ASMB American Society for Matrix Biology

President's Letter

Jean Schwarzbauer

Dear Fellow Matrix Biologists,

We just passed the first deadline for abstract submission to this fall's joint meeting of the ASMB and the Society for Glycobiology. It is shaping up to be a fantastic meeting! The combination of complementary scientific societies and a high quality program has put registration well ahead of our usual pace. The meeting will likely be fully subscribed, which is a good thing for you and for the ASMB. Plus we have attracted a level of sponsorship that, together with a well-scored NIH R13 proposal, should assure a financially sound meeting.

Session chairs with the help of society volunteer reviewers are in the midst of evaluating and selecting abstracts that will be the highlight of the concurrent sessions. Early reports indicate that the quality of the abstracts is outstanding and that the breadth of topics will interest members of both societies. With nearly 300 abstracts submitted, we expect lively and stimulating poster sessions. There is going to be a lot of terrific science to absorb. Be prepared for information overload!

The biennial meeting is our opportunity to honor colleagues who have distinguished themselves through their contributions to the field of matrix biology. We have two outstanding recipients of the ASMB awards: Billy Hudson (Vanderbilt University Medical School) will receive the Senior Investigator award and the Junior Investigator award goes to Tom Barker (Georgia Tech). ISMB will present their Distinguished Scientist award to Richard Hynes (MIT). At the meeting, a special awards session will be held on Monday evening with lectures by Billy and Richard, while Tom will chair and speak in the Mechanobiology and Biomedical Engineering concurrent. SfG will also hold an awards session to honor the recipients of the Rosalind Kornfeld award and the Karl Meyer award; these honorees have yet to be named.

One very exciting addition to our meeting is the Tabor Young Investigator award. With the help of Vince Hascall and the JBC, ASMB and SfG will each be presenting a Tabor award to a junior colleague who exemplifies Tabor's values of creativity and scientific excellence. In addition, ASMB will distribute ten travel awards to outstanding applicants – five for oral presentations and five for posters. The ISMB has provided funds for international travel awards to support attendance of three young scientists and the MARC awards will be presented to our most promising minority colleagues. Both societies are dedicated to supporting members by using all available resources to encourage and facilitate your participation in and contributions to the meeting.

In making your travel plans, please keep in mind the pre-meeting Guest Symposia that will be offered by TERMIS (our tissue engineering colleagues), by the Wound Healing Society, and by SfG affiliates who study glycomics and glycoprotein production. These guest sessions are directly relevant to the scientific interests of ASMB members and have added value because of the more translational aspects of their research focus.

The meeting officially starts on Sunday evening with a reception and keynote lecture by Carolyn Bertozzi (UC Berkeley). In addition to the science that fills

the next two and a half days, we have organized other offerings to enhance your meeting experience. Career Mentoring breakfasts will be held on Monday and Tuesday mornings and are open to anyone who is interested in getting career advice from senior scientists. Wednesday breakfast will feature Howard Garrison, Deputy Executive Director for Policy at FASEB who will speak about science policy and NIH funding issues. Last but not least, the Tuesday evening banquet is sure to please with special entertainment that is being organized by Hudson Freeze, President of SfG and a San Diego resident.

We are confident that the diversity of the program will offer late-breaking and novel science from a mix of seasoned and up-and-coming investigators. The schedule, the venue, and the laid-back atmosphere of San Diego should give you plenty of opportunity to discuss science within and outside the sessions.

This is your meeting, and you are encouraged to provide feedback on what you enjoyed and could be improved. We will start organizing the next gathering soon after this one ends, and your input and participation will help us continue to improve the educational, scientific, and social aspects of this event.

Thanks so much for your support of this key activity of the ASMB.
See you in the fall!

Jean Schwarzbauer
ASMB President

Jeff Davidson
ASMB President-elect

Important Meeting Updates!

Regular Abstract submission is now closed. There will be a late breaking submission period from July 23-27.

Meeting registration is almost full! If you have not yet registered, please do so!

Thank you, 2012 Meeting Sponsors

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2012 Guest Symposia

ASMB and SFG are pleased to announce four bonus session available to main conference participants for a nominal registration fee. All programs will take place on ***Sunday, November 11th*** *at the Sheraton Hotel and Marina San Diego, CA.*

WOUND HEALING SOCIETY

Quantifying Heterogeneity and Modeling Complexity in the Injury Response. Implications for Therapeutics Development.

Summary: The molecular, matrix and cellular heterogeneity of tissues drives a highly specific, sometimes unique and often complex injury responses in different tissues. These constituents are dynamic and dependent on local, neighboring and distal cues introduced into the cellular environment. This mini-symposia will review emerging concepts that are helping understand (1) how these variables define -- and refine -- the injury response, (2) how they change over time to modulate tissue homeostasis and (3) how they gauge the resolution phase of repair, in anticipation of an exacerbation of injury. Using an informal style, *the mini-symposia will focus on how this complexity can be measured, manipulated and modeled so as to help develop effective therapeutics to promote injury resolution.*

Topics include:

1. Epithelial and Endothelial Barriers in Injury Response and Resolution.
2. Afferent and Efferent Neuronal Pathways Signaling Injury Responsiveness.
3. Systemic Contributions to Responsiveness Predict Repair.
4. Tissue-Dependent Heterogeneity in the Response to Infection and Immunity.
5. Distinguishing Stem Cell Niches in Tissues and Bone Marrow.
6. Mathematical Modeling Predict Response and Resolution.

Registration: $50 WHS members/$100 WHS non-members

TISSUE ENGINEERING & REGENERATIVE MEDICINE INTERNATIONAL SOCIETY (TERMIS)

Organized by: Anthony Ratcliffe (*Synthasome, Inc.*) and Karen Christman (*UCSD*)

Matrix for Vascular and Lung Regeneration

Laura E. Niklason, Yale University

Extracellular Matrix Scaffolds for Airway Repair

Thomas W. Gilbert, University of Pittsburgh

Injectable Extracellular Matrix Based Hydrogels for Treating Cardiovascular Disease

Karen L. Christman, University of California San Diego

The Extracellular Matrix in Biomaterials Design and Tissue Engineering

Jennifer H. Elisseeff, Johns Hopkins University

NO Registration Fee: Costs covered by TERMIS

ANALYTICAL SATELLITE

Advances in Glycoprotein Production, Characterization and Modification

Organizers: Qun Zhou (*Genzyme*), John Briggs (*Genentech*), and Sam Tep (*Biogenidec*)
Program details TBA
Registration: $50 (includes scientific program, workshop and coffee breaks)

CFG SATELLITE:

Organizer: James Prestegard (*University of Georgia*)
http://glycomics.scripps.edu/PI2012.html

12:00 pm CFG Participating Investigator Meeting

12:30 pm Networking lunch – organized by CFG subgroup leaders

2:00 pm Symposium: Polysaccharide Analysis, Synthesis and Pathophysiology

Registration: $50 (includes scientific program, boxed lunch and coffee break)

2012 ASMB Senior Investigator Award

Billy Hudson

Dr. Billy G. Hudson, Ph.D., is the Elliot V. Newman Professor of Medicine, Biochemistry and Pathology, and Director of the Center for Matrix Biology at Vanderbilt University. His research has focused on ancient collagen proteins that compose basement membranes, a specialized form of extracellular matrix. The matrix is essential for the development and maintenance of tissue architecture and function in all multi-cellular organisms from sponge to human. His research group discovered two collagen proteins, and named them alpha-3 and alpha-4 chains of collagen IV, and described how they, together with an alpha-5 chain, assemble into a complex α3α4α5 network that functions as a key component of the kidney filtration barrier. The network is directly involved in the pathogenic mechanisms underlying several diseases that cause kidney failure in millions of people: autoimmune Goodpasture syndrome; hereditary Alport syndrome; thin basement membrane nephropathy, Alport post-transplant nephritis, and diabetic renal disease. His work has defined the three-dimensional structure and antibody binding sites of the autoantigen of Goodpasture syndrome, uncovering clues to the pathogenesis of a prototype autoimmune disease. Recently, his team discovered a new chemical bond in biology that fastens the autoantigen together and helps hold tissues together in all animals. He is the coauthor of over 200 scientific publications and 30 patents.

For these seminal discoveries, he received the 2003 Homer W. Smith Award, the highest honor given by the American Society of Nephrology. He is the recipient of other awards and honors, including: the Dolph Simons/Higuchi Research Award; Distinguished Service Citation from the American Society of Biochemistry and Molecular Biology; Distinguished Alumnus of the University of Iowa, Carver College of Medicine; Distinguished Alumnus of Henderson State University; multiple teaching awards from Kansas University Medical Center; the Elliott V. Newman Professorship at Vanderbilt University; 2009 Fellow, American Association for the Advancement of Science; Stanley Cohen Research Award (2010), Vanderbilt University Medical Center; William B. McAllister Visiting Professor (2010), Yale University School of Medicine, and Franklin H. Epstein Fellow (2010), Mount Desert Island Biological Laboratory. In 2011 he was the Chair of the Gordon Research Conference on Collagen and Vice Chair in 2009.

He is a co-founder of NephroGenex, a biotech company that is developing Pyridorin, a drug-candidate which was discovered in his laboratory for the prevention of diabetic kidney disease. A Phase IIb trial was completed in 2010 and a phase III clinical trial is planned for 2012. He is also co-founder of the Aspirnaut Initiative, an educational initiative that encourages students, kindergarten thru undergraduate, to pursue studies and careers in science, technology, engineering and mathematics. The initiative has received national publicity for equipping middle and high school students with laptop computers and broadband internet access to turn long school bus rides into productive learning time.

Billy received his Ph.D. from the University of Iowa in 1966 and performed his postdoctoral training at Harvard University and the U.S. Army Research Institute of Environmental Medicine.

KEYNOTE SPEAKER

Carolyn Bertozzi is the T.Z. and Irmgard Chu Distinguished Professor of Chemistry and Professor of Molecular and Cell Biology at UC Berkeley, an Investigator of the Howard Hughes Medical Institute, and Senior Faculty Scientist at the Lawrence Berkeley National Laboratory. She completed her undergraduate degree in Chemistry from Harvard University in 1988 and her Ph.D. in Chemistry from UC Berkeley in 1993. After completing postdoctoral work at UCSF in the field of cellular immunology, she joined the UC Berkeley faculty in 1996.

Prof. Bertozzi's research interests span the disciplines of chemistry and biology with an emphasis on studies of cell surface glycosylation pertinent to disease states. Her lab focuses on profiling changes in cell surface glycosylation associated with cancer, inflammation and bacterial infection, and exploiting this information for development of diagnostic and therapeutic approaches. In addition, her group develops nanoscience-based technologies for probing cell function and methods for protein engineering.

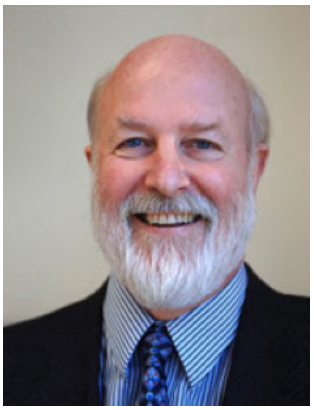
2012 ASMB Junior Investigator Award

Dr. Barker is currently an Associate Professor in the joint Emory University and Georgia Institute of Technology Biomedical Engineering department where he has held this position since 2006. He holds faculty memberships in the Petit Institute for Bioengineering and Bioscience, the Emory Alcohol and Lung Biology Center, and the CHOA Pediatric Research Centers for Nanomedicine and Lung Biology among other Atlanta area research centers. He received his Ph.D. in Biomedical Engineering from the University of Alabama at Birmingham. His research focused on regulators of cell-matrix interactions and specifically focal adhesion formation and TSP-1-mediated focal adhesion disassembly in fibroblast subpopulations relevant to lung fibrosis. He followed his Ph.D. with a Postdoctoral Fellowship with E. Helene Sage at the Benaroya Research Institute where he studied the role of SPARC in fibroblast contractility and fibronectin assembly. Immediately prior to his professorship, Dr. Barker spent 2 years at the Ecole Polytechnique Fédérale de Lausanne in Switzerland as a senior scientist in Jeffrey Hubbell's lab exploring engineering of ECM for directed cell differentiation. His current research integrates engineering and basic cell and molecular biology approaches to understand and control matrix-driven cell phenotypic changes through the design of engineered extracellular matrices. His research is also focused on understanding fundamental roles of mechanical forces in regulating the biochemical activity of proteins in the extracellular matrix toward tissue development, regeneration, and pathogenesis. Dr. Barker has authored 5 book chapters and 28 research and review papers in leading cell biology, matrix biology, and biomaterials journals and currently serves on the International Board for *Biomaterials*, the leading biomaterials journal. Dr. Barker has actively reviewed for over 20 journals and numerous U.S. and international funding agencies. Dr. Barker receives funding from the NIH, the Wallace H. Coulter Foundation, the John and Mary Brock Translational Fund, and the Health Effects Institute. Dr. Barker was awarded the Walter A. Rosenblith New Investigator Award by the Health Effects Institute in 2008 and was very recently named the 2012 ASMB Junior Investigator Awardee. His past accomplishments include the Ruth L. Kirchstein NIH Postdoctoral Fellow, National NASA Space Fellow, as well as several conference awards for outstanding original research. Dr. Barker has been an active member of ASMB since 2002 and is currently serving on the Program Committee for the 2012 meeting.

Tom Barker

2012 ISMB Distinguished Investigator Award

The 2012 ISMB Distinguished Investigator award winner is Dr. Richard O. Hynes. Dr. Hynes is a Daniel K. Ludwig Professor for Cancer Research and an Investigator of the Howard Hughes Medical Institute at MIT. He received his B.A. in biochemistry from the University of Cambridge, U.K., and his Ph.D. in biology from MIT in 1971. After postdoctoral work at the Imperial Cancer Research Fund in London, where he initiated his work on cell adhesion, he returned to MIT as a faculty member. For more than three decades, Dr. Hynes has worked to uncover the specific proteins that govern cell adhesion and migration in healthy tissues and in various disease states. He has made substantial contributions to establishing the field of cell adhesion. Through his investigation of the molecular changes on cell surfaces that distinguish cancer cells from normal cells, he discovered fibronectin. His work was instrumental in establishing integrins as a major family of cell adhesion receptors and a critical link between the extracellular matrix and intracellular pathways. Many of his current research projects study cell adhesion in tumor invasion, metastasis, and angiogenesis using mice with targeted mutations in adhesion proteins. Hynes is a fellow of the Royal Society of London, the American Academy of Arts and Sciences, and the American Association for the Advancement of Science, and a member of the National Academy of Sciences and the Institute of Medicine.



Richard Hynes

Tell Us What Your Lab is Doing!

From the laboratory of Rocky S. Tuan, Ph.D
University of Pittsburgh

Our lab, the Center for Cellular and Molecular Engineering, is currently pursuing a range of projects that can be grouped around three main topics: stem cell biology, tissue engineering, and osteoarthritis and cartilage pathobiology. As diverse as these areas are, nearly every project in the lab considers the extracellular matrix to some extent.

Center for Cellular and Molecular Engineering. Top Row (L to R): Mark Howard, Mark Langhans, Benjamin Rothrauff, Karen Clark, Solvig Diederichs, Heidi Hofer, Lauren Statman, Lauren Bonomo, Anthony Cheng. Middle Row (L to R): Ryan Koch, Peter Alexander, Riccardo Gottardi, Beverly Knasko, Jian Tan, Charles Tuan, Allison Bean, Guang Yang, Thomas Lozito, Hang Lin, Timothy McCann. Bottom Row (L to R): Veronica Ulici, Haruyo Yagi, Natasha Baker, Rocky Tuan, Kristy Shine, Dongning Zhang, Bonnie Tesch

Most of the stem cell research conducted in the lab focuses on mesenchymal stem cells (MSCs). MSCs have traditionally been thought of in terms of their multilineage differentiation potential, being able to differentiate into bone, fat, and cartilage. However, their true therapeutic potential may lie in the regulatory influences MSCs exert on their environments. There is strong evidence to suggest that MSCs occupy a perivascular niche in a variety of vascularized tissues, affording them a prime location for regulating vascular events such as angiogenesis, cancer, and wound healing. In most traumatic injuries, disruption of the vascular bed is one of the biggest obstacles for recovery, and reformation of the vasculature is critical for healing. Tightly wrapped around the vessels, MSCs interact with another critical regulator of the vascular environment, matrix. Focusing on the regulatory effects of MSCs on vascular matrix and structure, we found that MSC-secreted TIMPs protect vessel destruction by MMP-2, a protease secreted by most cancer cells during metastasis (1). TIMPs are the natural inhibitors of MMPs, and MSCs secrete them in high levels over multiple conditions. We are currently looking to take advantage of this ability of MSCs to stabilize and protect vessels, through both cell-cell contact and secreted factors, by including MSCs in engineered vessels where stability is critical.

Another group of projects involving stem cells considers the effects of decellularized matrix on MSC biology. For example, within the perivascular niche, MSCs also interact with endothelial cells (ECs), the primary vascular cell type. We looked at the effects of matrix secreted by ECs on MSCs by culturing MSCs directly on decellularized EC matrix and studying what effects this had on MSC differentiation towards vascular cell lineages. We found that the same EC matrix supports EC and then smooth muscle cell (SMC) differentiation (2). We traced this shift in matrix differentiation capacity to MSC-induced matrix alterations (3). Thus, rather than merely responding to signals from the matrix, MSCs altered the very signals acting upon them, ultimately regulating their own differentiation. We're finding that these types of feedback loops are very common in cell-matrix interactions involving stem cells. For instance, depending on the cell's differ-

The Professional Development and Diversity Committee Needs You!

The ASMB is looking for a committed society member to head our Professional Development and Diversity Committee. The chair of this committee is responsible for leading the society's efforts in advising, mentoring, and promoting the careers of junior investigators in matrix biology. The new chair will be involved in career development activities at the biennial meeting. As an example, the committee sponsored a Career Mentoring Breakfast at the 2010 ASMB meeting. This event was highly successful and will again be offered at the 2012 meeting. The new chair of this committee will be encouraged to devise activities to support young scientists throughout the year. If you are interested in matrix biology, the ASMB, and helping junior investigators, please contact Kendra LaDuca at kladuca@faseb.org

entiation state, decellularized MSC matrix specifically induces proliferation, migration, and differentiation in other stem cells (4).

Tissue engineering involves the application of traditional engineering techniques towards fabricating functional tissue constructs, and most of the tissue engineering projects in the lab are aimed at modulating stem cell behavior through engineered matrix scaffolds. For example, synthetic fiber scaffolds that mimic matrix nanostructure are fabricated using electrospinning to provide the high surface areas and pore densities conducive to tissue formation. Electrospinning utilizes a high electric field to draw fibers from solutions of polymers, whether biological or synthetic, and can be controlled to alter the diameter of the fibers, thereby creating nano- to micro-fibers. We are looking at how these various fiber properties affect stem cell behavior and differentiation. Researchers in the lab are also trying to overcome the problems that have plagued researchers attempting to uniformly distribute cells within engineered constructs. During native tissue development, cells build their matrix environments around them. In traditional tissue engineering practices, cells are seeded onto pre-formed tissue constructs. Depending on the cell type and construct thickness, it can be difficult to attain uniform cell distribution throughout the construct. We are addressing these challenges with the use of projection stereolithography, a process in which 3-D materials are being printed down one layer at time. Our lab has adapted this process to create tissue constructs containing cells by developing hydrogels that are able to be crosslinked with visible light. In this manner, the cell-containing hydrogel solutions are printed down and crosslinked with harmless visible light, allowing complex tissues to be created one layer at a time.

Another major research focus in the lab is osteoarthritis, the most common form of degenerative joint disease, with special attention paid to the changes that occur to cartilage matrix during disease progression. We use highly sensitive techniques including atomic-force microscopy and scanning electron microscopy to investigate the structural changes to collagen fibers that occur during osteoarthritis, either as a result of natural disease progression or by virtue of experimentally applied mechanical impact to produce injury. These changes are being linked to matrix alterations caused by proteases and shifts in matrix molecule expression, indicating that these analytical microscopy techniques can be applied in new ways to classify disease states and assess engineered cartilage constructs.

References

1. *Lozito TP, Tuan RS. Mesenchymal stem cells inhibit both endogenous and exogenous MMPs via secreted TIMPs. J Cell Physiol. 2011 Feb;226(2):385-96.*

2. *Lozito TP, Kuo CK, Taboas JM, Tuan RS. Human mesenchymal stem cells express vascular cell phenotypes upon interaction with endothelial cell matrix. J Cell Biochem. 2009 Jul 1;107(4):714-22.*

3. *Lozito TP, Taboas JM, Kuo CK, Tuan RS. Mesenchymal stem cell modification of endothelial matrix regulates their vascular differentiation. J Cell Biochem. 2009 Jul 1;107(4):706-13.*

4. *Lin H, Yang G, Tan J, Tuan RS. Influence of decellularized matrix derived from human mesenchymal stem cells on their proliferation, migration and multi-lineage differentiation potential. Biomaterials. 2012 Jun;33(18):4480-9.*

Call for ASMB Council Nominations!

It's that time of year! There will be openings on the ASMB Council for the 2013-2016 term. We are now accepting nominations (self nominations gladly accepted). If you are interested in being more involved in the ASMB and its activities or if you have questions about society leadership duties, please email Kendra at kladuca@faseb.org by August 15th (date dependent on newsletter distribution).

As an ASMB member, you receive a 33% discount on all new volumes of the **Biology of Extracellular Matrix** series, with a portion of royalties going to the Society. The first new volume in the series: "***Extracellular Matrix: An Overview***" is now available. The objective of this overview volume is to update and build upon topics discussed in previous volumes in this series as well as in classic ECM review texts, such as Betty Hay's *Cell Biology of Extracellular Matrix*. The new volume focuses on the major molecules that make up the ECM and will serve as an up-to-date reference for the beginner and matrix aficionado alike. The volume chapters are:

An Overview of Extracellular Matrix Structure and Function
Jürgen Engel and Matthias Chiquet

Fibronectin and Other Adhesive Glycoproteins
Jielin Xu and Deane Mosher

Collagens, Suprastructures, and Collagen Fibril Assembly
David E. Birk and Peter Brückner

Basement Membranes
Jeffrey H. Miner

Hyaluronan and the Aggregating Proteoglycans
Thomas N. Wight, Bryan P. Toole, and Vincent C. Hascall

Small Leucine-Rich Proteoglycans
Renato V. Iozzo, Silvia Goldoni, Agnes Berendsen and Marian F. Young

Microfibrils and Fibrillin
Dirk Hubmacher and Dieter P. Reinhardt

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Matricellular Proteins
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Other volumes in the series include:
Glycans in Disease and Therapeutics
Extracellular Matrix Degradation
Extracellular Matrix in Development (in production)
Evolution of Extracellular Matrix (in production)

Information about this and other volumes in the series can be found at www.springer.com/series/8422. The ASMB member discount can only be obtained when orders are placed directly at orders-HD-individuals@springer.com. Please confirm with your order that you are a member of the ASMB and that you would like to order the volume at the special member price.