopher Ahn	Christina Champagne	Amanda Holloway	Elyssa Sham
Junaid Akhter	Danielle Chiz	Amit Jhaveri	Andrea Stewart
Adil Asgher	Samantha Crandall	Khyrie Jones	Laura Strojny
Maia Ashman	Benjamin Craxton	Benjamin Kellman	Kriti Thapa
Molly Austen	Nicole Dibenedetti	Sonia Mandal	Christine Trahms
Ekaterina Babko-Malaya	Lauren Fischer	Jovany Martinez	Cole Valko
Kathleen Black	Alexandra Glover	Billal Masood	Yue Yu
Stephanie Bolin	Kathryn Haapala	Kelly Ostrander	Ansa Zahid
Nikita Bourque	Christina Harmon ΦBK	Roshal Patel	Jianxin Zeng
Mehreen Butt	Julie Henderson	Mary Pilarz	

Bachelor of Science Biochemistry (BS BBC):

Emily Adams	Kevin Huie	Morgan Preziosi ⚿⚿	Raizada Vaid
Frank Chang	Monica Jung	Miranda Russo	Jaclyn Walker ΦBK
Daniel Cho	Kateryna Kolesnikova	Naohito Sadoshima	Christopher Wright
Philip Cistrone ΦBK ⚿⚿	Bridget Lang	Kaci Schiavone ⚿⚿	Jonathan Yang
Terrance Dolan	Charles Lee	Margaret Schoeniger ΦBK	
Joshua Geiger	Nicholas Lewandowski	Bradley Tun	
Sarah Han	Mark Lipstein	Kevin Uherek	

Bachelor of Science Cell and Developmental Biology (BS BCD):

Sanah Ali	Jared Hilton	Amer Musleh	Matthew Taddei
Birx Allen	Ian Jacobs	Thanh Ngo	Emily Yan
Lennart Brown	Yelena Kernogitski	Hailey Pikna	Wai Ye
Enoch Chan	Lauren Montemorano	Diana Pratt ΦBK	
Kassandra Doyle	Kelly Mulrey	Deanna Roggie	

Degree with Distinction in Research ★★
Phi Beta Kappa ΦBK

Continued...

Bachelor of Science Ecology and Evolutionary Biology (BS BEB):

Kathryn Armstrong
Brendan Dempsey
Benjamin Desch ΦBK ★★
Emily Dunn
Madelyn Eberle
Kindred Harris
Jerome Hoke
Michael Klobucher
Emily Kraus ★★
Allison Manly
Colleen Mchale
Anthony Momb
Olivia Morgan ★★
Elza Picasso-Hobin
Michael Wallis ★★
Narayan Wong
Shengyuan Yang
Rachael Ziembroski

Bachelor of Science Microbiology (BS BMB):

Jason Audlin
Adam Bossert
Jeffrey Bulger ★★
Yujing Dai
John Emery
Yelstin Fernandes
Ariana Garcia
Hillary Goldman
Sierrah Grigsby
Trissha Higa
Judy Chun Hu
Song Hyun Hur
Sarah Hussein
Yoel Kim ΦBK
Alexander Manzella
David Mertz
Michael Nevid
Alexandra Peck
Jessamyn Perlmutter
Umayal Sivagnanalingam
Urmila Sivagnanalingam
Andrew Smith
Nicole Staie
Alexander Sundermann
Aoi Wakabayashi
Shouling Zhang ΦBK

Bachelor of Science Molecular Genetics (BS BMG):

Leyla Akhverdiyeva
Fernando Anazco
Jayson Baman ★★
Katie Bredbenner ΦBK
Martin Chang
Ariel Chez
John Dawson ΦBK
Meghan Demirer
Hilary Dietz ΦBK
Eric Dong
Louisa Durkin
Matthew Erby
Leah Friess
Sharon Garrison
Shelby Hall ΦBK
Henry Kwan
Nuphar Lendner
Timothy Morello
Laura Mueller
Mark Okimoto
Ji Hun Park
Jyothi Purushotham ΦBK
Robert Rigobello
Justin Roncaioli ΦBK
Dylan Sacks ★★
Ulascan Sarica ΦBK
Meghan Sullivan
Yanling Tang
Stefanie Thorsness
David Toomey
Simeng Wang ΦBK

Bachelor of Science Neuroscience (BS BNS):

Allyssa Abel ΦBK ★★
Laura Ackerman ★★
Cole Allen
Mark Angland
Bradley Ashcroft
Mary Bachmann
Kory Buresh
Albert Chen
Jasmin Cobb
Nicholas Cuvelier
Danielle Davis
Richard Deane
Donias Doko
Haley Dupree
Benjamin Farmer
Paul Gilroy
Samantha Hayes
Sukriye Kara
Jessica Kim
Thomas Krasner
Mallory Laboulaye
Fangzhou Li
Paneeni Lohana
Beatrice Maidman
Hillary Mcmullin
Eric Miller
Taryn Mockus
Madhura Navada
Jessica Newton
Katherine Obudzinski
Alejandra Perez
Emily Rodenbush
Eloise Rogers
Alyssa Ruffner
Ellie Sacks
Casey Schroeder
Abigail Sefton
Michael Shteyn
Karla Sordia Lozano
Sara Spielman
Stefan Sumsky
Dylan Thiel
Rushabh Thosani
Harrison Tietze
Neal Vohora
Alaina Wayland ΦBK ★★

Degree with Distinction in Research ★★
Phi Beta Kappa ΦBK

Thirteen Graduates Earned Degrees with Distinction in Research

The Undergraduate Program in Biology and Medicine (UPBM) provides majors in the B.S. or B.A. tracks the opportunity to graduate with distinction in research. Students must achieve a minimum GPA of 2.7 and defend their written thesis at a meeting of their advisory committee. Most students seeking a degree with distinction have worked on a research project for a year or more and have achieved significant results. They then immerse themselves in the time-consuming process of writing the thesis. Those who successfully complete their research and then push on to write the required paper are rewarded with the phrase “Distinction in Research” added to their transcripts. The thirteen members of the class of 2013 who have earned the honor of “Distinction in Research” are:

Allyssa Abel BNS
Dissertation: "Adaptive Stress Regulation of Carbonic Anhydrase 6 in Mouse Neuronal Cell Culture Models"
Mentor: Dr. Keith Nehrke

Laura Ackerman BNS
Dissertation: "Regional Changes in Cortical Thickness Predict Performance in Multiple Domains of Numerical Cognition in the Developing Brain"
Mentor: Dr. Jessica Cantlon

Jayson Baman BMG
Dissertation: "An Analysis of Two RNA Secondary Structures in Influenza A"
Mentor: Dr. Douglas Turner

Jeffrey Bulger BMB
Dissertation: "Identifying Structure Activity Relationship Trends among RnpA Inhibitors and Optimizing a Novel Screening Method to Identify Anti-Biofilm Agents"
Mentor: Dr. Paul Dunman

Philip Cistrone BBC
Dissertation: "Analysis of Restricted Alphabet Mutagenesis Schemes for P450 Functional Diversification"
Mentor: Dr. Rudi Fasan

Benjamin Desch BEB
Dissertation: “The Phylogeography and Population Structure of the *Anolis chlorocyanus* Species Group”
Mentor: Dr. Richard Glor

Emily Kraus BEB
Dissertation: "Characterization of Magnetotactic Bacteria From a Western New York Freshwater Kettle Pond"
Mentor: Dr. John Tarduno

Olivia Morgan BEB, SA
Dissertation: "Origins and Subspecific Taxonomy of North American *Achillea* Based on Analyses of Leaf Morphology and Ploidy Level"
Mentor: Dr. Justin Ramsey

Morgan Preziosi BBC, PSY
Dissertation: "ERBB3 is Important for Melanoma Metastasis"
Mentor: Dr. Lei Xu

Dylan Sacks BMG
Dissertation: "Sex and Species Specific Wing Size at the ws2 Locus in *Nasonia vitripennis* and *girault*i"
Mentor: Dr. Jack Werren

Kaci Schiavone BBC
Dissertation: "Role of Bloom Helicase in the Maintenance of Genome Stability by Resolving Blocked Intermediates of Lagging Strand DNA Replication"
Mentor: Dr. Robert Bambara

Michael Wallis BEB
Dissertation: "Inference of Stand Age and Historic Disturbance in Urban Old Growth Forests"
Mentor: Dr. Justin Ramsey

Alaina Wayland BNS
Dissertation: "Characterization of Neuronal Lipid Droplets and Implications for Metabolic Signaling in the CNS"
Mentor: Dr. Marc Halterman

Independent Research

Graduates Pushing the Boundaries of Knowledge

In addition to being an outstanding undergraduate institution, the University of Rochester is also a major research university. One of the Rochester Advantages is the opportunity for undergraduates to gain hands-on experience doing modern biological research. Research opportunities are made possible by the enthusiasm of faculty for cooperative learning. A student's opportunity to do research is limited only by their talent and persistence to find faculty to sponsor research projects within their area of interest.

One way students may gain research experience is through registering for Independent Research (395) Courses. Several members of the 2013 Undergraduate Program in Biology and Medicine graduating class have done one or more semesters of Independent Research for credit. The following is a list of seniors and faculty sponsors who have taken one or more semesters of independent research courses:

Allyssa Abel BNS (2)
Faculty Sponsor: Dr. Keith Nehrke
Nephrology

Laura Ackerman BNS (2)
Faculty Sponsor: Dr. Jessica Cantlon
Brain and Cognitive Science

Emily Adams BBC (2)
Faculty Sponsor: Dr. Elizabeth Grayhack
Biochemistry and Biophysics

Leyla Akhverdiyeva BMG / RUS (2)
Faculty Sponsor: Dr. Andrei Seluanov
Biology

Sanah Ali BCD (2)
Faculty Sponsor: Dr. Michael Becker
Hematology and Oncology

Jason Audlin BMB
Faculty Sponsor: Dr. Stephen Dewhurst
Microbiology and Immunology

Molly Austen BIO / HBS (2)
Faculty Sponsor: Dr. Keith Nehrke
Nephrology

Jayson Baman BMG (2)
Faculty Sponsor: Dr. Douglas Turner
Chemistry

Hannah Bazarian BCS
Faculty Sponsor: Dr. Marc Halterman
Neurology

Adam Bossert BMB
Faculty Sponsor: Dr. Carrie Dykes
Pediatric Infectious Disease

Katie Bredbenner BMG / PHL (2)
Faculty Sponsor: Dr. Vera Gorbunova
Biology

Jeffrey Bulger BMB (2)
Faculty Sponsor: Dr. Paul Dunman
Microbiology and Immunology

Enoch Chan BCD (2)
Faculty Sponsor: Dr. Stephen Dewhurst /
Dr. Archibald Perkins & Dr. Yi Zhang
Pathology / Microbiology and Immunology

Martin Chang BMG
Faculty Sponsor: Dr. Heinrich Jasper
Biology

Ariel Chez BMG / IRL (2)
Faculty Sponsor: Dr. Andrew Samuelson
Biomedical Genetics

Daniel Cho BBC / ECO (2)
Faculty Sponsor: Dr. David Mathews
Biochemistry and Biophysics

Philip Cistrone BBC (2)
Faculty Sponsor: Dr. Rudi Fasan
Chemistry

Benjamin Craxton BIO / GER (2)
Faculty Sponsor: Dr. Lianping Xing
Pathology and Laboratory Medicine

Danielle Davis BNS
Faculty Sponsor: Dr. Steven Goldman /
Dr. Romane Auvergne
Translational Neuromedicine

Continued...

John Dawson BMG (2)
Faculty Sponsor: Dr. Andrew Samuelson
Biomedical Genetics

Brendan Dempsey BEB
Faculty Sponsor: Dr. Jacques Robert
Microbiology and Immunology

Benjamin Desch BEB
Faculty Sponsor: Dr. Richard Glor
Biology

Terrance Dolan BBC / PSY
Faculty Sponsor: Dr. Patricia Hinkle
Pharmacology and Physiology

Eric Dong BMG (2)
Faculty Sponsor: Dr. Andrew Samuelson / Dr. Charles Lowenstein
Biomedical Genetics

Emily Dunn BEB
Faculty Sponsor: Dr. Robert Minckley
Biology

Yelstin Fernandes BMB
Faculty Sponsor: Dr. Michael Welte
Biology

Ariana Garcia BMB (2)
Faculty Sponsor: Dr. Robert Quivey
Center for Oral Biology

Joshua Geiger BBC / CHM (2)
Faculty Sponsor: Dr. Dirk Bohmann
Biomedical Genetics

Sierrah Grigsby BMB
Faculty Sponsor: Dr. Jacques Robert
Microbiology and Immunology

Shelby Hall BMG (2)
Faculty Sponsor: Dr. Andrea Seluanov
Biology

Sarah Han BBC (2)
Faculty Sponsor: Dr. Baek Kim
Microbiology and Immunology

Kindred Harris BEB
Faculty Sponsor: Dr. Elena Bulgac-Rustchenko / Dr. Jeffrey Hayes
Biochemistry and Biophysics

Stephanie Hayes BNS
Faculty Sponsor: Dr. James Palis
Pediatric Biomedical Research

Trissha Higa BMB
Faculty Sponsor: Dr. James Miller
Microbiology and Immunology

Jared Hilton BCD (2)
Faculty Sponsor: Dr. Vera Gorbunova / Dr. Richard Glor
Biology

Anh Thi Hoang SP (2)
Faculty Sponsor: Dr. Mundeep Kainth
Pediatrics

Judy Chun Hu BMB
Faculty Sponsor: Dr. Jennifer Hunter
Opthamology

Kevin Huie BBC (3)
Faculty Sponsor: Dr. Yi-Tao Yu
Biochemistry and Biophysics

Song Hyun Hur BMB (2)
Faculty Sponsor: Dr. Baek Kim
Microbiology and Immunology

Ian Jacobs BCD / PSY (2)
Faculty Sponsor: Dr. Jianwen Que
Biomedical Genetics

Amit Jhaveri BIO / RLS
Faculty Sponsor: Dr. Jack Werren
Biology

Monica Jung BBC
Faculty Sponsor: Dr. Eric Phizicky
Biochemistry and Biophysics

Benjamin Kellman BIO / BCS
Faculty Sponsor: Dr. Mark Noble
Biomedical Genetics

Jessica Kim BNS (3)
Faculty Sponsor: Dr. Jason Huang / Dr. Richard Libby / Dr. Kevin Walter
Neurosurgery / Opthamology / Neurosurgery

Yoel Kim BMB (2)
Faculty Sponsor: Dr. Stephen Dewhurst
Microbiology and Immunology

Continued...

Kateryna Kolesnikova BBC / SP (2)
Faculty Sponsor: Dr. Archibald Perkins
Pathalogy

Mallory Laboulaye BNS (2)
Faculty Sponsor: Dr Michael Welte /
Dr. Edward Brown
Biology / Biomedical Engineering

Bridget Lang BBC (2)
Faculty Sponsor: Dr. Gregory Tall / Dr. Mark
Dumont
Pharmacology and Physiology

Charles Lee BBC (2)
Faculty Sponsor: Dr. Alan Smrcka
Pharmacology and Physiology

Nicholas Lewandowski BBC (3)
Faculty Sponsor: Dr. Mark Dumont
Biochemistry and Biophysics

Mark Lipstein BBC (2)
Faculty Sponsor: Dr. Xin Bi
Biology

Allison Manly BEB
Faculty Sponsor: Dr. Eric Phizicky
Biochemistry and Biophysics

Alexander Manzella BMB
Faculty Sponsor: Dr. J Scott Butler
Microbiology

Brandon McDonald HBS
Faculty Sponsor: Dr. Stephen Dewhurst
Microbiology and Immunology

David Mertz BMB
Faculty Sponsor: Dr. Paul Dunman
Microbiology and Immunology

Eric Miller BNS (3)
Faculty Sponsor: Dr. Paul Kammermeier
Pharmacology and Physiology

Taryn Mockus BNS
Faculty Sponsor: Dr. Harris Gelbard
Neurology

Timothy Morello BMG (2)
Faculty Sponsor: Dr. Andrei Seluanov
Biology

Olivia Morgan BEB / SA
Faculty Sponsor: Dr. Justin Ramsey
Biology

Michael Nevid BMB (2)
Faculty Sponsor: Dr. Alan Friedman
Environmental Medicine

Thanh Ngo BCD / PSY (2)
Faculty Sponsor: Dr. Vera Gorbunova / Dr. Michael
Elliott
Biology / Microbiology and Immunology

Roshal Patel BIO / HLP
Faculty Sponsor: Dr. Patricia White
Neurobiology and Anatomy

Alexandra Peck BMB / PSY (3)
Faculty Sponsor: Dr. Mundeep Kainth (2) /
Dr. Carrie Dykes (1)
Pediatric Infectious Disease

Morgan Preziosi BBC / PSY
Faculty Sponsor: Dr. Lei Xu
Biomedical Genetics

Jyothi Purushotham BMG
Faculty Sponsor: Dr. Craig Jordan
Medicine, Hematology/Oncology

Danielle Rivera Doi HBS
Faculty Sponsor: Dr. John Jaenike
Biology

Justin Roncaioli BMG (3)
Faculty Sponsor: Dr. Daven Presgraves
Biology

Miranda Russo BBC (2)
Faculty Sponsor: Dr. Archibald Perkins
Pathology

Dylan Sacks BMG (2)
Faculty Sponsor: Dr. Jack Werren
Biology

Naohito Sadoshima BBC
Faculty Sponsor: Dr. David Goldfarb
Biology

Sandeep Sandhu HLP
Faculty Sponsor: Dr. John Jaenike
Biology

Continued...

Ulascan Sarica BMG / PHY (2)
Faculty Sponsor: Dr. Douglas H. Turner
Chemistry

Kaci Schiavone BBC (3)
Faculty Sponsor: Dr. Robert Bambara
Biochemistry and Biophysics

Margaret Schoeniger BBC (2)
Faculty Sponsor: Dr. Dmitri Ermolenko
Biochemistry and Biophysics

Elyssa Sham BIO / PSY
Faculty Sponsor: Dr. Tristram Smith
Neurodevelopment & Behavioral Pediatrics

Umayal Sivagnanalingam BMB (2)
Faculty Sponsor: Dr. Craig Jordan
Hematology Oncology

Urmila Sivagnanalingam BMB
Faculty Sponsor: Dr. Craig Mullen
Pediatrics

Andrew Smith BMB
Faculty Sponsor: Dr. Paul Dunman
Microbiology and Immunology

Nicole Staie BMB
Faculty Sponsor: Dr. Robert Quivey
Center for Oral Biology

Meghan Sullivan BMG (2)
Faculty Sponsor: Dr. Andrew Samuelson
Medical Center faculty

Alexander Sundermann BMB (2)
Faculty Sponsor: Dr. Constantine Haidaris
Microbiology and Immunology

Dylan Thiel BNS
Faculty Sponsor: Dr. Mark Noble
Biomedical Genetics

David Toomey BMG (2)
Faculty Sponsor: Dr. Alan Grossfield /
Dr. Elaine Sia
Biochemistry and Biophysics / Biology

Christine Trahms BIO / SP
Faculty Sponsor: Dr. David Goldfarb
Biology

Bradley Tun BBC (2)
Faculty Sponsor: Dr. Harold Smith
Biochemistry and Biophysics

Raizada Vaid BBC (2)
Faculty Sponsor: Dr. Elizabeth Grayhack
Biochemistry and Biophysics

Jaclyn Walker BBC (2)
Faculty Sponsor: Dr. Josh Munger
Biochemistry and Biophysics

Michael Wallis BEB (2)
Faculty Sponsor: Dr. Justin Ramsey
Biology

Simeng Wang BMG / ECO (3)
Faculty Sponsor: Dr. Helene McMurray (2) /
Dr. Nina Schor (1)
Biomedical Genetics

Alaina Wayland BNS (3)
Faculty Sponsor: Dr. Marc Halterman
Neural Development and Disease

Narayan Wong BEB
Faculty Sponsor: Dr. John Jaenike
Biology

Christopher Wright BBC (2)
Faculty Sponsor: Dr. Alison Frontier
Chemistry

Emily Yan BCD / PSY (2)
Faculty Sponsors: Dr. Andrei Seluanov /
Dr. Chawnshang Chang
Biology / Pathology

Jonathan Yang BBC
Faculty Sponsor: Dr. Gail V.W. Johnson
Anesthesiology

Wai Ye BCD
Faculty Sponsor: Dr. David Goldfarb
Biology

Shouling Zhang BMB / PSY (2)
Faculty Sponsor: Dr. Mary Caserta
Pediatric Infectious Diseases

De Kiewiet Summer Research Fellowship

Summer of 2012

The Undergraduate Program in Biology and Medicine (UPBM) has been awarding de Kiewiet Summer Research Fellowships since 1983 to UR students majoring in UPBM tracks. The fellowship is designed to give University of Rochester students an opportunity to obtain substantial research experience in the laboratories of Program Faculty. Students in their junior year are invited to submit competitive applications. The Class of 2013 graduates who participated in the deKiewiet fellowship are:

Philip Cistrone BBC, '13
Title: "Analysis of Restricted Alphabet Mutagenesis Schemes for P450 Functional Diversification"
Faculty Sponsor: Dr. Rudi Fasan, Chemistry

Benjamin Desch BEB, '13
Title: "Testing Predictions of Sensory Drive Using Phylogenetic and Population Structure Analyses in Populations of *Anolis cristatellus*"
Faculty Sponsor: Dr. Rich Glor, Biology

Joshua Geiger BBC, '13
Title: "Determination of the Putative Epigenetic Control of Aging Using DNase I Hypersensitivity"
Faculty Sponsor: Dr. Dirk Bohmann, Biomedical Genetics

Bridget Lang BBC, '13
Title: "Coupling the Human Beta-2 Adrenergic Receptor to the Pheromone Response Pathway in Yeast"
Faculty Sponsor: Dr. Mark Dumont, Biochemistry and Biophysics

Bradley Tun BBC, '13
Title: "Analysis of Complexes Formed by APOBEC3G with ssDNA and RNA"
Faculty Sponsor: Dr. Harold Smith, Biochemistry and Biophysics

Simeng Wang BMG, ECO '13
Title: "Genomic-Based Anti-Cancer Drug Discovery"
Faculty Sponsor: Dr. Helene McMurray, Biomedical Genetics

Certificate Program in Biotechnology

2013 Recipients

The Certificate Program in Biotechnology is designed to give students the background needed for entry into biotechnology and for advanced study, and it gives recognition for specialization in the field. The graduates who have met the requirements for the Biotechnology Certificate are:

- Adam Bossert BMB
- Yelstin Fernandes BMB
- Trissha Higa BMB
- Alexander Manzella BMB
- Abigail Sefton BNS

Accomplishments

Honors, Awards, Scholarships, and Recognitions

Ayman Amin-Salem Memorial Award

The Ayman Amin-Salim Memorial is a college-wide award which is to be presented each year at Commencement to that member of the senior class who best evidences the quality of good character and good citizenship, such as decency, reliability, responsibility, and congeniality. Preference may be given to students who also have an interest in biology or the biological sciences, music, art, writing, or athletics.

- Jared Hilton BCD, '13
- Yoel Kim BMB, '13
- Roshal Patel BIO, '13

Continued...

Fullbright U.S. Student Program

The Fulbright Scholarship competition is sponsored by the U.S. Department of State and designed to promote mutual understanding and peace between the United States and other nations through educational and cultural exchange. It offers opportunities for career-launching study, teaching, and research abroad. Scholars pursuing study or research design their own programs and arrange institutional affiliations in the host countries. This year's recipient is:

- Jyothi Purushotham BMG, '13- India

Garnish Scholar-Athlete Awards

The Garnish Program was created in honor of Lysle "Spike" Garnish, coach and mentor to many Rochester student-athletes from 1930 to 1948. He was a trainer and assistant basketball coach in 1931. Garnish was named an assistant baseball coach in 1932, and served as assistant football coach from 1945 to 1948.

- Adam Bossert BMB '13: As a junior, Bossert was selected as the Liberty League men's swimmer of the year, helping the Yellowjackets win the team championship. He has two top-10 times. He was named to the Liberty League and UAA All-Academic Teams. Rochester was ranked in the Division III National Poll last season.
- Shelby Hall BMG '13: Hall has been a key contributor for the University's field hockey team. Last season, the Yellowjackets tied a single-season record for victories. This year, the team is ranked 18th nationally. She is been named to the Liberty League All-Academic team and been chosen to the NFHCA Scholar-Athlete team.
- Bridget Lang BBC '13: Lang helped Rochester Women's Soccer secure NCAA playoff bids in 2009 and 2010. She has earned All-UAA honors as well as UAA All-Academic honors in each of the last two seasons. Rochester was nationally ranked in her sophomore and junior years.
- Jackie Walker BBC '13: Walker has helped Rochester to a high national ranking in each of her four seasons and contributed to Yellowjacket teams that earned two NCAA Division III Women's Basketball playoff bids. She earned UAA All-Academic honors as a sophomore and a junior and was named All-UAA in her junior year.

German Academic Exchange Service Research Internships in Science & Engineering (DAAD-RISE)

RISE is a summer internship program for undergraduate students from the United States, Canada and the UK in the fields of biology, chemistry, physics, earth sciences and engineering. It offers unique opportunities for undergraduate students to work with research groups at universities and top research institutions across Germany for a period of 2 to 3 months during the summer.

- Katie Bredbenner BMG/PHL, '13 - Goettingen Summer 2012
- Justin Roncaioli BMG, '13 - Declined Summer 2012
- Kristin Abramo BMG '15 - Goettingen
- Kevin Allan BNS, '14 - Langen
- Alexandra Morn BMB/CHM, '15 - Dresden-Rossendorf
- Louis Papa BBC/CHM, '14 - Jena
- Robert Rietmeijer BBC, '15 - Tübingen
- Jamie Strampe BMB, '15 - Ulm

Benjamin A. Gilman International Scholarship

The scholarship, which provides financial assistance to students who are enrolled in study abroad programs worldwide, is sponsored by the U.S. Department of State, Bureau of Educational and Cultural Affairs, and the Institute of International Education. "Rochester students have studied in 26 different countries through the scholarship," said Jacqueline Levine, director of Rochester's Center for Study Abroad and Interdepartmental Programs. This year's recipients are:

- Donias Doko '13/T5, BNS / HIS - United Kingdom Spring 12
- Kindred Harris '13/T5, BEB - United Kingdom Fall 11
- Yelena Kernogitski '13/T5, BCD/REL - St. Petersburg, Russia Fall 12

Continued...

Kauffman Entrepreneurial Year (KEY) Program

The University of Rochester defines entrepreneurship as "transforming an idea into an enterprise that generates value," implying that the enterprise outlives the creator and that it positively affects others. Qualified students may propose to devote as much as an entire academic year to internships, special projects, business plan development, research into various facets of entrepreneurship, or analysis of how culture and public policy influence entrepreneurial activity. Students may apply from the time that they have been accepted into a major through the first semester of their senior year. This year's recipients are:

- Leyla Akhverdiyeva BMG/RUS, '13
- Stefanie Thorsness BMG, '13

National Conference on Undergraduate Research (NCUR)

NCUR is an annual conference (the only one if its kind, with a national scope) for primary research and artistic performance by undergraduate students, encompassing the natural and social sciences, the humanities, the arts, and engineering. Since its beginnings the conference has enjoyed the active support of major American colleges and universities. The UR Office of Undergraduate Research began sending students to NCUR in 1991. Student investigators may present their work at NCUR as an oral presentation or in a poster format. NCUR participants are also eligible to submit texts of their presentations to be considered for publication in the annual NCUR Proceedings, a juried publication. Undergraduate UPBM majors who participated:

- Shay Behrens BIO, '14
- Kindred Harris BEB, '13
- Alisa Johnson BIO, '14
- Ugochi Ndubuisi BMB, '14
- Louis Papa BBC/CHM, '14
- Siddhi Shah BIO, '14
- Shilpa Topudurti BMG, '14
- Harris Weber BCD, '15

Paul and Daisy Soros Fellowship for New Americans 2013 Fellow

Paul and Daisy Soros, Hungarian immigrants and American philanthropists, established their fellowship program for New Americans in December 1997 with a charitable trust of fifty million dollars. Their reasons for doing so were several. They wished to "give back" to the country that had afforded them and their children such great opportunities and felt a fellowship program was an appropriate vehicle. They also felt that assisting young New Americans at critical points in their educations was an unmet need. Finally, they wished to call attention of all Americans to the extensive and diverse contributions of New Americans to the quality of life in this country. This year's recipient is:

- Shouling Zhang BMB/PSY, '13

Student Life Awards / Individual Leadership 2013

The annual University Student Life Awards recognize those undergraduate students who—through service to others, investment of talent and time, and pursuit of excellence—have significantly and positively impacted the University of Rochester and/or surrounding community. This year's recipients are:

- Allyssa Abel, BNS '13 - Presidential Award for Community Service
- Korey Buresh, BNS '13 - Seth H. & Harriet S. Terry Prize

UR Undergraduate Research Exposition - April 16th, 2013

The Undergraduate Research Exposition is a College-wide event in which UR students at all levels and in all areas of study are invited to present their investigative and creative work. The Expo reflects the passion for learning that enlivens the University, professors and students alike, and that finds expression in varied forms, in every area of study UPBM majors selected to participate in the 2013 Exposition were:

- Laura Ackerman BNS, '13
- Kevin Allan BNS, '14
- Shay Behrens BIO, '14
- Kathleen Black BIO/MUS, '13
- Boris Borovcanin BEB, '14
- Grace Cannon BCS/LIN, '13
- Hamza Chengazi BNS, '14
- Ariel Chez BMG/IRL, '13
- Brendan Dempsey BEB, '13
- Benjamin Desch BEB, '13
- Alisa Johnson BIO, '14
- Taryn Mockus BNS, '13
- Annah Moore BNS/CHM, '15
- Jiyoon (Junne) Park BCD/HLP, '15
- Lauren Petrilli BCS/PSY, '13
- Prishanya & Priyanka Pillai BMB/PH, '14 - Deans' Award
- Morgan Preziosi BBC/PSY, '13 - Professor's Choice Award
- Alfred Rabinovich BIO, '14
- Yanhan Ren BMG, '14
- Siddhi Shah BIO, '14
- Harris Weber BCD, '15

Continued...

UR Undergraduate Writing Colloquium Contest

The College Writing Program holds an annual undergraduate writing contest to recognize and celebrate outstanding student writing and to share that writing with the University of Rochester community. Each spring the College Writing Program accepts submissions from students in four categories: Humanities, Social sciences. Natural and applied sciences, WRT 105/E. Submissions are reviewed by graduate student writing consultants and faculty members from across the disciplines. Prizes are awarded for the best paper in each of the four categories.

- Philip Cistrone BBC, '13 - Honorable Mention

Simon Early Leaders Case Competition

Rochester, N.Y.—November 13, 2012—Forty-eight of the brightest young business minds in the country competed for thousands of dollars in prizes on November 2—3, 2012, during the *Early Leaders® Case Competition* at the Simon School of Business, University of Rochester. The *Early Leaders® Case Competition* brought together undergraduate students from 15 colleges and universities across the country to compete in a business case competition designed to simulate decisions faced by global business leaders. With more than 100 registrants applying, selection for this case competition was highly competitive this year. Teams competed for a total of $10,000 in prize money.

- First Place Team ($5,000): **Roshal Patel BIO/HLP '13, University of Rochester**; Amanda Carney, Hobart and William Smith Colleges; Francis Sirch, Ursinus College; Anh Nguyen, Colby Sawyer College; and Kyle Zaverton, Hobart and William Smith Colleges.

Dr. Nathaniel and Helen Wisch Endowed Scholarship

The Dr. Nathaniel and Helen Wisch Endowed Undergraduate Scholarship provides income that supports a promising junior or senior undergraduate student or students majoring in Biology at the University of Rochester. This year's recipients are:

- Katie Bredbenner BMG/PHL, '13
- Iris Chen BBC, '14
- Diana Pratt BCD, '13

NSF Awards Graduate Research Fellowships

The fellowship, which is part of a federally sponsored program, provides up to three years of graduate study support for students pursuing doctoral or research-based master's degrees. Since the program's inception in 1952, it has supported nearly 50,000 students conducting research in science, technology, engineering, mathematics, and selected social science disciplines. This year's recipients are:

- Maria Strangas BEB, '10
- Zachary Lynch BEB, '11
- Matthew Demars II BBC, '12 - Honorable Mention
- Jaclyn Lerea BBC, '11 - Honorable Mention
- David Reiner BNS, '10 - Honorable Mention

Continued...

What was your most memorable moment or most significant achievement at the U of R?

A fantastic learning experience working with Dr. Bi, taking his class on eukaryotic gene regulation, learning about the fascinating field of epigenetics. It spurred me on to working in his lab on an independent study project which has in addition given me hands-on, valuable experience in the field. --Mark Lipstein, BBC

The University of Rochester allowed me to pursue my passions by giving me the opportunity to study both public health and biology, become involved in research, teach students as a teaching assistant and contribute to the community through MERT. My family, friends and this university have all helped make me the person I am today and the lessons I have learned will follow me in the future to guide me to become a compassionate physician. Thank you for helping me achieve my dreams. --Christina Champagne, BIO

My most memorable moments at UR were taking Intro to Emerging Pathogens with Dr. Barth and working in the lab with Dr. Dykes. From these two, I gained experience with independent learning and met some of the most encouraging people. I learned so much and made connections with some great people! --Alexandra Peck, BMB

Some of my most memorable moments at the UR include my research experiences in pediatrics, the teaching opportunities I had as an undergraduate, and the instances where I could see connections between different scientific disciplines that had once seemed so distant. I also enjoyed the strong friendships I formed in class and on campus, figure-skating at the local ice rink, and the occasional sunny day where I could sit out on the Quad without gloves or a jacket. --Shouling Zhang, BMB, PSY

I'll never forget my time here working for Bob Minckley, John Tarduno, and Rory Cottrell (I can't thank you all enough). And, of course, the EZ's and the Piggies will always have a special place in my heart for the millions of wonderful memories. --Emily Kraus, BEB

Faculty Press Releases

April 24, 2012

Biology Professor John H. Werren Named to American Academy of Arts and Sciences

John H. Werren, the Nathaniel and Helen Wisch Professor of Biology at the University of Rochester, has been elected a fellow of the American Academy of Arts and Sciences.

One of the nation's most prestigious honorary societies, the Academy's membership includes scientists, politicians, businesspeople, and artists.

Werren is a leading expert in evolutionary genetics. His research combines genetic, molecular, and population studies to investigate diverse topics in biology. His studies on the genetic basis of shape and size differences between closely-related insect species has uncovered mechanisms of growth regulation, which may eventually lead to a better understanding of diseases that involve inappropriate growth, such as cancer. Werren's research comparing genomes revealed that some animals routinely acquire genes from their bacterial associates—a mechanism that may be important for the evolution of genetic novelty in animals, and which may lead to new genetic targets for pest control. Werren was recently the recipient of an NIH EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration) grant to explore the venoms of parasitic wasps as a possible resource for new drug discovery.

"Election to the Academy is both an honor for extraordinary accomplishment and a call to serve," said Academy President Leslie C. Berlowitz. "We look forward to drawing on the knowledge and expertise of these distinguished men and women to advance solutions to the pressing policy challenges of the day."

Werren and the rest of the new class will be inducted at a ceremony on October 6, at the Academy's headquarters in Cambridge, Massachusetts.

Past members of the Academy have included George Washington and Benjamin Franklin in the eighteenth century, Daniel Webster and Ralph Waldo Emerson in the nineteenth, and Albert Einstein and Winston Churchill in the twentieth.

May 9, 2012

University of Rochester Professor to Receive Grand Challenges Explorations Grant

Grant Will Be Used for Groundbreaking Research in Global Health and Development

University of Rochester biologist John Jaenike has been named a recipient of a grant from Grand Challenges Explorations, an initiative funded by the Bill & Melinda Gates Foundation. The $100,000 grants are given for innovative projects that "break the mold" in trying to solve important problems in global health and development.

Jaenike's project, which will apply his previous research to help protect crops from pests without using toxic pesticides, is one of more than 100 projects funded in the eighth round of the Grand Challenges Explorations program.

Two years ago, Jaenike published the surprising discovery that animals infected with a beneficial bacterium can pass the trait on to their offspring. The bacterium, Spiroplasma, is found in some common fruit flies and provides the flies with resistance to a tiny, parasitic worm called a nematode. Nematodes also attack plants, causing crop losses each year of more than $125 billion, much of it in the developing world. The goal of Jaenike's Grand Challenges Explorations-funded proof of concept project is to see if in controlled trials the bacterium can protect crop plants from nematodes in the same way it protects fruit flies. If that is possible, it could both reduce the use of toxic chemicals and increase crop yields. "Along with

often cannot afford them, and the nematodes may evolve resistance to them," said Jaenike. "Therefore, there is much interest in the development of nematode-resistant crops."

"Grand Challenges Explorations encourages individuals worldwide to expand the pipeline of ideas where creative, unorthodox thinking is most urgently needed," said Chris Wilson, director of Global Health Discovery and Translational Sciences at the Bill & Melinda Gates Foundation. "We're excited to provide additional funding for select grantees so that they can continue to advance their idea towards global impact."

To receive funding, Jaenike and other Grand Challenges Explorations Round 8 winners demonstrated in a two-page online application a bold idea in one of five critical global heath and development topic areas that included agricultural development, immunization and nutrition. Applications for the current open round, Grand Challenges Explorations Round 9, will be accepted through May 15, 2012.

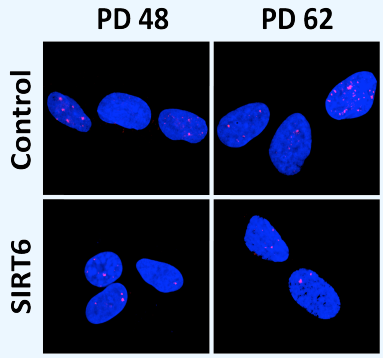
August 30, 2012

Researchers Find a Protein That Helps DNA Repair in Aging Cells

Results Provide Insight on Age-Related Health Issues

Scientists have long wondered why cells lose their ability to repair themselves as they age. New research by scientists at the University of Rochester has uncovered two intriguing clues.

The work by biologists Andrei Seluanov, Vera Gorbunova, Zhiyong Mao, Xiao Tian, Michael Van Meter, and Zhonghe Ke, has been published in the Proceedings of the National Academy of Sciences.



Cells expressing SIRT6 accumulate less DNA damage (areas in red). The cells in the PD 48 column are younger than those in the PD 62 column.

DNA strands in human cells routinely break and repair themselves, Seluanov and Gorbunova explained, but as cells age, the system for repair becomes less efficient and flaws in the process lead to a decline in the functionality of tissue and an increase in the incidence of tumors. Their team wanted to determine why this occurs, and establish whether the process could be slowed, or even reversed.

Seluanov and his colleagues found that the decline in a cell's ability to repair DNA during aging coincided with a global reduction in the levels of proteins involved in the repair process. Seluanov's group tried to reverse the age-related decline in DNA repair efficiency by restoring the proteins to their original levels and found only one protein, SIRT6, did the trick.

Gorbunova said the results build on a paper by Haim Cohen, a staff scientist investigating aging at Bar-Ilan University in Israel, and others published in the journal Nature this summer. "That work showed that overexpressing the SIRT6 protein extended the lifespans of mice," said Gorbunova, "Our research looked at DNA repair and found a reason for the increased longevity, and that is SIRT6's role in promoting more efficient DNA repair."

The next step for Seluanov and his team is to study the factors that regulate SIRT6, in an effort to learn more about the early stages of the DNA repair process. Seluanov said that multiple groups are trying to develop drugs that activate SIRT6, and he hopes that this research will one day lead to therapies that help extend a person's lifespan and treat cancer.

Seluanov and Gorbunova pointed out that previous research from their groups had established that SIRT6 plays a critical role in repairing the most dangerous type of DNA damage: double-strand breaks. DNA is a two-stranded molecule, and breaks can occur to one strand of the molecule or to both. In the case of single-strand breaks, the unbroken strand guides the

repair process and the DNA molecule is typically restored to its original state. However, double-strand breaks, in which both strands are severed, are particularly hazardous because they are more difficult to repair and can lead to a rearrangement of the cell's genetic material, Seluanov said.

Cells have evolved two major pathways to repair double-strand breaks: a high fidelity process—homologous recombination (HR)—and a quicker, but more error-prone process—non-homologous end joining (NHEJ). Seluanov's current study shows that the age-related decline in HR is particularly precipitous, with old cells being 38-times less efficient at the process than their younger counterparts. Gorbunova speculated that older cells may be forced to overly rely on the less accurate NHEJ, which also becomes less efficient during aging, likely contributing to the loss of tissue functionality and the increase in tumor incidence that characterize aging.

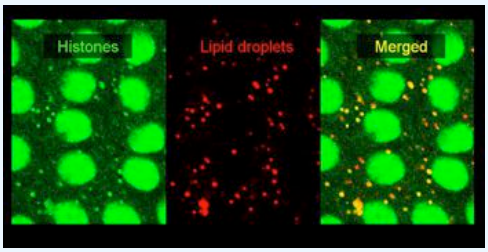
October 18, 2012

Rethinking Toxic Proteins on the Cellular Level

Lipid Droplets Play an Unexpected Role in Embryo Development

Histones are proteins needed to assemble DNA molecules into chromosomes. They have long represented a classic balancing act in biology; too few histone molecules result in DNA damage, while too many histones are toxic to the cell. New research at the University of Rochester is causing a fundamental shift in the concept of histone balance and the mechanism behind it.

Previous studies of Drosophila embryos showed massive amounts of histones located on lipid droplets, the structures associated with fat storage. While it had been speculated that the lipid droplets provide a place for safe, temporary storage of the histones, scientists had no clear proof for this storage idea nor did they understand how the histones attached to the surface of the droplets.



Histones attached to lipid droplets.
Photo by Michael Welte / Current Biology 2006

"What we discovered is that the lipid droplets serve as a holding space, making the histones available for the formation of chromosomes at the precise time they're needed," said Associate Professor of Biology Michael Welte. "We also found that when there are no lipid droplet-bound histones in the embryo, there are problems with the structure of chromosomes that can lead to death."

Welte and his research team were able to come to these conclusions by identifying the protein called "Jabba" as the specific molecule that anchors histones onto the surface of the lipid droplets.

The other scientists on the research team were Zhihuan Li in Rochester, and Katharina Thiel, Peter Thul, Mathias Beller and Ronald Kühnlein in Germany. Their work will be published next month in the journal Current Biology.

Histones not bound to DNA have long been considered toxic, prompting them to be destroyed by the cells. Welte's work demonstrates that binding to lipid droplets protects the histones, while storing them for later use in chromosome assembly.

Since there is evidence that histones and other proteins are associated with lipid droplets in a variety of organisms, including humans, Welte believes there may be medical relevance in the future.

"We've shown that lipid droplets have a function beyond fat metabolism, and it raises the possibility that, in some cases, fat storage may be beneficial," said Welte. "Additional lipid droplets may allow more toxic proteins to be sequestered,

thus protecting the organism."

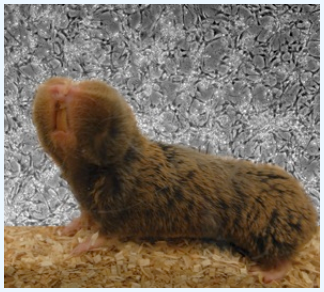
The next step for Welte and his lab is to determine how Jabba attaches the histones to the lipid droplets and how the binding is regulated. Welte also wants to know if proteins other than histones are being sequestered on the droplets for future use by the Drosophila embryo.

November 5, 2012

Researchers Discover How Underground Rodent Wards Off Cancer

Second Mole Rat Species Has Different Mechanism for Resisting Cancer

Biologists at the University of Rochester have determined how blind mole rats fight off cancer—and the mechanism differs from what they discovered three years ago in another long-lived and cancer-resistant mole rat species, the naked mole rat.



A blind mole rat is shown on the background of dying necrotic blind mole rat cells. (Photo by Andrei Seluanov/University of

The team of researchers, led by Professor Vera Gorbunova and Assistant Professor Andrei Seluanov, found that abnormally growing cells in blind mole rats secrete the interferon beta protein, which causes those cells to rapidly die. Seluanov and Gorbunova hope the discovery will eventually help lead to new cancer therapies in humans. Their findings are being published this week in the Proceedings of the National Academy of Sciences.

Blind mole rats and naked mole rats—both subterranean rodents with long life spans—are the only mammals never known to develop cancer. Three years ago, Seluanov and Gorbunova determined the anti-cancer mechanism in the naked mole rat. Their research found that a specific gene—p16—makes the cancerous cells in naked mole rats hypersensitive to overcrowding, and stops them from proliferating when too many crowd together.

"We expected blind mole rats to have a similar mechanism for stopping the spread of cancerous cells," said Seluanov. "Instead, we discovered they've evolved their own mechanism."

Gorbunova and Seluanov made their discovery by isolating cells from blind mole rats and forcing them to proliferate in culture beyond what occurs in the animal. After dividing approximately 15-20 times, all of the cells in the culture dish died rapidly. The researchers determined that the rapid death occurred because the cells recognized their pre-cancerous state and began secreting a suicidal protein, called interferon beta. The precancerous cells died by a mechanism which kills both abnormal cells and their neighbors, resulting in a "clean sweep."

"Not only were the cancerous cells killed off, but so were the adjacent cells, which may also be prone to tumorous behavior," said Seluanov.

"While people don't use the same cancer-killing mechanism as blind mole rats, we may be able to combat some cancers and prolong life, if we could stimulate the same clean sweep reaction in cancerous human cells," said Gorbunova.

The research team also included Christopher Hine, Xiao Tian, and Julia Ablaeva in Rochester, Andrei Gudkov at Roswell Park Cancer Institute in Buffalo, NY, and Eviatar Nevo at the University of Haifa in Israel.

Gorbunova and Seluanov say they next want to find out exactly what triggers the secretion of interferon beta after cancerous cells begin proliferating in blind mole rats.

Gorbunova believes the anti-cancer mechanism is an adaptation to subterranean life. "Blind mole rats spend their lives in underground burrows protected from predators," said Gorbunova. "Living in this environment, they could perhaps afford to evolve a long lifespan, which includes developing efficient anticancer defenses."

February 26, 2013

Superbugs May Have a Soft Spot, After All

The overuse of antibiotics has created strains of bacteria resistant to medication, making the diseases they cause difficult to treat, or even deadly. But now a research team at the University of Rochester has identified a weakness in at least one superbug that scientists may be able to medically exploit.

Biologists Gloria Culver at Rochester and Keith Connolly, now at Harvard University, thought one key to stopping the bacteria may lie with proteins, so they studied the mechanism behind the development of bacterial ribosomes—the cell's protein-manufacturing machine.

"We targeted the ribosomes in our research because cells and organisms can't live if they don't make proteins, and they can't make proteins if their ribosomes aren't functioning properly." said Culver.

Culver and Connolly specifically worked with cultures of E. coli, a bacteria commonly found in the intestines. While E. coli is usually harmless, some strains are resistant to antibiotics and can cause serious food poisoning.

They discovered that two proteins already present in E. coli cells—RbfA and KsgA—need to be in balance with each other in order for ribosomes to function. If those proteins are present in the wrong concentrations, the ribosomes will not mature properly and will be unable to produce proteins, leading to the death of the cells. Their findings are being published this week in the journal Molecular Microbiology.

Culver said with the discovery that KsgA and RbfA must be in balance for the cells to function properly, the next goal is to determine an effective way to disrupt that balance.

Crucially, RbfA does not exist in humans. "That may make it possible," Culver said," to kill E. coli without having a harmful effect on people."

Eric Brown, a professor of biochemistry and biomedical sciences at McMaster University in Hamilton, Ont., calls their work creative and scholarly. "Ribosome assembly represents a rich target for much needed antibacterial drugs to treat drug-resistant infections," said Brown, "and this work offers new and important insights into the process."

Culver explained the role the proteins play in ribosome maturation. A healthy ribosome is made up of two compartments—or subunits—that must come together only when each one is mature. An overabundance of RbfA hurries the process along, which could result in an ineffective structure. The job of the KsgA is to bind with the smaller of the compartments, preventing the formation of the ribosome until both parts are ready.

Culver says RbfA and KsgA belong to "the chicken or the egg" category of microbiology. While they're essential to the development of ribosomes, the ribosomes themselves are needed to create proteins, including the RbfA and KsgA. She calls it an ongoing and intriguing question for biologists.

Media contact: Peter Iglinski
peter.iglinski@rochester.edu
585.273.4726

Biology in bones and jars

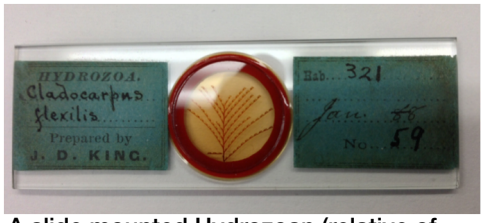
by Robert Minckley

Not very long ago, biology was taught on the chalkboard (with chalk!) and the textbook for the course was where students found pictures of cells, endoplasmic reticula, and polar bears with cubs. Laboratory courses had bones, whole specimens in jars, and cases and cases of slides with cross-sections of cells, roots, hairs, and other minutiae for students to examine.

As with all subjects, biology today is different both in what is covered and how it is presented. Digital images and PowerPoint presentations have replaced the chalkboard, and have reduced the need for textbooks. New technology has also changed the laboratory experience in some, but not all, respects. The University of Rochester has changed along with most other institutions, but its collections hold a valuable archive of how biology was taught in the past and work is underway to preserve it for use long into the future. This "preservation" has begun to unfold in just the past few months and an overview of progress to date is presented here.

Everyone should walk through the back corridors on the second floor of Hutchison Hall where you will see cabinets with skeletons and skulls of mammals, birds, fishes, and lizards (www.rochester.edu/College/BIO/specimen/specimen.html). They illustrate amazing adaptations to different ways of feeding, moving and finding mates. Some skeletons are posed in mid-climb, simulating their perch on tree branches. Others are mounted so the intricate detail is readily seen: the wing of a fruit bat skeleton clearly shows how the bones--those that in humans form hands--have been modified to support flight.

As we have recently rediscovered, the skeletons in the hall are a small portion of the material in the department's possession, and are the vestige of a very large collection that had been at the University until the late 1950's. Packed into a room no more than 90 square feet were more than 300 skeletons and taxidermy specimens, many more jars of specimens preserved in fluids, and boxes of fossils and vintage microscope slides from the 1800's. Some specimens are of species that are rare today, and others are of considerable lasting scientific interest. Most are from regions far distant from Rochester and New York State.



A slide mounted Hydrozoan (relative of corals) that occurs on the east coast of North America. The specimen's name (*Cladocarpus flexilis*) and the preparator (J.D. King) are listed on the left label and the date when the specimen was prepared (January 1888) is listed on the right label.

Where did all this material come from? Here is where our collection makes history come alive. The oldest material can be traced back to Henry A. Ward. Ward had an interest in natural history and especially geology, which led him to travel, attend college, and probably worry his parents (this last statement is pure conjecture). For a few years (1860-1865) he was a faculty member at the University of Rochester, but quit purportedly because there were too many faculty meetings (no comment from the author)! Teaching also interfered with his travels. Leaving an academic career, Ward began a company that prepared and sold specimens to universities, colleges and other educational entities. Early on, the buildings where the preparators cleaned and articulated skeletons and prepared the minerals for display were on the grounds of the University's Prince Street Campus (where the Memorial Art Gallery is still located). The company survives to this day and is called Ward Science and continues in the business of supplying biological and geological material to educational institutions.

An indication of the level of recognition Ward and his associates had worldwide is found in the story of Jumbo the elephant, an animal originally from Sudan that was one of the stars of the Barnum & Bailey Circus. P.T. Barnum himself had arranged with Ward that if and when Jumbo passed, Ward was to prepare the skeleton and the skin. The unfortunate day came when there was a train-elephant collision in Canada. Jumbo lost. As per the original agreement, the elephant was transported to Rochester and prepared. Ward did his part but did not anticipate how long it would take. A dispute over compensation

resulted in a firm response from Barnum (see the letter exchange here: //www.lib.rochester.edu/index.cfm?PAGE=3599). Today, the result of this work—which was done here in Rochester—is the massive elephant skeleton found in the American Museum of Natural History (en.wikipedia.org/wiki/Jumbo).

Many specimens collected by Henry Ward himself or acquired later from his company made up a natural history museum that the University of Rochester maintained for many years. Its last home was Dewey Hall and a beautiful wooden door and stone transom still mark the Museum entrance.

Door in Dewey Hall that was the main entrance to the natural history museum here at the University of Rochester

Once the biology department moved to Hutchison Hall, the collection was dispersed. Much of the material was donated in the late-1950's to the Rochester Museum and Science Center on East Avenue, and some was later moved into storage in Hutchison Hall where few knew of its existence.

This brings us to the present. Although the biological specimens we have are no longer alive, they need attention and the material here in Hutchison has been long-ignored. As we explored the treasure trove of material, we found specimens still in hand-blown jars made sometime in the 1860's. Over the years, fluids had evaporated and some of the specimens had dried out completely. We prioritized these specimens for immediate attention and with the help of a local glass blower/sculptor, Lucas Jones, we have re-curated the specimens, made new seals for the jars, and have greatly extended the educational lifespan of the specimens.


Bullfrog


Puffer fish as found before restoration (left) and after restoration (right) in original hand-blown specimens jars made in the 1860's.


Baby Hammerhead Shark

Many of the skeletons and taxidermy specimens are also in need of restoration and a careful cleaning. Our plan is to temporarily move these into glass-fronted cases to minimize the possibility of further damage. In the future, we hope to secure funds that will allow us to rearticulate the broken parts and present cleaned and useful specimens to students, alumni, and the public in proper cabinets.

Why is this worth doing? There are many reasons, both practical and esoteric. Perhaps one of the most important is as a teaching tool so that people understand the range and limitations of materials that were available not long ago to students and professors of biology. And as people lose access to outdoor spaces and more of us live in crowded urban areas, the opportunity to see the colors and anatomy of diverse organisms from throughout the world can't be replaced digitally. We now have the capability to fill this void at the University of Rochester. For the naturalist in all of us, there is also the great satisfaction of

seeing such an array of beautiful (and not so beautiful) organisms in one place.

What began as an effort to reclaim some much-needed office space has led to a rediscovery of our departmental history, and a new vision of how old and new teaching collections can live side-by-side in the classroom and beyond. Many of the letters of Henry Ward and his company are housed at the Rare Books and Special Collections in Rush Rhees Library, and with the help of Melissa Mead (the University Archivist) we hope to link information on how and when the material was obtained with its scientific significance. Having the material displayed means we will need student and staff involvement at all levels including building and installing appropriate cabinetry and lighting, development of a database and a web site, and further research on the biology and conservation status of these animals. Clearly no one expected so much would eventually come out of a storage room of skeletons and jars, and there is much more to do.

Echidna, or spiny anteater skeleton, one of the few egg-laying mammals found today only in Australia and New Guinea.

Howard Bryant Memorial Golf Tournament
Friday, June 22, 2012
Chili Country Club

Howard Bryant Memorial Golf Tournament

Please join us!

Friday, June 14, 2013

Registration: 10:00 AM
Shotgun Start: 11:00 AM
Dinner: 5:30 PM

Registration Fee:
$95.00/person

Fee includes golf, lunch, chicken wing appetizers, and chicken/beef dinner.

Prizes!

- Closest to Pin
- Longest Drive
- Raffles
- Doorprizes

Chili Country Club
760 Scottsville-Chili Road
Scottsville, NY 14546
www.chilicountryclub.com

Unable to join us?
Direct Donations to the Howard Bryant Memorial Scholarship Fund are welcome and can be mailed to the address below.
If you wish to remain anonymous, please write "anonymous" on the memo line of your check.
Thank you for your support!

Not a golfer?
"Dinner Only" fee is $35.00
Kids under 10 get in free!

Howard Bryant

Howard was a beloved member of the Biology Department at the University of Rochester for over 40 years.

All proceeds from this tournament benefit The Howard Bryant Memorial Scholarship Fund. The Fund was established in 2004 to honor Howard's legacy of caring and support by providing aid to students in need of financial assistance and who are interested in pursuing a career in Science or Engineering.

Registration

Please send checks & form to:

Kathy Giardina
University of Rochester
Department of Biology
487 Hutchison Hall
Rochester, NY 14627

Checks made payable to:
University of Rochester

All registered golfers will receive one *free golf pass* for the Chili Country Club!!!

Name: _____

Name: _____

Name: _____

Name: _____

No. of Golfers _____

x $95.00 ea=(Total_____)

Dinner Only _____

x $35.00 ea=(Total_____)