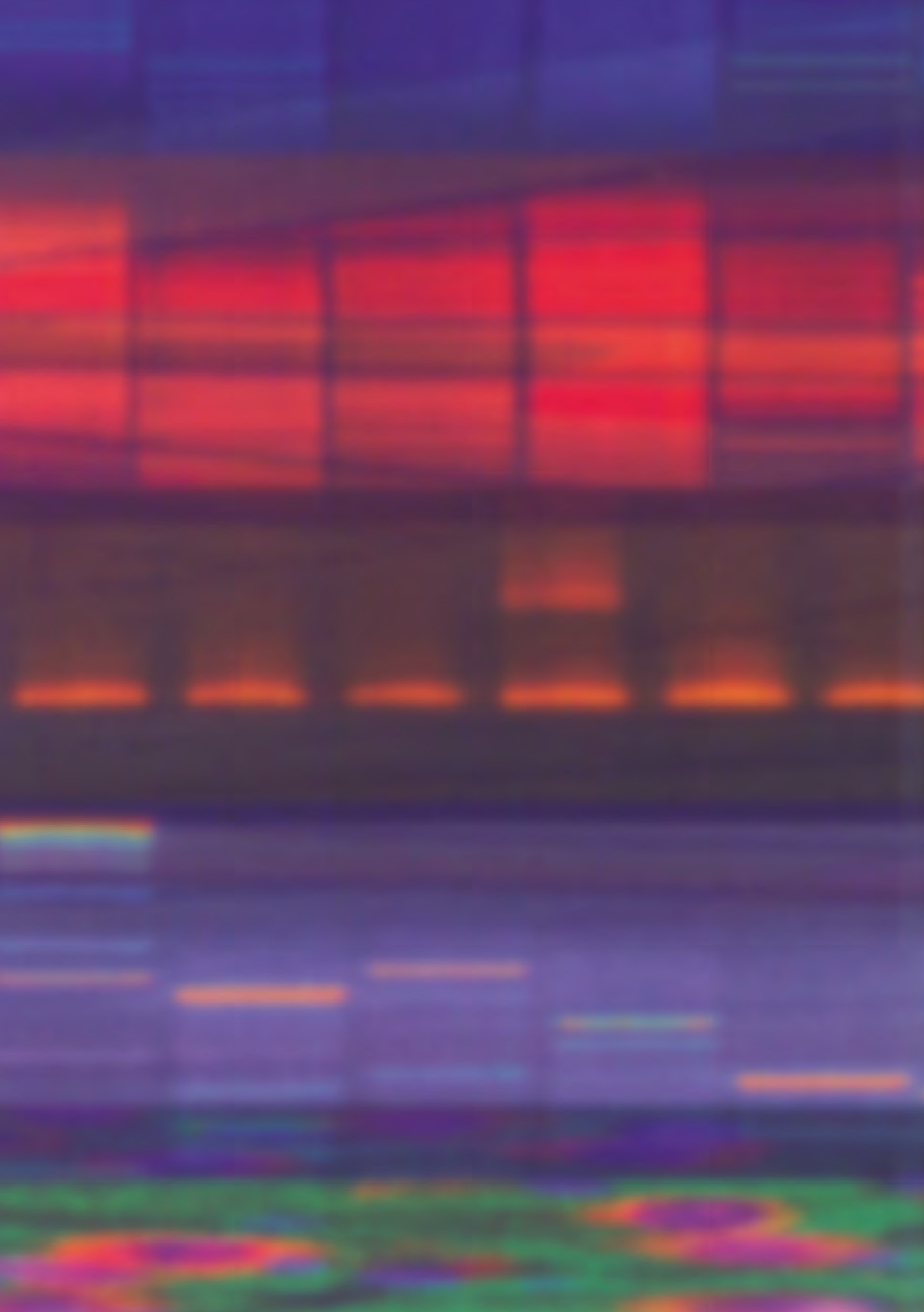
Mendel Lectures
2008—2009




2008 — 2009

Jan-Michael Peters

*1962

IMP, Vienna, Austria

October 9, 2008

Jan-Michael Peters is a German cell and molecular biologist. He studied biology at Kiel and Heidelberg. He obtained his PhD from the University of Heidelberg in 1991, where he worked with Werner Franke, discovered p97-ATPase and the AAA-ATPase family, and first purified and structurally characterized the 26S proteasome. As a postdoctoral fellow with Marc Kirschner at Harvard Medical School in Boston, he discovered the anaphase promoting complex/cyclosome (APC/C) and other enzymes required for chromosome segregation. In 1996 he became Junior Group Leader, in 2002 Senior Scientist, in 2011 Scientific Deputy Director, and in 2013 Scientific Director of the Institute of Molecular Pathology (IMP) in Vienna.

The lab of Dr. Peters is studying genome architecture and chromosome segregation in mammalian cells and has made important contributions to understanding the molecular mechanisms of these processes, including developing the hypothesis that cohesin and CTCF contribute to genome architecture by forming chromatin loops.

Dr. Peters has received numerous awards including the Wittgenstein Prize and two ERC advanced grants, and has coordinated several large-scale research projects, such as the European Union projects MitoCheck and MitoSys. He has been a member of EMBO since 2002, of the Austrian Academy of Sciences since 2012, and of the Academia Europaea since 2014. He has participated in several public outreach activities, served as an advisor for the exhibition "Mendel, the genius of genetics" (Brno, 2002–2003), co-organized the exhibition "Lens on Life" (Rome 2014, London 2014, Heidelberg 2015), co-organized and participated in the film documentary "Meetings of Minds" (2014), and has given iBio talks (2019). He has also initiated industrial collaborations to explore the therapeutic potential of cell cycle inhibitors, such as the PLK1 inhibitor Volasertib, which is in clinical trials for the treatment of paediatric cancers.

How Cohesin Controls Sister Chromatid Cohesion and Transcription

Photo: Lukas Beck

Andrea Musacchio

*1964

European Institute of Oncology, Milan, Italy

November 20, 2008

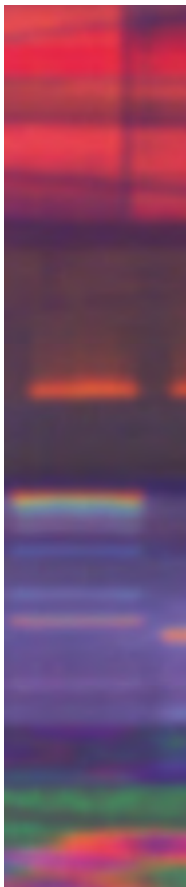
Andrea Musacchio is an Italian structural and molecular cell biologist, who focuses on the structure and function of the kinetochore, an extremely complex structure that plays a key role in the distribution of chromosomes among the daughter cells when a cell divides.

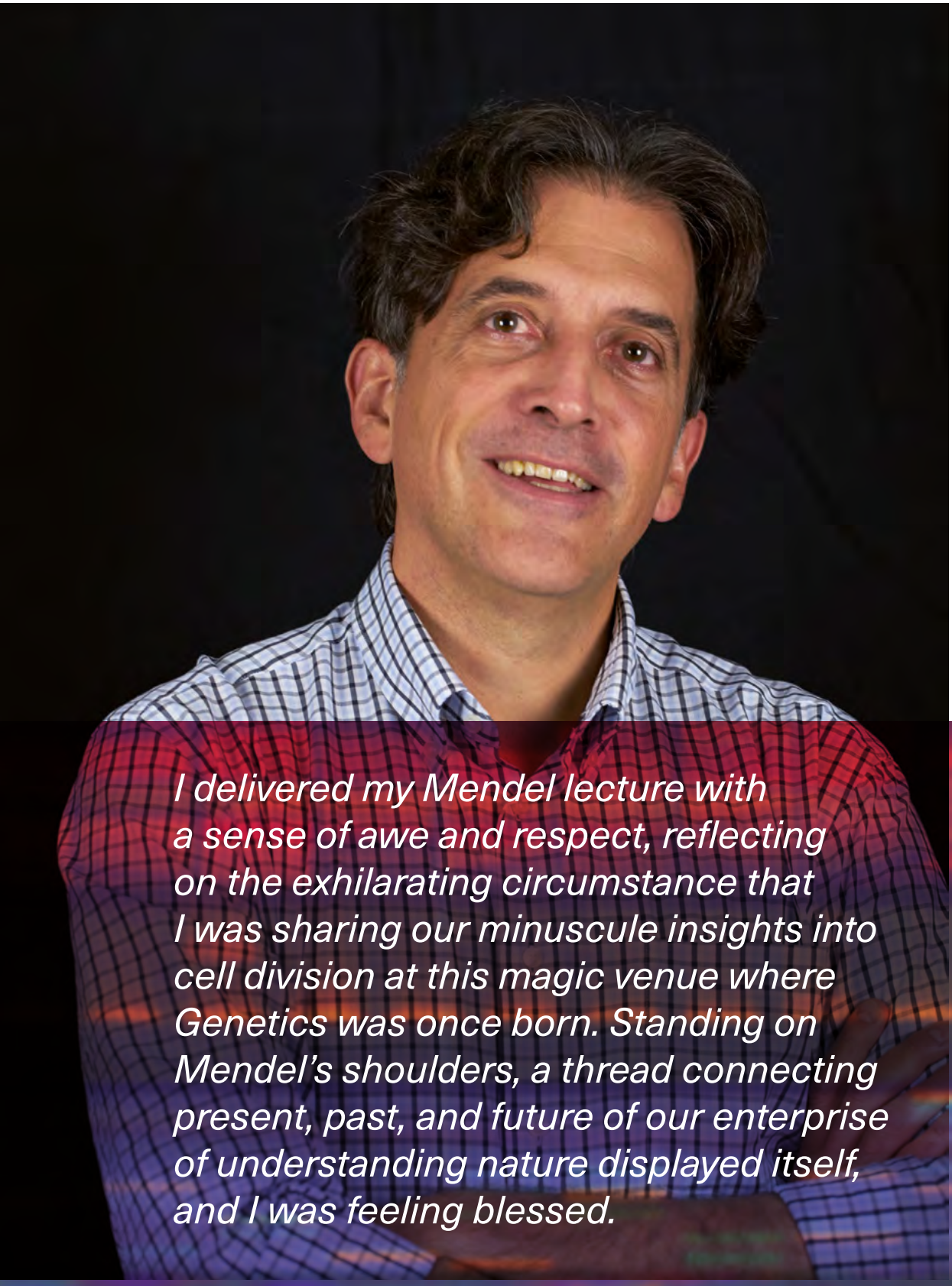
Andrea Musacchio graduated in biology from the Tor Vergata University in Rome in 1990. He later moved to the European Molecular Biology Laboratory in Heidelberg to carry out his PhD work in the area of biochemistry and structural biology. After receiving his PhD degree from the University of Heidelberg early in 1995, Musacchio moved to the Harvard Medical School to work as a postdoctoral fellow in the laboratory of Stephen C. Harrison. In Boston, Musacchio worked on the structural characterization by X-ray crystallography and electron microscopy of proteins implicated in trafficking of membrane and proteins in cells.

Late in 1998, Musacchio gained a position at the European Institute of Oncology in Milan, where he started directing a research group investigating the molecular mechanisms of mitosis with emphasis on the spindle assembly checkpoint using a combination of structural, biochemical, and cell biological methods. His work on the Mad1/Mad2 complex led to the formulation of the influential *Mad2 template model*. Musacchio's laboratory has also made important contributions to the understanding of the role of the Aurora B, BUB1, Haspin, Mps1, and Plk1 kinases in mitosis. Structural work on various kinetochore complexes, such as the Ndc80 and Mis12 complexes, in the Musacchio laboratory also set the groundwork for new lines investigation on kinetochore assembly and microtubules attachment.

In 2009, Musacchio was elected a member of the European Molecular Biology Organization (EMBO). In 2011, he moved to Dortmund to direct the Department of Mechanistic Cell Biology at the Max Planck Institute of Molecular Physiology. In 2020 he received the Leibniz Prize for his pioneering work in structural biology, specifically the mechanisms of chromosome segregation in cell division, and took over the chair of the Max Planck Society's Biology and Medicine Section.

Molecular Bases of Chromosome Segregation





I delivered my Mendel lecture with a sense of awe and respect, reflecting on the exhilarating circumstance that I was sharing our minuscule insights into cell division at this magic venue where Genetics was once born. Standing on Mendel's shoulders, a thread connecting present, past, and future of our enterprise of understanding nature displayed itself, and I was feeling blessed.

Jonas Frisén

*1966

Karolinska Institute, Stockholm, Sweden

March 26, 2009

Jonas Kristoffer Frisén is a Swedish molecular biologist and stem cell researcher.

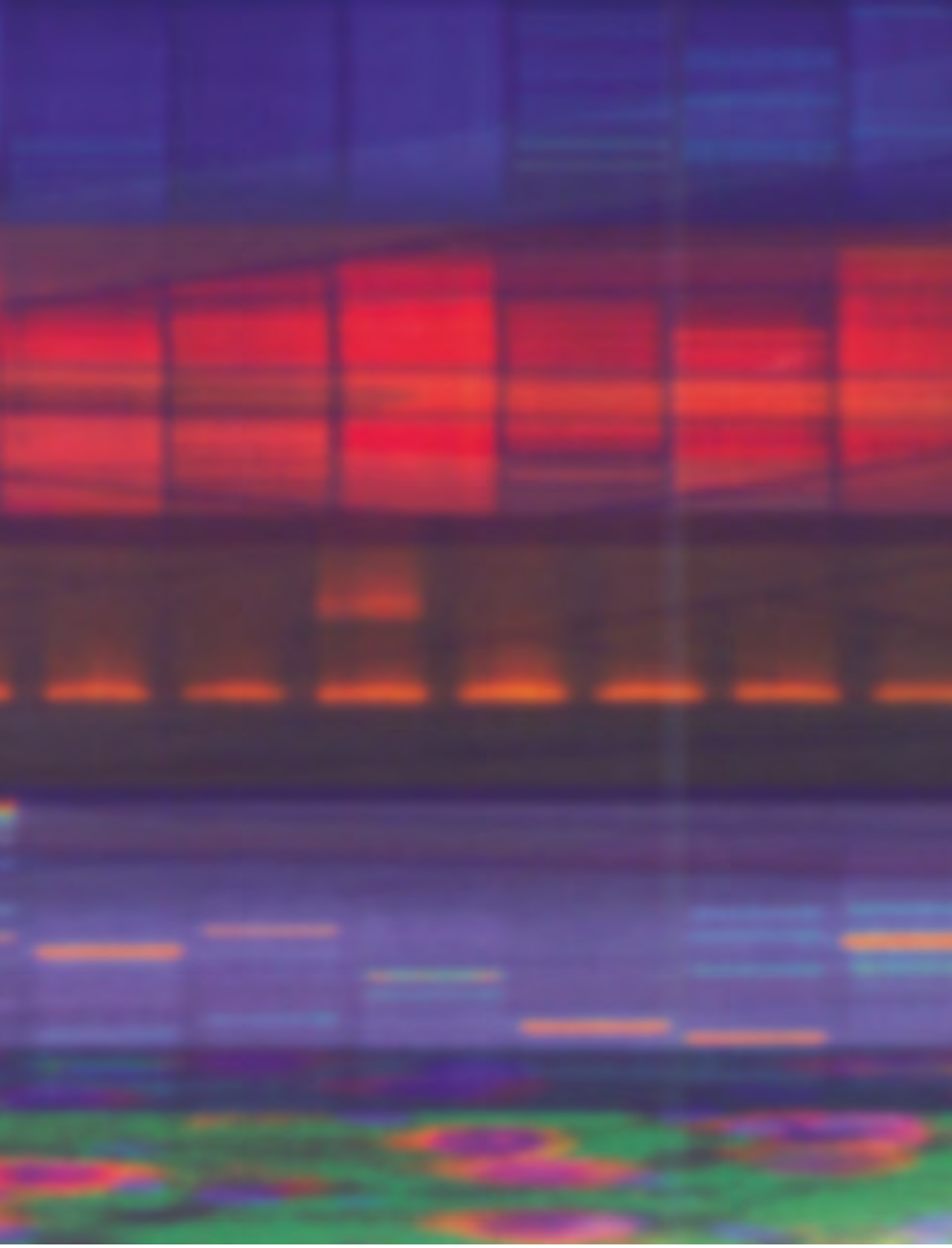
Frisén defended his dissertation at the Karolinska Institute in 1993 and graduated with a PhD in 1995. He co-founded Neuronova AB in 1998 and in 2001 was appointed professor of stem cell research at Karolinska.

Frisén's group is interested in the role of stem cells in cell turnover in healthy and pathological situations. Many of their projects focus on stem cells in the brain and spinal cord and adult neurogenesis. They are also interested in cell renewal in the heart and use the intestine as a stem cell and cancer model system. They have developed a method to study cell turnover by analyzing the integration in DNA of 14C derived from a nuclear bomb test, and use this to assess cell renewal in humans. Also, the group recently showed that it is possible to affect stem cells in the nervous system in order to contribute to functional recovery.

Frisén was awarded the Göran Gustafsson Prize in Molecular Biology in 2002. He became a member of the European Molecular Biology Organization (EMBO) in 2003 and a member of Royal Swedish Academy of Engineering Sciences in 2005.

Jonas Frisén was awarded the Hilda and Alfred Eriksson Prize 2010 in medicine, and the Akzo Nobel Science Award Sweden in 2011. In the same year he was elected as a member of the Royal Swedish Academy of Sciences. In 2017, he was awarded the Fernström Prize.

New Neurons in Old Brains



Venki Ramakrishnan

*1952

MRC Laboratory of Molecular Biology, Cambridge, UK

March 26, 2009

Venkatraman "Venki" Ramakrishnan is an Indian-born British-American structural biologist. In 2009, he shared the Nobel Prize in Chemistry with Thomas A. Steitz and Ada Yonath, for studies of the structure and function of the ribosome.

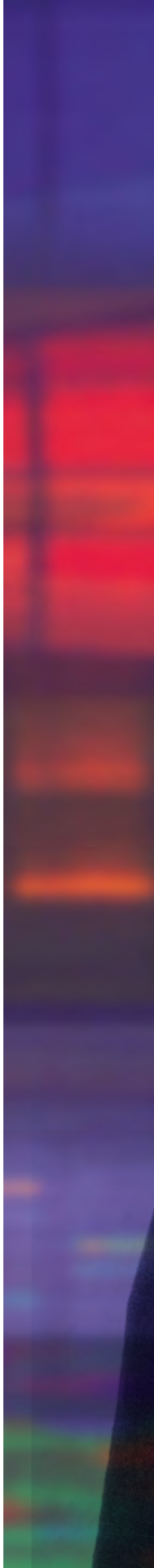
Ramakrishnan graduated with a BSc degree in physics in 1971 from the Maharaja Sayajirao University in Baroda, India. Immediately after graduation he moved to the US, where he obtained his PhD in physics from Ohio University in 1976. Then he spent two years studying biology as a graduate student at the University of California, San Diego, while making a transition from theoretical physics to biology. As a postdoctoral fellow at Yale University, Ramakrishnan began work on ribosomes and he continued this research as a staff scientist at Brookhaven National Laboratory (1983–95). In 1995 he moved to the University of Utah as a Professor of Biochemistry, and in 1999, he moved to his current position at the Medical Research Council Laboratory of Molecular Biology in Cambridge, England.

He determined the atomic structure of the 30S ribosomal subunit followed by structures of the entire ribosome in many different states and in complexes with several antibiotics. He further provided insights into the mechanism that ensures the fidelity of protein biosynthesis. More recently, he has been using electron microscopy to visualize ribosomes in action in higher organisms. His work has advanced our understanding of how the ribosome works and how antibiotics inhibit it. In the past he has also worked on histone and chromatin structure, which help us to understand how DNA is organized in cells.

Ramakrishnan was elected a member of the European Molecular Biology Organization (EMBO) in 2002, a Fellow of the Royal Society (FRS) in 2003, and a member of the US National Academy of Sciences in 2004. In 2007, Ramakrishnan was awarded the Louis-Jeantet Prize for Medicine. In 2008 he won the Heatley Medal of the British Biochemical Society. In 2008, he was elected a Fellow of Trinity College, Cambridge, and a foreign Fellow of the Indian National Science Academy.

In 2010, he received India's second highest civilian honour, the Padma Vibhushan. Ramakrishnan was knighted in 2012 for services to molecular biology and was awarded the Sir Hans Krebs Medal by the FEBS. In 2015 he was elected President of the Royal Society for a term of five years and in 2020 Ramakrishnan was elected to the American Philosophical Society.

What Structures of the Ribosome Have Revealed About Its Central Role in Trans-lating Genetic Information



Mendel's studies on genetics paved the way for the growth of modern biology and it was both fascinating and a pleasure to visit the abbey where he did his work and deliver a lecture in his honour.

Dame Frances Ashcroft

*1952

University of Oxford, UK

May 14, 2009

Frances Mary Ashcroft is a British ion channel physiologist. Her research group has an international reputation for work on insulin secretion, type II diabetes and neonatal diabetes.

Ashcroft's first degree was in natural sciences at Cambridge University. She continued at Cambridge to complete a PhD in zoology, which she obtained in 1978. After that Ashcroft switched to physiology and did postdoctoral research at Leicester University and the University of California at Los Angeles. Following her return to Europe, Ashcroft set up her own lab at Oxford studying how a rise in blood sugar stimulates the release of insulin from the beta-cells of the pancreas and, in 1996, she was appointed Professor. She became a Fellow at Trinity College in 2001.

Ashcroft's research focuses on ATP-sensitive potassium channels that close in response to glucose metabolism, and their role in insulin secretion. Her work focuses on explaining how impediments in this process give rise to type-2 diabetes and how drugs used to treat this condition exert their beneficial effects. Her work with Andrew Hattersley has helped enable children born with a rare inherited form of diabetes, caused by mutations in ATP-sensitive potassium channel genes, to switch from insulin injections to tablet therapy. Alongside her research, she has also published a number of textbooks and popular science books.

Ashcroft has received numerous awards and honours. She was elected a Fellow of the Royal Society in 1999 and the same year was elected a Fellow of the Academy of Medical Sciences. In 2007 she was awarded the Walter B. Cannon Award, the highest honour bestowed by the American Physiological Society. Frances Ashcroft was the European laureate for the L'Oreal-UNESCO Award for Women in Science in 2012 and was also awarded the Croonian Lecture by the Royal Society (2013). In 2015, she was appointed Dame Commander of the Order of the British Empire (DBE) "for services to Medical Science and the Public Understanding of Science".

Neonatal Diabetes: From Ion Channel to Disease

Photo: Robert Taylor

Walter Keller

*1938

University of Basel, Switzerland

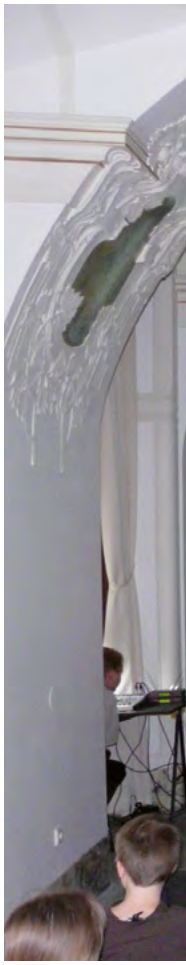
May 21, 2009

Walter Keller is a German cell biologist, professor emeritus of the Department of Cell Biology at the Biozentrum of the University of Basel.

He graduated with a Doctor of Medicine degree from the Medical Academy in Düsseldorf, Germany, in 1962 and obtained his PhD in biochemistry and molecular biology at the State University of New York in Stony Brook, USA, in 1974. After finishing his medical studies, he held a position at the University of Freiburg till 1968, then leaving for postdoctoral work in the Department of Biophysics at Johns Hopkins University Medical School in Baltimore, USA. After a year at the National Institutes of Health in Bethesda, Maryland, he spent six years at the Cold Spring Harbor Laboratory in New York. In 1976 he moved to the Department of Microbiology at the University of Heidelberg, Germany, and in 1980 became a head of the Division of Molecular Biology at the Institute of Cell and Tumor Biology at the German Cancer Research Center in Heidelberg. In 1987 he became a professor in the Department of Cell Biology at the Biozentrum of the University of Basel, where he became a professor emeritus in 2008.

His research focuses on the biochemistry and molecular biology of the processing of eukaryotic messenger RNA and transfer RNA precursors in yeast and human cells. Keller made multiple seminal discoveries in molecular biology. His early work at Cold Spring Harbour Laboratories was focused on mechanisms of RNA transcription. After establishing his group in Heidelberg, he made key discoveries of the principles of pre-mRNA 3'end processing in eukaryotic cells. He dedicated his entire scientific career to uncovering the machines involved in 3' pre-mRNA cleavage and polydenylation. In parallel, he significantly contributed to the understanding of mechanisms of pre-mRNA splicing and A to I editing of mRNAs and tRNAs.

Keller has been a member of the European Molecular Biology Organization (EMBO) since 1978, was elected as a member of Academia Europaea in 1989, was awarded the 1998 Louis-Jeantet Prize for Medicine, and in 2007 obtained the Lifetime Achievement Award for Science from the RNA Society.



3'end Processing of Messenger RNA Precursors and RNA Quality Control


Expression of eukaryotic protein-coding genes
Gene
TRANSCRIPTION
CAPPING
Primary transcript
SPLICING
POLYADENYLATION
NUCLEUS
Mature mRNA
TRANSPORT
TRANSLATION
CYTOPLASM