JACOB HESKEL GABBAY AWARD IN BIOTECHNOLOGY AND MEDICINE
Early in 1998, the trustees of the Jacob and Louise Gabbay Foundation decided to establish a major new award in basic and applied biomedical sciences. The foundation felt that existing scientific awards tended to honor people who were already well-recognized or to focus on work that had its primary impact in traditional basic research fields. Yet the history of science suggests that most scientific revolutions are sparked by advances in practical areas such as instrumentation and techniques or through entrepreneurial endeavors. The foundation therefore created the Jacob Heskel Gabbay Award in Biotechnology and Medicine to recognize, as early as possible in their careers, scientists in academia, medicine or industry whose work had both outstanding scientific content and significant practical consequences in the biomedical sciences. Because of their long association with Brandeis University, the trustees of the foundation asked the Rosenstiel Basic Medical Sciences Research Center at Brandeis to administer the award.
The award, given annually, consists of a $15,000 cash prize (to be shared in the case of multiple winners) and a medallion. The honorees travel to Brandeis University each fall to present lectures on their work and attend a dinner at which the formal commendation takes place. This year, a committee of distinguished scientists selected Edward S. Boyden of the Massachusetts Institute of Technology, Karl Deisseroth of Stanford University and Gero Miesenböck of the University of Oxford for their contributions to the discovery and applications of a method called optogenetics. Optogenetics is a technology that allows scientists to control the brain’s activity by genetically engineering neurons to fire in response to light. Hundreds of labs have started using the technique to manipulate brain activity in experimental animals, exploring the neurobiology of underlying behaviors — such as decision-making
— and neurodegenerative diseases. The technique is expected to have a significant impact on the BRAIN Initiative that President Obama announced in April.

The Jacob and Louise Gabbay Foundation was founded by its namesakes in 1969. The late Jacob Gabbay, a physician, moved his family from Baghdad to the United States in 1952, maintaining a medical practice in New York City until 1982. The foundation, originally intended to help students of Iraqi descent pursue higher education in Israel, has subsequently funded computer education for Israeli high schoolers and various medical projects. Louise Gabbay established the Gabbay Award, the foundation’s first American endeavor, in honor of her husband, who passed away in 1995.
PRESIDING

Dagmar Ringe
Professor of Biochemistry, Chemistry and
Rosenstiel Basic Medical Sciences Research Center

WELCOME

Steve A.N. Goldstein ’78, MA’78, MD, PhD, FAAP
Provost and Chief Academic Officer

ADDRESS

Eve Marder
Head, Division of Science
Victor and Gwendolyn Beinfield Professor
of Neuroscience
PRESENTATION OF MEDALLIONS AND AWARDS

Dagmar Ringe

RESPONSE

Karl Deisseroth

Edward Boyden

Gero Miesenböck
Karl Deisseroth

Karl Deisseroth is the D.H. Chen Professor of Bioengineering and Psychiatry at Stanford University. He earned an A.B. from Harvard and an M.D./Ph.D. from Stanford.

Deisseroth serves as director of undergraduate education in bioengineering at Stanford and is a practicing psychiatrist board-certified by the American Board of Psychiatry and Neurology. He has developed and applied novel technologies for controlling (optogenetics) and imaging (CLARITY) specific elements within intact biological systems, and he continues to develop and apply new technologies to study physiology and behavior in health and disease as well as train researchers around the world.
He has received the National Institutes of Health’s Pioneer Award (2005), the Schuetze Prize (2008), the Society for Neuroscience’s Young Investigator Award (2009), the Koetser Prize (2010), the Nakasone Award (2010), the Spencer Award (2011), the Perl/UNC Prize (2012), the Zuelch Prize (2012), the Pasarow Award (2013), the Brain Prize (2013) and the Lounsbery Award (2013). Deisseroth is a member of the Institute of Medicine and the National Academy of Sciences.
Edward Boyden

Edward Boyden is associate professor of biological engineering and brain and cognitive sciences at the MIT Media Lab and the MIT McGovern Institute. He leads the Synthetic Neurobiology Group, which develops tools for analyzing and engineering the circuits of the brain.

In 2000, Boyden and Karl Deisseroth began to discuss using opsins to manipulate neural activity, and in early 2004, they established a collaboration with Georg Nagel and Ernst Bamberg that led to a successful demonstration of opsin-mediated neural activation using the light-gated cation channel channel-rhodopsin-2 (ChR2). Boyden’s group has introduced novel optogenetic tool classes into neuroscience, including halorhodopsins (2007) and bacteriorhodopsins (2010) for optical neural silencing. They have optimized these opsins for novel neuroscientific appli-
cations and developed complementary technologies, such as scalable integrative cell analysis and neural recording technologies, often through interdisciplinary collaborations.

Boyden has received the Brain Prize, the Society for Neuroscience’s Research Award for Innovation in Neuroscience, the Perl/UNC Prize, the A.F. Harvey Prize, the Paul Allen Distinguished Investigator Award and the National Institutes of Health’s Director’s New Innovator Award, and his work was featured by the journal Nature Methods as 2010 “Method of the Year,” among other recognitions. He has contributed to more than 300 peer-reviewed papers, articles and current or pending patents, and he has given more than 200 invited talks on his work.
Gero Miesenböck

Gero Miesenböck is the Waynflete Professor of Physiology and director of the Centre for Neural Circuits and Behaviour at the University of Oxford. A native of Austria, he received an MD from the University of Innsbruck in 1993 and was a postdoctoral fellow at Memorial Sloan-Kettering Cancer Center until 1998. Before coming to Oxford in 2007, he held faculty appointments at Memorial Sloan-Kettering Cancer Center and Yale University.
Eve Marder

Eve Marder earned a PhD at the University of California, San Diego, and did postdoctoral work at Paris’ École Normale Supérieure. She is head of the science division and the Beinfield Professor of Neuroscience at Brandeis and past-president of the Society for Neuroscience. She is a member of the National Academy of Sciences and the American Academy of Arts & Sciences. She received the Salpeter Award from Women in Neuroscience, the Gerard Prize from the Society for Neuroscience, the George A. Miller Award from the Cognitive Neuroscience Society, the Karl Spencer Lashley Award from the American Philosophical Society, an honorary doctorate from Bowdoin College, and the 2013 Gruber Prize in Neuroscience. She serves on the Director’s BRAIN Working Group of the NIH.

Marder studies the dynamics of small neural circuits and was instrumental in demonstrating that neuronal circuits are not “hardwired” but can be reconfigured by neuromodulatory neurons and substances. Her lab pioneered studies of homeostatic regulation of intrinsic membrane properties, and stimulated work on the mechanisms by which brains remain stable while allowing for change during development and learning. Marder now studies how similar network performances can arise from different sets of underlying network parameters, opening up rigorous studies of the variations in individual brains of normal healthy animals.
PREVIOUS WINNERS OF THE JACOB HESKEL GABBAY AWARD IN BIOTECHNOLOGY AND MEDICINE

1999
for their entrepreneurial roles in the creation of some of the most successful biotechnology firms

David V. Goeddel
Chief Executive Officer
Tularik Inc.
San Francisco, Calif.

Thomas P. Maniatis
Thomas H. Lee Professor of Molecular and Cellular Biology
Harvard University
Cambridge, Mass.

William J. Rutter
Chairman Emeritus
Chiron Corporation
Emeryville, Calif.

2000
for his leadership in genome sequencing

J. Craig Venter
Founder and Chief Scientific Officer
Celera Genomics Corporation
Rockville, Md.
2001

for his pioneering achievements in miniaturization of fundamental biochemical experiments

J. Michael Ramsey
Chemical and Analytical Sciences Division
Oak Ridge National Laboratory
Oak Ridge, Tenn.

2002

Dr. Rastetter for his pioneering contributions in the development of antibody-based drugs; Dr. Slamon for his role in the development of the HER-2 immunotherapy against certain types of breast cancer, a pioneering contribution to medicine; and Dr. Winter for his pioneering role in the development of humanized monoclonal antibodies, and for the founding of the company Cambridge Antibody Technology (CAT) in the United Kingdom

William H. Rastetter, PhD
Chairman, and Chief Executive Officer
IDEC Pharmaceuticals Corp.
San Diego, Calif.

Dennis J. Slamon, MD, PhD
Executive Vice Chair for Research and Professor of Medicine
UCLA School of Medicine
Los Angeles, Calif.

Gregory P. Winter, CBE, FRS
Joint Head of Division of Protein & Nucleic Acid Chemistry
MRC Laboratory of Molecular Biology
Cambridge, England
2003

for their development of yeast two-hybrid and yeast mating interaction traps

Roger Brent
President and Research Director
The Molecular Sciences Institute
Berkeley, Calif.

Stanley Fields
Howard Hughes Medical Institute
Department of Genome Sciences and Medicine
University of Washington
Seattle, Wash.

2004

for his many contributions to the biotechnology industry

George M. Whitesides
Woodford L. and Ann A. Flowers
University Professor
Harvard University
Cambridge, Mass.

2005

for their roles in the development and use of molecular beacons as a diagnostic tool in vivo, and in the detection of RNA in living cells

Fred R. Kramer
Professor of Microbiology and Molecular Genetics
New Jersey Medical School; and Member,
Public Health Research Institute
Newark, N.J.

Sanjay Tyagi
Professor, Department of Medicine,
New Jersey Medical School; and Member,
Public Health Research Institute
Newark, N.J.
2006
for their role in the development of contrast agents used in cardiodiagnostic procedures

Dr. Alan Davison
Professor Emeritus of Chemistry
Massachusetts Institute of Technology
Cambridge, Mass.

Dr. Alun Gareth Jones
Professor of Radiology
Harvard Medical School & Brigham and Women’s Hospital
Boston, Mass.

2007
for pioneering the technology of gene targeting in mouse embryo-derived stem (ES) cells that allows scientists to create mice with mutations in any desired gene by choosing which gene to mutate and how to mutate it

Dr. Mario Capecchi
Howard Hughes Medical Institute
Professor of Human Genetics
University of Utah, School of Medicine
Salt Lake City, Utah

2008
for his seminal basic-science discoveries, including regulated protein turnover in bacteria and mitochondria and, most importantly, the development of proteasome inhibitors as a treatment for cancer

Dr. Alfred Goldberg
Professor of Cell Biology
Harvard Medical School
Boston, Mass.
2009

for their significant contributions in the field of assisted human reproduction

Dr. Alan H. Handyside
Visiting Professor
University of Leeds, and
Director of the London Bridge Fertility, Gynaecology and Genetics Centre
London, England

Dr. Ann A. Kiessling
Associate Professor
Harvard Medical School, and
Director of the Bedford Stem Cell Research Foundation
Bedford, Mass.

Dr. Gianpiero D. Palermo
Professor
New York Presbyterian Hospital, Weill Medical College of Cornell University, and
Director of Assisted Fertilization and Andrology at the Center for Reproductive Medicine and Infertility
New York, N.Y.

2010

for her work on aromatase inhibitors for breast cancer

Dr. Angela Hartley Brodie
Professor of Pharmacology
University of Maryland
Marlene and Stewart Greenebaum Cancer Center
Baltimore, Md.
2011

for his work on the immune responses by T cells, a type of lymphocyte

James P. Allison
Howard Hughes Medical Institute Investigator and Chair of the Immunology Program
Memorial Sloan-Kettering Cancer Center
New York, N.Y.

2012

for their work in identifying the negative cellular effects of bisphenol in plastics, and for alerting the commercial sector in order to prevent its further use

Patricia Hunt
Professor, School of Molecular Biosciences
Washington State University
Pullman Wash.

Ana M. Soto
Professor, Department of Anatomy and Cellular Biology
Tufts University School of Medicine
Boston, Mass.

Carlos Sonnenschein
Professor, Department of Anatomy and Cellular Biology
Tufts University School of Medicine
Boston, Mass.