Department of Developmental Biology

The principal research activities of the Department of Developmental Biology are focused on attaining a mechanistic understanding of animal development, encompassing the earliest cell fate specification and movement processes that shape the early embryo, organogenesis, stem cell biology and engineering, tissue homeostasis and repair, and aging. Students and postdoctoral fellows work closely with faculty and staff on research projects and participate in weekly journal clubs and seminars at which recent literature and ongoing research are discussed.

The developmental biology faculty employ a variety of model organisms and cell-based systems to answer key outstanding questions about the fundamental mechanisms of development and to apply this knowledge to pathogenic mechanisms leading to human birth defects and disease, and to improve future therapies. We take a broad view of developmental biology, with our research groups studying diverse developmental processes including early embryogenesis, organogenesis, and aging, and applying multidisciplinary approaches that include forward and reverse genetics, epigenetics, molecular and chemical, and computational methods. Embryogenesis is a fascinating process during which a fertilized egg undergoes divisions to form a mass of pluripotent cells that signal to one another to establish embryonic polarity, diverse cell types, and organs, and that also undergo massive cell migrations and rearrangements to sculpt the embryonic body.

Research is also carried out on the processes involved in tissue degeneration, repair and regeneration, the biology of embryonic and adult stem cells, and cellular reprogramming. It is a particularly opportune time for developmental biology research, as recent technological breakthroughs in both animal model systems and genomics afford insights into developmental processes at the epigenetic, genetic and molecular levels, and enable the monitoring of cell behaviors in vivo. We are discovering genes that are responsible for birth defects and defining connections between many adult human diseases and their origins during embryogenesis. The studies of stem cells, cellular reprogramming and regeneration are bringing us closer to curing human diseases, repairing damaged organs, and extending the boundaries of aging.

Website: http://devbio.wustl.edu

Degrees & Requirements

More information about Department of Developmental Biology degrees (http://bulletin.wustl.edu/grad/gsas/dbbs) and requirements can be found in the Graduate School Bulletin.

Research

Research in the department occurs in a highly collegial atmosphere and involves interdisciplinary collaborations between the members of the department, as well as investigators from different departments and centers throughout the School of Medicine, as well as the College of Arts & Sciences, and the School of Engineering & Applied Science. Developmental biology faculty have leading roles in several research centers, including the Center of Regenerative Medicine (http://devbio.wustl.edu/REGMED), the Center for the Investigation of Membrane Excitability Diseases (http://cimed.wustl.edu), the Center for Cardiovascular Research (https://cardiovascularresearch.wustl.edu), and the Hope Center (https://hopecenter.wustl.edu). The department has a rich tradition of mentoring undergraduate, graduate and medical students, and postdoctoral fellows. We are committed to creating a research environment in which our trainees reach their maximum scientific potential and career goals while addressing key outstanding questions and making important discoveries.

Douglas F. Covey, PhD
McDonnell Sciences Building, 3rd Floor
Phone: 314-362-1726
Medicinal chemistry of steroids.

Aaron DiAntonio, MD, PhD
6301 Couch Building
Phone: 314-362-9925
Neurodevelopment, neurodegeneration, and axon regeneration in Drosophila and mouse.

Shin-Ichiro Imai, MD, PhD
McDonnell Medical Sciences Building, Room 362A
Phone: 314-362-7228
Molecular mechanisms of aging and longevity in mammals, particularly focusing on the tissue-specific functions of the mammalian NAD-dependent deacetylase Sir2 and the physiological significance of systemic NAD biosynthesis mediated by Nampt (nicotinamide phosphoribosyltransferase) in an intimate connection between metabolism and aging.

Aaron N. Johnson, PhD
Cancer Research Building, 3rd Floor
Phone: 314-273-1834
Molecular mechanisms of muscle development and regeneration.

Kerry Kornfeld, MD, PhD
Cancer Research Building, 3rd Floor
Phone: 314-747-1480
Kristen Kroll, PhD  
320 McDonnell Sciences Building  
Phone: 314-362-7045  
Transcriptional networks that regulate the formation of neurons in early embryos and embryonic stem cells. Role of chromatin regulatory complexes in controlling pluripotency and differentiation.

Helen McNeill, PhD  
McDonnell Sciences Building, 3rd Floor  
Phone: 314-273-3050  
Our lab interests are focused on the cadherin family of molecules and their regulation of cellular polarity, growth, tissue organization and metabolism. The overall goal of our research is to understand how tissue growth and tissue organization are coordinately regulated. We are focusing on how Fat cadherins function in Hippo pathway-regulated growth control, planar cell polarity (PCP) tissue organization and metabolism in flies, mice and hydra. A second, new focus is studying how the nuclear envelope regulates gene expression and fertility.

Craig Micchelli, PhD  
328 McDonnell Sciences Building  
Phone: 314-362-7036  
Our lab studies the regulation of stem cell biology in development, homeostasis and disease.

Mayssa Mokalled, PhD  
Cancer Research Building, 3rd Floor  
Phone: 314-273-1835  
Spinal cord injury, degeneration and regeneration in zebrafish and mouse.

Samantha Morris, PhD  
3316 Couch Building  
Phone: 314-747-8618  
Stem Cell and Developmental Biology. Our research focuses on dissecting the gene regulatory networks that define cell identity, using the developing embryo and tissue regeneration as a guide to engineer fate in vitro.

Jeanne M. Nerbonne, PhD  
9900 Clinical Sciences Research Building  
Phone: 314-362-2564  
Structure, function and regulation of voltage-dependent ion channels in the cardiovascular and nervous systems. Regulation of membrane excitability in health and disease.

David M. Ornitz, MD, PhD  
South Building, 3rd Floor  
Phone: 314-362-3908  
Regulation of cardiovascular, lung, skeletal, and inner ear development, injury response, and regeneration by Fibroblast Growth Factors.

Zachary Pincus, PhD  
5304 Couch Building  
Phone: 314-747-5520  

Lila Solnica-Krezel, PhD  
3911A South Building  
Phone: 314-362-8768  
Genetic Regulation of Vertebrate Embryogenesis. Genetic mechanisms that regulate cell fates and movements during early vertebrate development using forward and reverse genetics in the zebrafish model and human embryonic stem cells.

Thorold W. Theunissen, PhD  
Couch Building, 3rd Floor  
Phone: 314-362-8768  
The Theunissen Lab seeks to understand the molecular mechanisms regulating pluripotent stem cell states, and develop optimal conditions for the derivation, maintenance and differentiation of human ESCs and iPSCs. We also explore whether naive pluripotent stem cells can be used to model early human development and disease.

Andrew Yoo, PhD  
361E McDonnell Sciences Building  
Phone: 314-362-1811  

Faculty

Department Head

Liliana Solnica-Krezel, PhD  
Visit our website for more information about our faculty (http://devbio.wustl.edu/faculty) and their appointments.

Irving Boime, MS, PHD  
Professor of Developmental Biology (primary appointment)  
Professor of Reproductive Biology in Obstetrics and Gynecology  
MS Purdue University 1966  
BS St Louis College of Pharmacy 1964  
PHD Washington Univ in St. Louis 1970

Angela N Bowman, PHD  
Assistant Professor of Developmental Biology (primary appointment)  
BA University of Pennsylvania 2006  
PHD Stanford University 2012

Douglas Floyd Covey, MA, PHD
Professor of Pharmacology in Developmental Biology (primary appointment)
Professor of Anesthesiology
Professor of Psychiatry
BS Loyola College 1967
MA Johns Hopkins University 1969
PHD Johns Hopkins University 1973

Aaron DiAntonio, MD, M PHIL, PHD
Professor of Developmental Biology (primary appointment)
Alan A and Edith L Wolff Professor of Developmental Biology
MD Stanford University 1995
M PHIL Cambridge University 1989
PHD Stanford University 1995
BA Harvard University 1988

George W Gokei, PHD
Adjunct Professor of Molecular Biology and Pharmacology (primary appointment)
PHD University of Southern Calif 1971
BS Tulane University 1968

Tracey O Hermanstyne, PHD
Instructor in Developmental Biology (primary appointment)
PHD Univ of Maryland Baltimore 2012

Didier Hodzic, PHD
Assistant Professor of Developmental Biology (primary appointment)
Assistant Professor of Cell Biology and Physiology
PHD University of Liege 1998
BS University of Liege 1991

Shin-Ichiro Imai, PHD, MD
Professor of Developmental Biology (primary appointment)
Professor of Medicine
PHD Keio University 1995
MD Keio University 1989

Aaron N Johnson, PHD
Assistant Professor of Developmental Biology (primary appointment)
PHD Arizona State University 2006
BA Arizona State University 1998

Raphael Kopan, PHD, MS
Adjunct Professor of Developmental Biology (primary appointment)

PHD University of Chicago 1989
BS Tel Aviv University 1981
MS Tel Aviv University 1984

Stephen K Kornfeld, PHD, MD
Professor of Developmental Biology (primary appointment)
PHD Stanford University 1991
MD Stanford University 1991
BA Yale University 1984

Kristen Louise Kroll, PHD
Associate Professor of Developmental Biology (primary appointment)
PHD University of CA Berkeley 1994
BA Northwestern University 1988

Yangjian Liu, BS1, MS1, PHD
Instructor in Developmental Biology (primary appointment)
BS1 Nanjing University 1998
MS1 Chinese Academy of Sciences 2002
PHD John Hopkins University 2006

Helen McNeill, BS1, PHD
Professor of Developmental Biology (primary appointment)
BS1 Ramapo College 1985
PHD Stanford University 1993

Craig Anthony Michelli, PHD
Associate Professor of Developmental Biology (primary appointment)
PHD Univ of Wisconsin Madison 1999
BS Univ of Wisconsin Madison 1993

Mayssa Mokalled, MS, PHD
Assistant Professor of Developmental Biology (primary appointment)
BS American University of Beirut 2003
MS American University of Beirut 2005
PHD University of Dallas 2010

Kelly Renee Monk, PHD
Adjunct Professor of Developmental Biology (primary appointment)
PHD University of Cincinnati 2006
BS Elmira College 2001

Samantha A Morris, BS1, PHD
Assistant Professor of Developmental Biology (primary appointment)
Assistant Professor of Genetics
BS1 University of London 2002
PHD Cambridge University 2007

Philip Needleman, MS, PHD
Adjunct Professor of Molecular Biology and Pharmacology (primary appointment)
MS School Not Listed 1962
BS School Not Listed 1960
PHD University of Maryland 1964

David M Ornitz, MD, PHD
Alumni Endowed Professor of Developmental Biology (primary appointment)
BS University of CA Davis 1981
MD University of Washington 1988
PHD University of Washington 1987

John Hall Russell, PHD
Professor of Developmental Biology (primary appointment)
PHD Washington Univ in St. Louis 1974
BS Juniata College 1968

Diane S Sepich, PHD
Assistant Professor of Developmental Biology (primary appointment)
PHD University of Oregon 1994
BS University of San Diego 1981

Jimann Shin, PHD, MS
Instructor in Developmental Biology (primary appointment)
BS Kyung Pook National University 2002
PHD Vanderbilt University 2007
MS Kyung Pook National University 2004

Lilianna Solnica-Krezel, PHD, MS
Professor of Developmental Biology (primary appointment)
Alan A and Edith L Wolff Professor of Developmental Biology
Head of the Department of Developmental Biology
PHD Univ of Wisconsin Madison 1991
MS Medical University of Warsaw 1985

Thorold W Theunissen, PHD, MA
Assistant Professor of Developmental Biology (primary appointment)
BA Harvard 2007
PHD Cambridge University 2011
MA Cambridge University 2008

Yongjun Yin, PHD
Instructor in Developmental Biology (primary appointment)
PHD Hebrew University 2004

Andrew Seungjo Yoo, MS, PHD
Associate Professor of Developmental Biology (primary appointment)
MS University of British Columbia 1997
PHD Columbia University 2005
BS McGill University 1995

Bo Zhang, PHD
Assistant Professor of Developmental Biology (primary appointment)
PHD Chinese Academy of Sciences 2011
BS Inner Mongolia University 2004

Courses
The Department of Developmental Biology also offers courses through the Graduate School. For a full listing of courses offered, please visit the university online course catalog (https://courses.wustl.edu/CourseInfo.aspx?sch=L&dept=L41&crslvl=5:9).

M04 FYSelect 500C Developmental Biology and Disease
Basic Science. Explores connections between basic research in developmental biology and disease. Students are expected to make a presentation based on current literature in the field and participate in class discussions. Credit 10 units.

M70 MolBio/Pha 900 Research Elective - Molecular Biology and Pharmacology
Research opportunities may be available. If interested, please contact the Department of Developmental Biology.