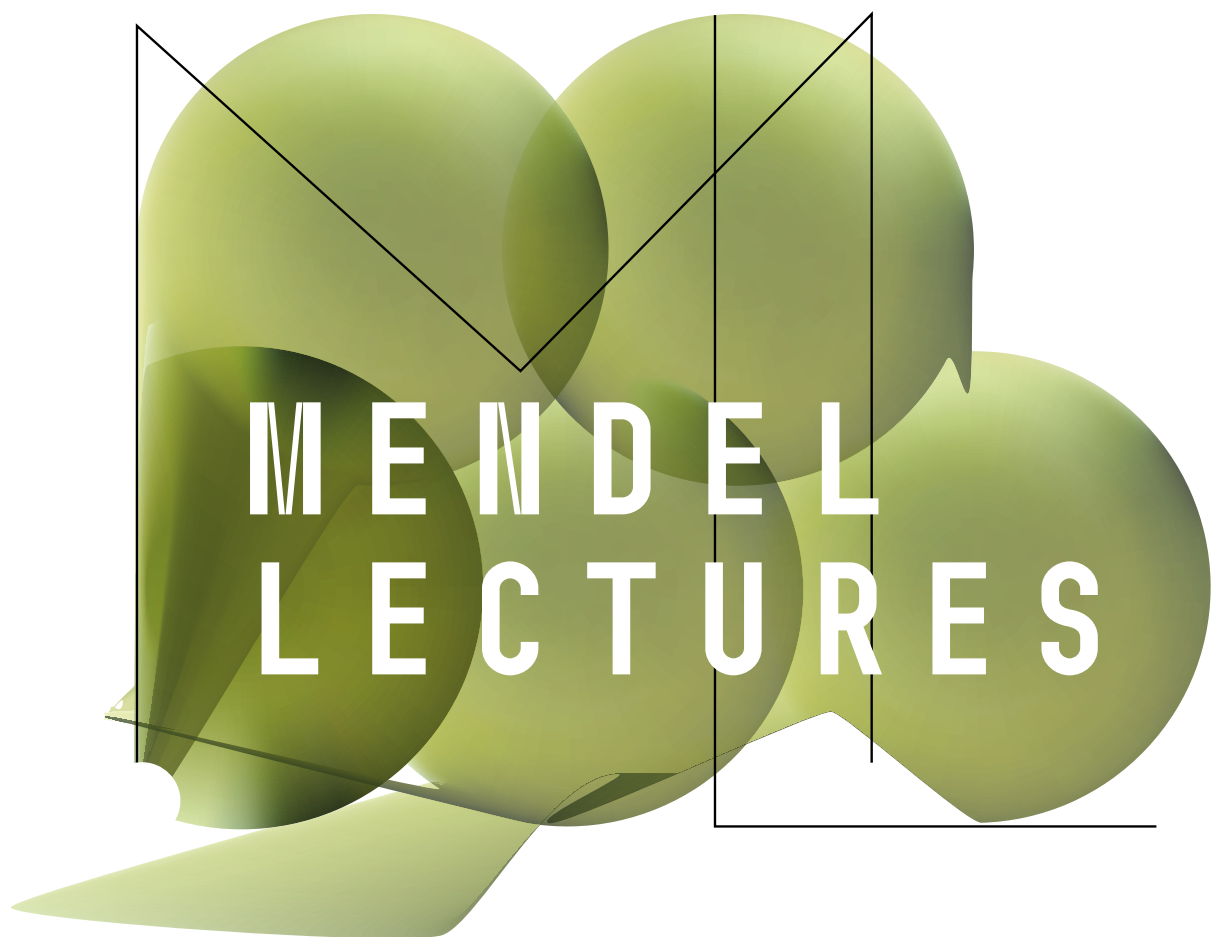
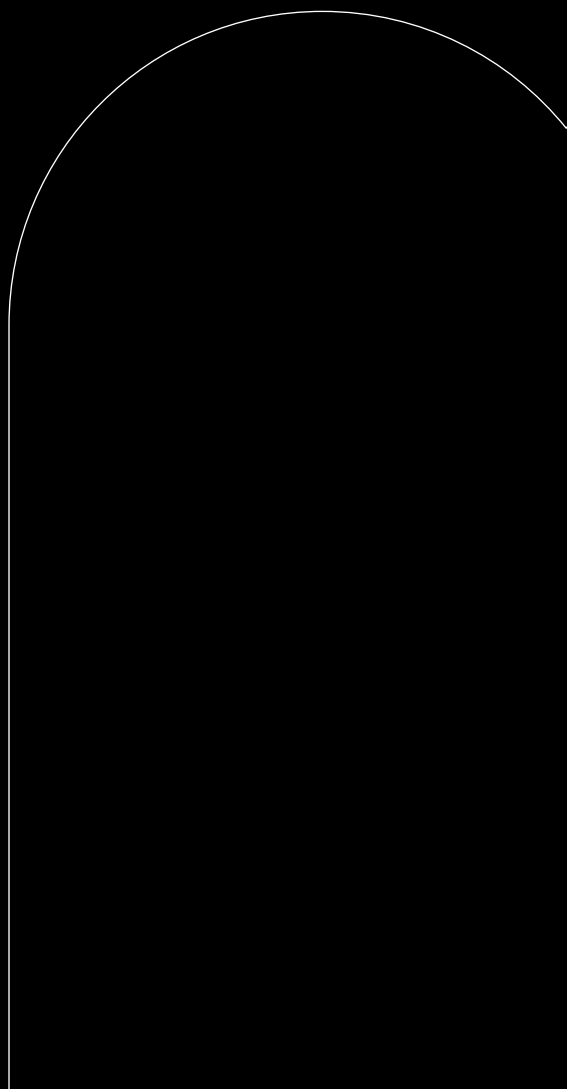
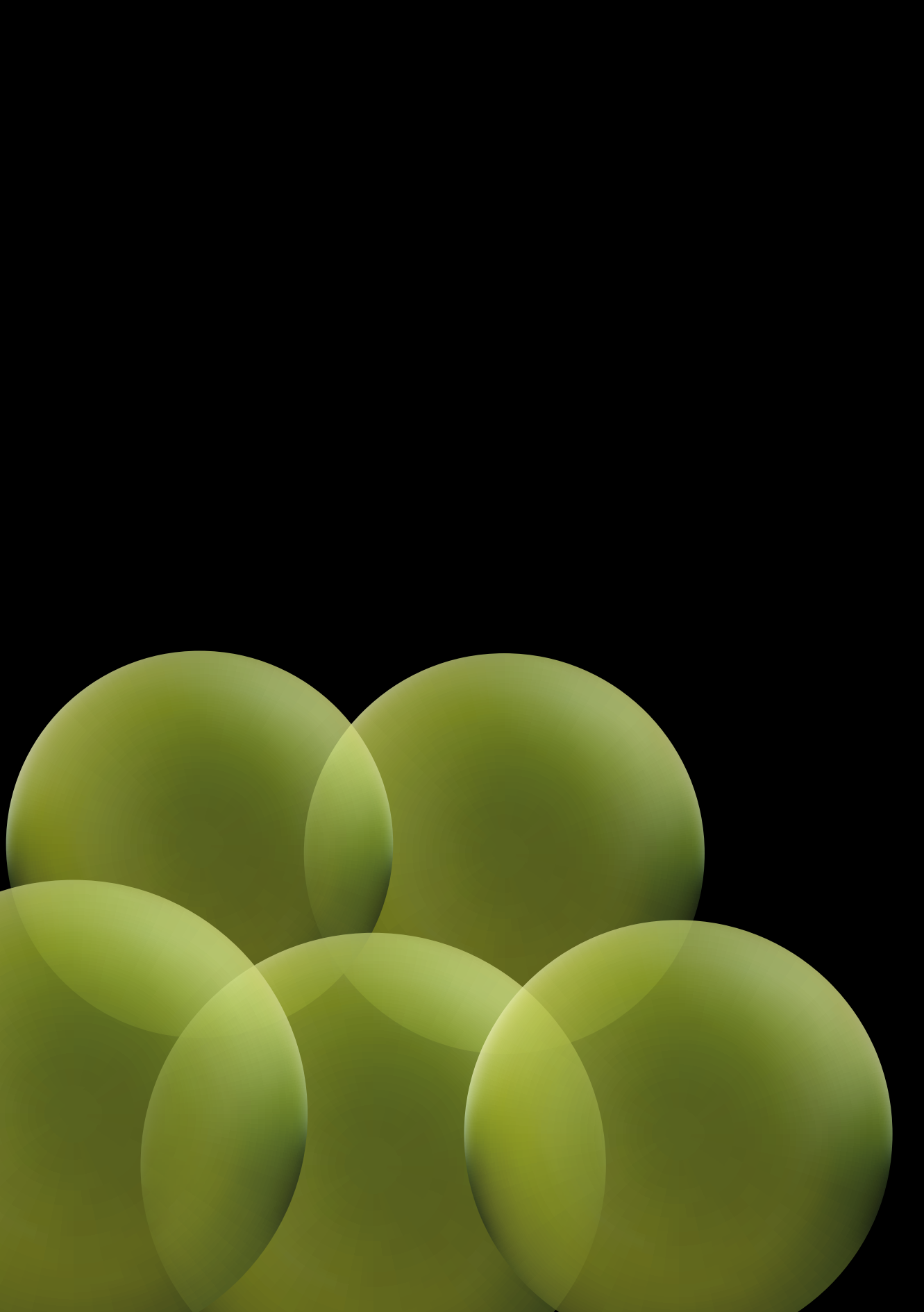


**MENDEL
LECTURES**
🍃 VOL. 1



2002—2022





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MENDEL
LECTURES
 VOL. 1

Mendel Lectures 2002—2022

MUNI
PRESS



Mendel Lectures

2002—2022

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Masaryk University Press
Brno 2022

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☁ The science of genetics came of age with the elucidation of DNA's double helical structure by Watson and Crick, but its intellectual roots lie in the 19th century with the work of Gregor Johann Mendel. His discovery that the characteristics of different varieties of pea were inherited by their progeny according to defined ratios was the first sighting of “genes” being passed down through the generations. As the father of genetics, Gregor Johann Mendel is as important a figure in the history of biology as Charles Darwin and Louis Pasteur. He laid the foundations for a completely new experimental approach to biology. His Abbey in Brno is thus a key part of our intellectual heritage and should be protected for, and used by, future generations.

— Kim A. Nasmyth



Mendel and the Augustinian Abbey

Brno, with a population of over 400,000, is the second largest city in the Czech Republic and the capital of South Moravia. It is situated at the crossroads of traditional trade routes and on the ancient cultural axis connecting Berlin–Prague–Vienna–Budapest. It is a thriving centre of culture, science, and education with more than 65,000 students enrolled in ten universities. As well as Gregor Johann Mendel, other well-known people linked with Brno include Leoš Janáček (a choir boy in the Abbey of St. Thomas when Mendel was Abbot), Rudolf Firkušný, Viktor Kaplan, Kurt Gödel, Adolf Loos, Mies van der Rohe, and Milan Kundera.



The Augustinian Abbey of St. Thomas is situated slightly outside the historical centre, in a neighbourhood called Old Brno. It is a beautiful building from the 14th century that fortunately has withstood Central European history largely intact. Johann Mendel entered the Abbey in 1843, was given the monastic name Gregor, and began his training as a priest. In 1851, he was sent, under the sponsorship of the Abbot, to the University of Vienna where he studied physics, mathematics, chemistry, botany, zoology and palaeontology, with Christian Doppler being his professor of physics. Mendel returned to the Abbey in 1853 as a teacher of natural sciences, mainly physics.

His revolutionary hybridization experiments with peas were performed between 1856 and 1863. The results were presented

at a meeting of the Brno Society of Natural Sciences in 1865 and subsequently published in a paper called “Versuche über Pflanzen-Hybriden” in 1866. Mendel was fortunate that his education in Vienna taught him the combinatorial mathematics that he would need to explain the ratios of progeny types produced by crossing different varieties of pea. However, his work was far ahead of his time. Chromosomes were not properly described until Flemming’s work in 1879 and it took several decades before it became widely accepted that they carried the hereditary factors first detected by Mendel. Consequently, none of Mendel’s contemporaries who actually read his paper could grasp, let alone appreciate its enormous significance. In 1868, Mendel replaced Napp as Abbot of the monastery, which largely ended his scientific work, as he became overburdened with administrative responsibilities.



The Brno Initiative

At the end of the 20th century and beginning of the 21st, there were only three friars living in the Abbey. The then-Abbot was gradually restoring the historical building but could only do so by renting space to a myriad of local companies. The Abbey was thus quickly becoming a business park.

In 1995, Kim Nasmyth, then-Director of the IMP in Vienna and now working at



Oxford University, visited the Abbey and was deeply impressed by its spell. He felt that something should be done to save the Abbey for future generations and the so-called “Brno Initiative” grew out of this visit. Without funding, things moved slowly until 1999, when Abbot Martinec approached the Vereinigung zur Förderung der Genomforschung (vfg), a charitable society in Vienna of which Nasmyth was a member, and asked them to organize an exhibition on Mendel in the Abbey. At this point the vfg committed itself to finance the early stages of the Brno Initiative and the project gained momentum. The long-term goal of the Brno Initiative was to develop part of the Abbey where Mendel worked as a centre for scientific discovery, communication, and education. Max Perutz, Paul Nurse, Tim Hunt, James Watson, Eric Wieschaus, Peter Swetly, Jiřina Relichová, Jan Motlík, Emil Paleček, Eva Jiřičná, Gustav Ammerer and Kim and Anna Nasmyth were among those involved in the original Brno Initiative. “I was a member of the Academic Council of the Academy of Sciences, which did everything it could to accommodate the so-called Brno Initiative. This initiative by leading world geneticists was an attempt to bring science back to the Abbey in Old Brno. The path was not easy, but eventually a mutual understanding was reached between the heads of the Abbey and the scientific community, in view of the importance and uniqueness of the mission of Gregor Mendel”, says Professor Motlík.



Beginnings

An inaugural conference entitled “EMBO Workshop, Genetics after the Genome” was organized in 2002 and was also accompanied by the mounting of a new exhibition called “Mendel: The Genius of Genetics” in rooms newly restored by the internationally renowned Czech-born architect Eva Jiřičná. “The Mendel Lectures grew from this conference, and I am delighted that the series continues to attract outstanding speakers”, says Anna Nasmyth, who, with her husband, is a former organizer of the Lectures. The celebration of the 50th anniversary of the discovery of the DNA structure in 2003 provided a unique opportunity to revitalize scientific activities at the Abbey. The British Council, which was involved in all these activities, even donated a copy of the original photograph of Watson and Crick, and a copy of their model of DNA from 1953 is on loan from Gustav Ammerer. At the same time, a special lecture series was arranged. This became the basis for the Mendel Lectures, which evolved into an annual lecture series.



First lectures

As its name, “The Road to DNA”, suggests, the first series of lectures was focused on the historical context of genetics. Subsequent series have addressed more topical scientific findings. “A small selection committee chose which scientists to invite each year”, says Anna Nasmyth, explaining how plans for each new series originated. And of course, each of the

speakers was a world leader in his or her field. Beside Anna Nasmyth, the Mendel Lectures were organized by Jiřina Relichová of Masaryk University in cooperation with Jan Motlík of the Czech Academy of Sciences and Imma Mautner Markhof from Austria. “All the lecturers expressed the honour they felt at being invited to speak in such an exceptional environment, where Mendel lived and worked, and in which genetics as a science has its origins”, says Professor Relichová.



Mendel Lectures now

Lumír Krejčí from Masaryk University took on the role of main organizer from Anna Nasmyth in 2007 and they worked together until 2011 when she stepped down. In 2015, a scientific board was established that selects scientists who are to be invited for the next season. A logo was designed and the Mendel Medal, together with a certificate, was introduced to congratulate the speakers for their achievements in science.



The Mendel Lectures has grown to be a prestigious platform for scientific talks of the highest quality. Many incoming scientists look forward to spending some time in Brno. Most of the lectures are streamed onto the web for an online audience and several speakers have also been invited by the Czech public broadcasting company to a prime-time interview.

In 2012, the 190th anniversary of Mendel's birthday was celebrated with the Anniversary Mendel Lectures that took place at the Abbey. It was fascinating not only to bring science back to the monastery but also to witness the return of the original manuscript reporting Mendel's work, which had been missing for several decades.



There is quite some symbolism in Mendel's life. Not only did his research-oriented work end when he had to take care of administration of the Abbey, but he is also a great example of the truth that a prophet is honoured everywhere but in his own country. First, there is Mendel's discovery that was initially believed to be about hybridization rather than inheritance and had to be re-discovered by an English geneticist, William Bateson, who publicly acclaimed Mendel's work at the Royal Horticultural Society of London and translated his manuscript. Second, there was the communist era when Lysenko rejected Mendel's theories, which set back genetics in central Europe

until the 1950s. Third, even after Lysenkoism was abandoned and the communist era ended throughout central Europe in the 1980s, it again required the activism of several foreign scientists to establish the Mendel Museum and organize meetings in the Augustinian Abbey.

“Through the Mendel Lectures, the scientific community is placing Mendel back on the map of great scientists, where he truly belongs”, says Krejčí. In the 20-year history of the Mendel Lectures, Brno has been visited by more than 130 scientists, including 15 Nobel Prize laureates. The lectures held in the refectory of the Augustinian Abbey in Old Brno – the very place where Mendel, the founder of genetics, worked almost 200 years ago – are attended annually by almost one thousand undergraduates, PhD students and scientists, who get to meet leading figures in science from around the world. Valuable scientific contacts are made at the event. The Augustinian Abbey has thus again truly become a place of scientific communication and education.

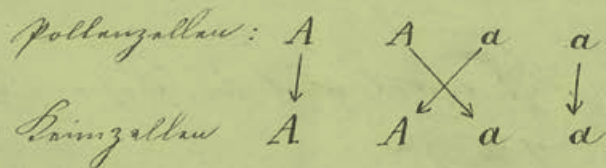
... and we believe it will remain so.

— Anna Nasmyth and Lumír Krejčí



**MENDEL
LECTURES**

Es bleibt ganz dem Zufalle überlassen, welche von den beiden Pollenzellen
sich mit jeder einzelnen Eizelle verbindet. Zudem sind es noch die
Regeln der Karyogamie, die im Durchschnitt vielen Fällen immer
gruppieren, daß sich jede Pollenzelle A und a gleich oft mit jeder
Eizellform A und a vereinigt; es wird daher nur von den
beiden Pollenzellen A mit einer Eizelle A, die andere mit einer
Eizelle a bei der Befruchtung zusammengebracht, und also so eine
Pollenzelle a mit einer Eizelle A, die andere mit a verbunden
werden.



Das Ergebnis der Befruchtung läßt sich dadurch veranschaulichen,
daß die Befruchtungen für die verbundenen Eltern- und Pollenzellen
in Eizellform umgekehrt werden, und zwar für die Pollenzellen
oben, für die Eizellen unter dem Kriese. Man erhält in dem
folgenden Falle:

$$\frac{A}{A} + \frac{A}{a} + \frac{a}{A} + \frac{a}{a}$$

Bei dem ersten und zweiten Kriese sind Eltern- und Pollenzellen gleich.
wichtig, daher müssen die Produkte ihrer Verbindung konstant sein,
nämlich A und a; bei dem dritten und vierten Kriese erfolgt
abermals eine Vermischung der beiden differenzierenden Elemente.
Merkmal, daher muß die aus diesen Befruchtungen hervorgehende
zusammengesetzte Summe mit den Hybriden, wie wir sie vorhin kennen,
ganz identisch sein. Es findet demnach eine wiederholte Hybridi-
sierung statt. Daraus erklärt sich die auffallende Erscheinung,
daß die Hybriden im Reine sind, selbst die beiden Elternformen
nicht vorkommen zu erkennen, die ihrer selbst gleich sind. $\frac{A}{A}$ und
 $\frac{a}{a}$ geben beide dieselbe Verbindung Aa, d. h. wir sehen keinen
Unterschied mehr, für den Erfolg der Befruchtung keinen Un-
terschied mehr, welche man die beiden Merkmale der Eltern-
zellen umgekehrt. Es ist daher $\frac{A}{A} + \frac{A}{a} + \frac{a}{A} + \frac{a}{a} = A + 2Aa + a$.

Es ergibt sich der mittlere Verlauf bei der Selbstbefruchtung der
Erbsen. wenn in demselben zwei differenzierende Merkmale vor-

man kann, nicht unbedeutende Römungen ableiten. Obgleich man davon
 daß das Konfekt ein Kreuz, in welchen beiden Dingen im
 Linsenschnitt vorhanden, wenn man Linsenschnitt als gleich anzu-
 nehmen man kann, bleibt es ganz dem Zufalle überlassen,
 welche von den beiden Pollenarten zu jeder einzelnen Pün-
 zelle die Befruchtung vollzieht. Dasselbe müßte die Einzel-
 mannte notwendig Befruchtungen unabhängig, und es sind selbst
 normale Fälle möglich, wie sie häufig bei den Konjekten
 über die Existenz der Pünze mit der Linsenschnitt das Überwachen
 anzuführen müßte. Ein weiterer Konfektionszustand könnte man
 durch das Mittel gegeben werden, welches aus den Pünzen
 möglichst vielen Einzelwerten gegeben wird; je größer ist
 Kreuz, desto größer wird das bloß Zufällige eliminirt.

Die Entwicklungsschritte für Hybriden, in denen zwei verschiedene
der Merkmale vorhanden sind, erfüllt man 16 Individuen
 9 konfigurierten Samen, nämlich: $AB + Ab + aB + ab + 2ABb + 2aBb + 2AaB + 2Aab + 4AaBb$.
 zu A, a und B, b sind 4 verschiedene Kombinationen möglich, diesen 4
 genügt muß die Hybriden die entsprechenden 4 Samen zu Pünzen- und
 Pollenzellen: AB, Ab, aB, ab , und jede davon wird im Linsenschnitt
 4 mal in Befruchtung treten, da in der Pünze 16 Individuen
 aufzufinden sind. Wenn man nun die Befruchtung Teil die

Pollenzellen: $AB + AB + AB + AB + Ab + Ab + Ab + Ab + aB + aB + aB + aB + ab + ab + ab + ab$.
 Keimzellen: $AB + AB + AB + AB + Ab + Ab + Ab + Ab + aB + aB + aB + aB + ab + ab + ab + ab$.

Zu mittleren Merkmalen der Befruchtung verbindet sich jede Pollenform
 gleich oft mit jeder Keimzellform, daher gibt man die 4 Pollenzellen
 AB einmal mit einem man die Keimzellen AB, Ab, aB, ab . Es folgt
 dann so anfolgt die Kreuzung der übrigen Pollenzellen mit
 den Samen Ab, aB, ab mit allen anderen Keimzellen. Man erhält
 demnach:

$$\frac{AB + AB + AB + AB + Ab + Ab + Ab + Ab + aB + aB + aB + aB + ab + ab + ab + ab}{AB \quad Ab \quad aB \quad ab \quad AB \quad Ab \quad aB \quad ab \quad AB \quad Ab \quad aB \quad ab \quad AB \quad Ab \quad aB \quad ab}, \text{ von}$$

$$AB + ABb + AaB + AaBb + ABb + Ab + AaBb + Aab + AaB + AaBb + aB + aBb + AaBb + Aab + aBb + ab =$$

$$AB + Ab + aB + ab + 2ABb + 2aBb + 2AaB + 2Aab + 4AaBb.$$

Sir Walter Bodmer

* 1936

Institute of Molecular Medicine, Oxford, UK

May 13, 2003

After obtaining a PhD in Genetics from Cambridge University, he moved to Stanford University in California where he rose to the position of Professor. In 1970, he returned to the UK as the first Professor of Genetics at Oxford University. He subsequently became the Director of Research, and finally the Director General, of the Imperial Cancer Research Fund in London.

In 1996, Sir Walter Bodmer assumed his current position at the Weatherall Institute of Molecular Medicine as Head of the Cancer and Immunogenetics laboratory and more recently also became Head of the Cancer and Immunogenetics Laboratory within Department of Oncology at the University of Oxford.

Walter Bodmer is a geneticist with a wide field of study. Early in his career, he helped to discover the human leukocyte antigen (HLA) system, vital for the success of organ and bone marrow transplants. His interest in human populations led him to set up a UK population gene bank that could be used as a control group in research. Sir Walter was also one of the first to suggest the idea of the human genome project. More recently, he has successfully grown bowel cancer cells in the lab in structures similar to those found naturally inside the bowel. His research group's primary interests lie in the fundamental genetics and biology of colorectal cancer and their potential applications, and the characterization and population distribution of genetic diversity in human populations, especially of the British Isles.

Sir Walter Bodmer is credited with beginning the movement for the public understanding of science, having chaired the first committee set up to establish standards for communicating science and technology, and for that was awarded the Michael Faraday Prize. He has also received Royal Medals for his seminal contributions to population genetics, gene mapping and understanding of familial genetic disease. He is a Fellow of the Royal Society and was knighted in 1986.

In 2005, Bodmer was appointed to lead a £2.3 million project by the Wellcome Trust at the University of Oxford to examine the genetic makeup of the United Kingdom – the “People of the British Isles” project. In 2013 he was awarded Royal Medal from the Royal Society.



The Human Genome: Past, Present and Future

Mendel taught us that the choice of phenotype is the key to finding clear-cut patterns of inherited variation. This lesson remains as important today as it was to Mendel for his discovery of the laws of inheritance.

Charles Weissmann

* 1931

Institute of Neurology, London, UK

 **May 13, 2003**

Charles Weissmann began his career with degrees in both medicine and organic chemistry from Zurich University, and then turned to the new field of molecular biology where he was recognized as one of the most creative investigators over several decades. He contributed to the first cloning of the genes for interferon, a protein released in response to viral infection that can now be synthesized on an industrial scale for use as a medicine. He was the first to discover and document the lifecycle of bacteriophages – viruses that infect bacteria – and subsequently investigated a number of pathogens, including those responsible for tuberculosis and malaria.

In recent years, Professor Weissmann has made breakthroughs in the investigation of diseases induced by prions (small proteinaceous infectious particles that resist inactivation by procedures that modify nucleic acids) that affect animals, such as mad cow disease, and humans, for example Creutzfeldt-Jakob disease.

Professor Weissmann has been internationally recognized for his work, including memberships in the Royal Society (UK) and National Academy of Science (USA). He has been awarded several honorary doctorates from universities around the world and many leading scientific prizes, including the 1995 Robert Koch Gold Medal. He was a co-founder of Biogen, the first European biotechnology company, and he continues to serve on several corporate boards.

Charles Weissmann received the Warren Alpert Foundation Prize in 2004. He was Chair of and Professor in the Department of Infectology, Scripps Florida (2004–2012), then became Professor Emeritus at the Department of Infectious disease until 2015, and Professor Emeritus in the Department of Immunology and Microbial Science (IMS) in 2015–2017. On 16 May 2011 Weissmann became Doctor of Science *Honoris Causa* at New York University.

The Role of DNA in Prion Diseases



$$AB + Ab + aB + ab + 2ABb + 2aBb + 2AaB + 2Aab + 4AaBb$$

Diese Entwicklungstafel ist nichts anderes eine Combinationstafel, in welcher die beiden Entwicklungstafeln für die Merkmale A und a, B und b gleichzeitig verbunden sind. Man erfüllt die Stellen der Tafel vollständig durch die Combination der Erbsenkräfte:

$$A + 2Aa + a$$

$$B + 2Bb + b$$

Zweiter Versuch: ABC Pflanzung.
A. Erbsenblau
B. Erbseisen gelb
C. Pflanzgrün

abc Pflanzung.
a. Erbsenblau
b. Erbseisen grün
c. Pflanzweiß

Dieser Versuch wurde in ganz ähnlicher Weise wie der vorhergehende durchgeführt, so wurde unter allen Umständen Zeit und Mühe in der Pflanzung. Von 24 Hybriden wurden im Frühjahr 187 Pflanzungen aufgestellt, welche jeweils ein Pflanzgrün, ein Erbseisen und ein Erbsenblau enthielten, nicht aber Pflanzgrün. Von den Samen im folgenden Jahr 139 Pflanzungen zur Untersuchung, und wie die weiteren Untersuchungen zeigten, besaßen sie folgende Eigenschaften:

8 Pflanzungen ABC.	22 Pflanzungen ABc.	45 Pflanzungen ABc.
14 " ABc.	17 " Abc.	36 " aBc.
9 " AbC.	25 " aBc.	38 " AaBc.
11 " Abc.	20 " abC.	40 " AabC.
8 " aBC.	15 " ABc.	49 " AaBbC.
10 " aBc.	18 " ABc.	48 " AaBbe.
10 " abC.	19 " aBbC.	

Horace Judson

* 1931

George Washington University, USA

 June 5, 2003

Horace Judson was a science writer whose 1979 book *The Eighth Day of Creation* is regarded as the definitive account of the breakthroughs that transformed molecular biology in the mid-20th century.

At age 15, he entered the University of Chicago and earned a bachelor's degree in 1948. He worked at writing and editing jobs in New York and wrote a book, *The Techniques of Reading*, before being hired in 1963 by *Time* magazine, for which he reviewed books and reported on the arts and sciences from London and Paris.

While in Britain, Mr. Judson became acquainted with Max Perutz, the Austrian-born molecular biologist and Nobel laureate known for his work on haemoglobin. This acquaintance suggested a narrow book idea about the discovery of the structures of cellular macromolecules. Following a discussion with Jacques Monod in 1969, Judson expanded his planned book to a general history of molecular biology: *The Eighth Day of Creation*. The book is considered among the greatest popular science books ever written, not only in its subject matter but also its method. It was described by Mr. Judson as a fusion of journalism and history with a strong emphasis on first-person testimony. Based on hundreds of hours of interviews with over 100 scientists conducted over decade, it established a new kind of science writing.

Although Mr. Judson had no science degrees, he taught the history of science at Johns Hopkins University from 1981 to 1990 and spent four years as a senior

research scholar at Stanford University before being named the director of the Center for History of Recent Science at George Washington University, where he taught from 1994 to 2003.

Mr. Judson published another book on science, *The Search for Solutions* (1980), a series of essays on how scientists approach their work.

In 2004 he published *The Great Betrayal: Fraud in Science*, an examination of the deliberate manipulation of scientific data.

Mr. Judson died in 2011.

Before the Structure: The Roots of Evolution in Biology





Photo: Kiva



A photograph of a grand, ornate interior space, likely a museum or historical building. The ceiling is covered in intricate, light-colored stucco or plasterwork, featuring floral and scrollwork designs. The walls are white with decorative moldings and arched niches. On the left, a dark wooden door is set within a decorative frame. To the right of the door, a small, light-colored bust is mounted on the wall. The floor is made of large, light-colored tiles with decorative borders. The overall atmosphere is one of classical elegance and historical significance.

2003 — 2004

Sir Tim Hunt

* 1943

Cancer Research UK, Clare Hall Laboratories, UK

 **September 29, 2003**

Sir Richard Timothy Hunt is a British biochemist and molecular physiologist.

Dr. Hunt was accepted into Clare College, Cambridge, in 1961 to study Natural Sciences, graduating in 1964 and immediately beginning work in the university's Department of Biochemistry under Asher Korner. A 1965 talk by Vernon Ingram interested Hunt in haemoglobin synthesis, and he spent the summer of 1966 in Irving London's laboratory in New York working on this subject. He finished his PhD in 1968 and returned to New York to work with London. After returning to Cambridge, he further worked on haemoglobin questions until the 1980s when he became interested in the cell cycle.

While studying fertilized sea urchin (*Arbacia punctulata*) eggs in the early 1980s, Hunt discovered cyclin, a protein that cyclically aggregates and is depleted during cell division cycles. He and others subsequently showed that cyclins bind and activate a family of protein kinases, now called cyclin-dependent kinases, one of which was identified as a crucial cell cycle regulator by Paul Nurse. The cyclin mechanism of cell division is fundamental to all living organisms (excluding bacteria) and thus the study of the process in simple organisms helps shed light on the growth of tumours in humans.

In 1990, he began work at the Cancer Research UK London Research Institute, where his work focused on understanding what makes cells go cancerous, that is,

proliferate uncontrollably, with the ordinary inhibitory signals switched off.

Sir Tim Hunt became a fellow of the Royal Society in 1991, received the Abraham White Scientific Achievement Award of the George Washington University in 1993, and became a foreign associate of the US National Academy of Sciences in 1999. In 2001 he was awarded the Nobel Prize in Physiology or Medicine with Sir Paul Nurse and US scientist Leland Hartwell for their discoveries regarding cell cycle regulation by cyclin and cyclin-dependent kinases. In 2003, Hunt was made an honorary Fellow of the Royal Society of Edinburgh (HonFRSE).

In 2006 Sir Tim Hunt was awarded the Royal Medal for “discovering a key aspect of cell cycle control” and was knighted by the Queen for his service to science.

Dr. Hunt had his own laboratory at the Clare Hall Laboratories until the end of 2010, and remained an Emeritus Group Leader at the Francis Crick Institute until 2015.

Cells and Their Division



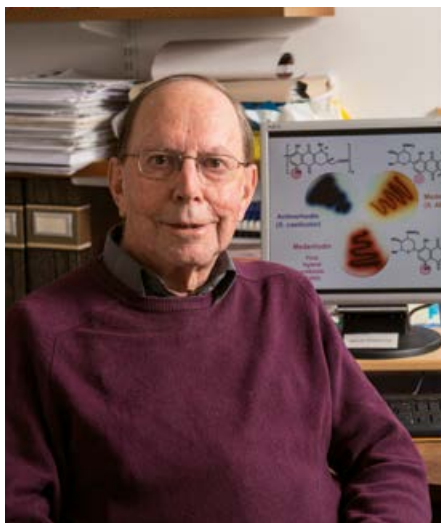
Sir David Hopwood

* 1933

John Innes Centre, Norwich, UK

📅 October 16, 2003

Sir David Alan Hopwood is a British microbiologist and geneticist who researches the biology of streptomycetes, the bacteria that produces the majority of antibiotics in clinical use around the world today.



Hopwood gained his Bachelor of Arts degree from St. John's College, Cambridge, and his PhD in the Botany School at Cambridge in 1959. During his PhD studies, Hopwood demonstrated that a group of antibiotic-producing micro-organisms called *Streptomyces* can exchange genetic information between cells by a unique mechanism of conjugation, and carried on this work at the University of Glasgow where he became a Lecturer in Genetics in 1961. He became John Innes Professor of Genetics at the University of East Anglia and Head of the Genetics Department at the John Innes Centre in 1968. He has been an Emeritus Fellow in the Department of Molecular Microbiology at the John Innes Centre since his formal retirement in 1998 and

continued to participate in the field of novel antibiotic discovery using genetic manipulation by editing, writing commentaries, contributing to symposia and organizing a biennial series of summer schools in Croatia.

Hopwood pioneered research into the genetics of *Streptomyces*. He developed original systems of genetic mapping based on their conjugation system which laid the foundations for the later demonstration of a unique linear chromosome topology. His genetic and cytological studies showed that *Streptomyces* are true bacteria rather than an intermediate group between bacteria and fungi, or even micro fungi, as previously widely believed.

Hopwood discovered the first clear example of plasmid-encoded antibiotic synthesis, while showing that most antibiotic biosynthesis is controlled by clusters of chromosomal genes. This led to the ability to clone whole biosynthetic pathways and transfer genes between species of *Streptomyces* to yield novel, "hybrid" antibiotics. He co-ordinated the sequencing of the *Streptomyces coelicolor* chromosome, which, in 2001, was the largest sequenced microbial genome. Strikingly, the sequence revealed more than 20 clusters of natural product biosynthetic genes, indicating that the organism had the capacity to make many more potentially interesting molecules than could be discovered by conventional screening approaches. This has led to the finding of vast numbers of novel natural product gene clusters in microbial genomes subsequently sequenced around the world.

Hopwood was elected a Fellow of the Royal Society in 1979, delivered their Leeuwenhoek Lecture in 1987, and received their Gabor Medal in 1995 for his distinguished work in genetic engineering and molecular biology. He was knighted in 1994 for his service to the study of genetics. He is the author of *Streptomyces in Nature and Medicine: The Antibiotic Makers*, reviewing the development of knowledge about Streptomyces and their genetics as of 2007. The field has developed profoundly since then, especially in the explosion of natural product chemistry based on molecular biological approaches.

Fifty Years of Streptomyces Genetics: Implications for Antibiotic Discovery

Photo: Kiva



Dame Anne McLaren

* 1927

Cancer Research UK, Cambridge, UK

 **October 30, 2003**

Anne McLaren was one of the most eminent and highly respected reproductive biologists of the twentieth century. Her most enduring interest as a scientist was in germ cells and early mammalian development. Her work helped further recognition of the importance of stem cells in the treatment of human disease and her research in the basic science underlying the treatment of infertility helped develop several human-assisted reproduction techniques.

Anne McLaren gained a zoology degree at Lady Margaret Hall, Oxford, completed her postgraduate degree at Oxford, and obtained her PhD in 1952. The topic of her thesis was murine neurotropic viruses. Anne then worked with her husband Donald Michie at University College London (1952–55) and at the Royal Veterinary College, London (1955–59). During this time, the couple studied the effects of the maternal environment in mice on the number of lumbar vertebrae. This work led them to take an interest in the technique of embryo transfer and implantation, showing it was possible to culture mouse embryos in a test tube and obtain live young after placing them in the uterus of a surrogate mother. McLaren continued her work on mammalian fertility, embryo transfer techniques, immunocontraception, and the mixing of early embryos to form chimeras (organisms consisting of two or more genetically different kinds of tissue) at the University of Edinburgh (1959–74). Her book on chimeras, published in 1976, became a classic in the field. She returned to UCL as director of the Medical

Research Council's Mammalian Development Unit (1974–92), and, following her mandatory retirement, she served as a principal researcher at the Wellcome Trust (1992–2007).

McLaren was made a fellow of the Royal Society in 1975. She was famously the first woman to hold office in the 330-year-old history of the Royal Society, becoming its Foreign Secretary in 1991 (until 1996), and a year later its Vice President (1992–1996), and did much to promote the advancement of women in science. McLaren was also President of the British Association for the Advancement of Science (1993–94) and received an impressive array of awards for her contributions to the field, including the March of Dimes (2002). She was appointed Dame Commander of the Order of the British Empire (DBE) in 1993.

Dame Anne McLaren still held a position as a principal research associate at the Wellcome Trust at the time of her death in 2007.

Mendel and Michurin Today

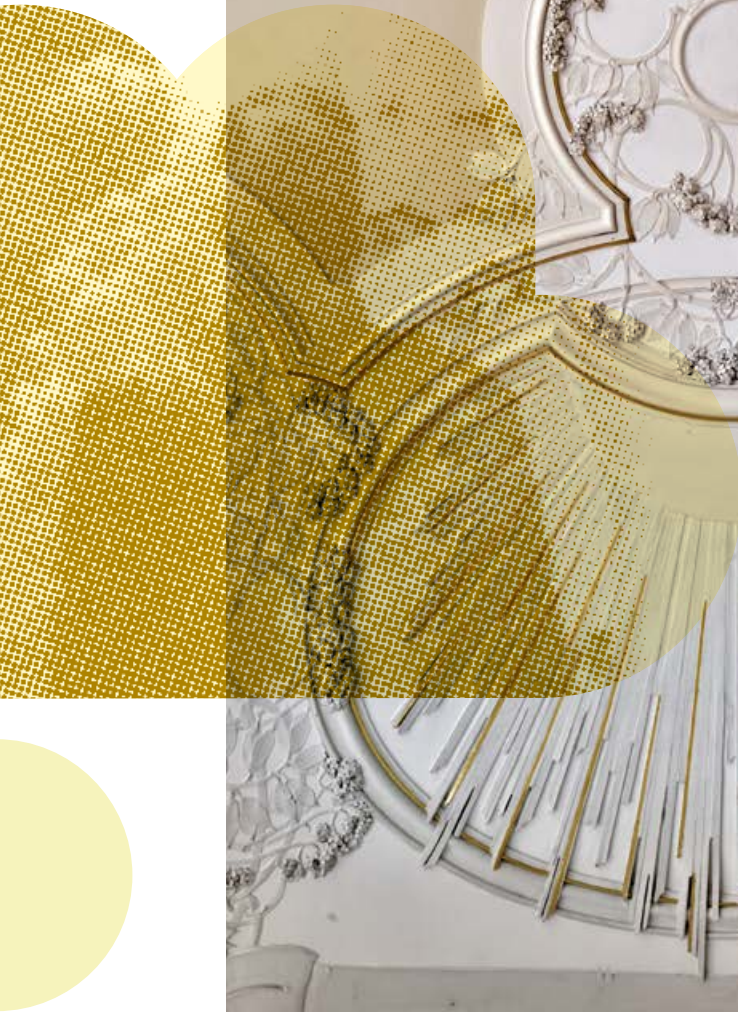


Photo: Kiva

Emil Paleček

* 1930

Institute of Biophysics, Brno, Czech Republic

 **November 11, 2003**

Emil Paleček was a Czech biochemist specializing in the electrochemistry of nucleic acids.

In 1959, Paleček received a PhD in biochemistry from Masaryk University in Brno, Czechoslovakia (now in the Czech Republic). During the 1960s, Paleček worked at the Institute of Biophysics at the Academy of Sciences in Brno. His first work focused on the investigation of DNA damage caused by radiation. In 1960, Paleček discovered that nucleic acids could be analyzed by electrochemical methods, which allowed him to explore how DNA can be used to diagnose genetic diseases. His discovery contradicted previous assumptions from the 1950s that DNA molecules were too large to be analyzed by electrochemistry. It took the scientific world 30 years to understand the importance of his findings, although the method began to be commonly used in the 1990s. In the 1960s, Paleček spent a year doing research at Harvard University in the United States. In the last years of his career, Professor Paleček focused on glycoproteins which could serve as tumour markers. During his life, Paleček published over 300 scientific works, making him one of the most respected scientists in the Czech Republic.

In 1989, Paleček became a member of the Czechoslovak Academy of Sciences. From 1993–97, he was a member of the Czech Academy of Sciences. In 1994, Paleček was one of the founding members of the Learned Society of the Czech Republic.

In 1961, Paleček was awarded the Jaroslav Heyrovský award for best young scientist. He was awarded the *Česká hlava* (Czech Head) award in 2014, and the Neuron Prize for his contributions to science in 2017. Professor Paleček died in October 2018.

DNA Double Helix in Czechoslovakia: Electrochemical DNA Sensors



Georgii P. Georgiev

* 1933

Institute of Gene Biology, Moscow, Russia

📅 November 11, 2003

Georgii Pavlovich Georgiev graduated from the I.M. Sechenov First Moscow State Medical University in 1956. In 1959, he was invited by V.A. Engelhardt to join the ranks of the newly created Institute of Radiation and Physicochemical Biology within the USSR's Academy of Sciences. Soon, he became part of the elite group of the Academy of Sciences of the Soviet Union, which allowed him to travel to the West and meet with other scientists involved in cutting-edge research.

In the late 1950s, at a time when molecular biologists focused on *E. coli* and phages, he was one of the first to practice molecular biology in eukaryotes. Here the focus was on the structure of the cell nucleus, the structure and determination of nuclear RNA, the structure of chromatin, and the development of methodological approaches that became widely used for these studies, such as the electrophoretic method for separation of nucleosomes and subnucleosomal particles.

In 1962, Georgiev announced the isolation of "DNA-like RNA" and ribosomal RNA from the nucleolo-chromosomal apparatus of mammalian cells. This was a very long single strand RNA, apparently synthesized from a DNA template in the nucleus. His lab soon found that the bulk of this long molecule could be recovered in the form of heterogeneous 30S particles. However, the small size of the particles did not coincide with that of giant DNA-like RNA. The team's attempts to characterize these structures succeeded in 1968, when they finally published their findings on the organization of nuclear

complexes containing DNA-like RNA in the *Journal of Molecular Biology*.

During the 1970s Georgiev and his team continued to be deeply interested in the role of genetic structure and repetitive sequences in gene regulation of eukaryotic cells. Georgiev and his colleagues chose *Drosophila melanogaster* as an experimental model, and decided to clone and isolate individual genes and adjacent regulatory regions, which they thought corresponded with repetitive genomic elements. Soon they found clones that contained structural genes and repetitive elements; however, the repeats appeared to coincide with genes. Using hybridization experiments, they set out to locate these genes in the chromosome but unexpectedly found that the genes had no fixed location. Their chromosomal location varied in different strains and even among individuals of the same strain. They could be considered as mobile or transposable elements. This was one of Georgiev's greatest career achievements: in 1977, in a paper in *Science*, he and his collaborators were the first to report transposable elements in animals.

Georgiev's commitment to the study of gene organization in eukaryotic chromosomes, and its relation to regulation, extended well into the 1990s, when he engaged in the study of cancer, and founded the Institute of Gene Biology of the Soviet Academy of Sciences (1990) around his own laboratory and those of his previous students and collaborators.



He was appointed a number of honours and awards, including the Lenin Prize in 1976, the State Prize in 1983, and membership in the Russian Academy of Sciences, the Academia Europaea, the Leopoldina, and associate membership in the European Molecular Biology Organization.

Some Achievements of Russian Molecular Genetics Between the Double Helix and Human Genome

François Gros

* 1925

Académie des Sciences, Paris, France

 **December 9, 2003**

François Gros was a French biologist and one of the pioneers of cellular biochemistry in France. His scientific career concerned genes and their role in regulating cellular functions.

François Gros received the preparatory certificates for the license in natural sciences at the Faculty of Sciences of Toulouse and completed his university training in Paris at the end of 1944. In 1946 he was admitted to the Institut Pasteur in the biochemistry department, where he studied the mode of action of penicillin on the metabolism of bacteria sensitive to this antibiotic, then a little later extending his research to the study of streptomycin.

After defending his doctoral thesis in 1952, François Gros carried out a research stay in the United States, first at the University of Illinois, then at the Rockefeller Institute of New York. In 1954 he returned to the Institut Pasteur where he initiated his research on the biosynthesis of ribonucleic acids (RNA) and their role in protein synthesis.

The year 1961 marks an important stage in his work. Invited by Professor James D. Watson to do a research internship in his laboratory at Harvard University, he succeeded in highlighting the existence of messenger RNAs. A similar discovery made almost simultaneously and independently in a laboratory on the west coast of the United States (by F. Jacob, S. Brenner and M. Meselson) prompted the two teams to publish their work in the same issue of the journal *Nature*.

In 1963, François Gros was offered the directorship of the microbial physiology service of the Institute of Physico-chemical Biology. There he continued his work on messenger RNAs (1963–1968) and, with his colleague Michel Revel, demonstrated the existence of proteins also called “initiation factors” playing a major role in the “start of genetic translation within cells”.

In 1976 he was elected Director General of the Institut Pasteur, where he served until 1981.

François Gros held the post of permanent secretary of the French Academy of Sciences from 1991, later becoming Honorary Professor at the Collège de France. He was a member of various academic committees as well as the “councils” of numerous scientific and humanitarian foundations established at the Institut de France.

François Gros was a member or associate member of several academies and learned societies, including the American Academy of Arts and Science, and was awarded numerous prizes and honours, including the Gay-Lussac Humboldt Prize (1988) and the Grand Cross of the National Order of Merit (2017).

François Gros died in spring 2022.

From the Double Helix to Genomics and Beyond



Robert Olby

*1933

University of Pittsburgh, USA

 February 2004

Robert Olby was a research professor in the Department of History and Philosophy of Science at the University of Pittsburgh. He is a historian of 19th and 20th century biology, his specialist fields being genetics and molecular biology.

After teaching courses in the United Kingdom on the history of biology, Olby moved to Pittsburgh, where he taught from 1994 to 1999, concentrating on genetics, molecular biology, and aspects of neuroscience. In 1994, he received the Marc-Auguste Pictet Medal from the Société de physique et d'histoire naturelle de Genève. He has written several books on the history of genetics, including *Charles Darwin* (1967), *Origins of Mendelism* (1966), and *The Path to the Double Helix* (1974).

After retiring, Olby researched and in 2009 published a biography of Francis Crick, *Francis Crick: Hunter of Life's Secrets*.

On Becoming a Molecular Biologist: The Early Career of Francis Crick







2004 — 2005

Edward Trifonov

* 1937

University of Haifa, Israel

 **October 7, 2004**

Edward Trifonov is an Israeli molecular biophysicist and a founder of Israeli bioinformatics. In his research, he specializes in the recognition of weak signal patterns in the world of biological sequences.

At the beginning of his scientific career, Trifonov studied the characteristics of DNA using biophysical methods. After his relocation to Israel in 1976, he switched to bioinformatics, and established the first research group for that discipline in the country.

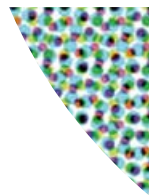
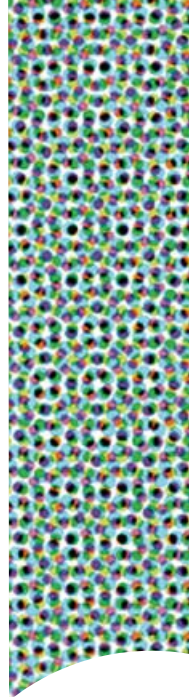
Trifonov was born in the former USSR, where he graduated in biophysics in 1961 and obtained his PhD in molecular biophysics in 1970, both at the Moscow Physico-Technical Institute. He worked as a researcher at the Moscow Physico-Technical Institute from 1961 to 1964. Then he moved to the Biological Department at the I. V. Kurchatov Institute of Atomic Energy in Moscow. In 1976 he emigrated to Israel and joined the Department of Polymer Research at the Weizmann Institute of Science. He worked there from 1976 to 1991 before moving to the Department of Structural Biology as a full professor in 1992. He was also head of the Center for Genome Structure and Evolution at the Institute of Molecular Sciences in Palo Alto, California (1992–1995). In 2002 Trifonov became head of the Genome Diversity Center at the Institute of Evolution at the University of Haifa in Israel.

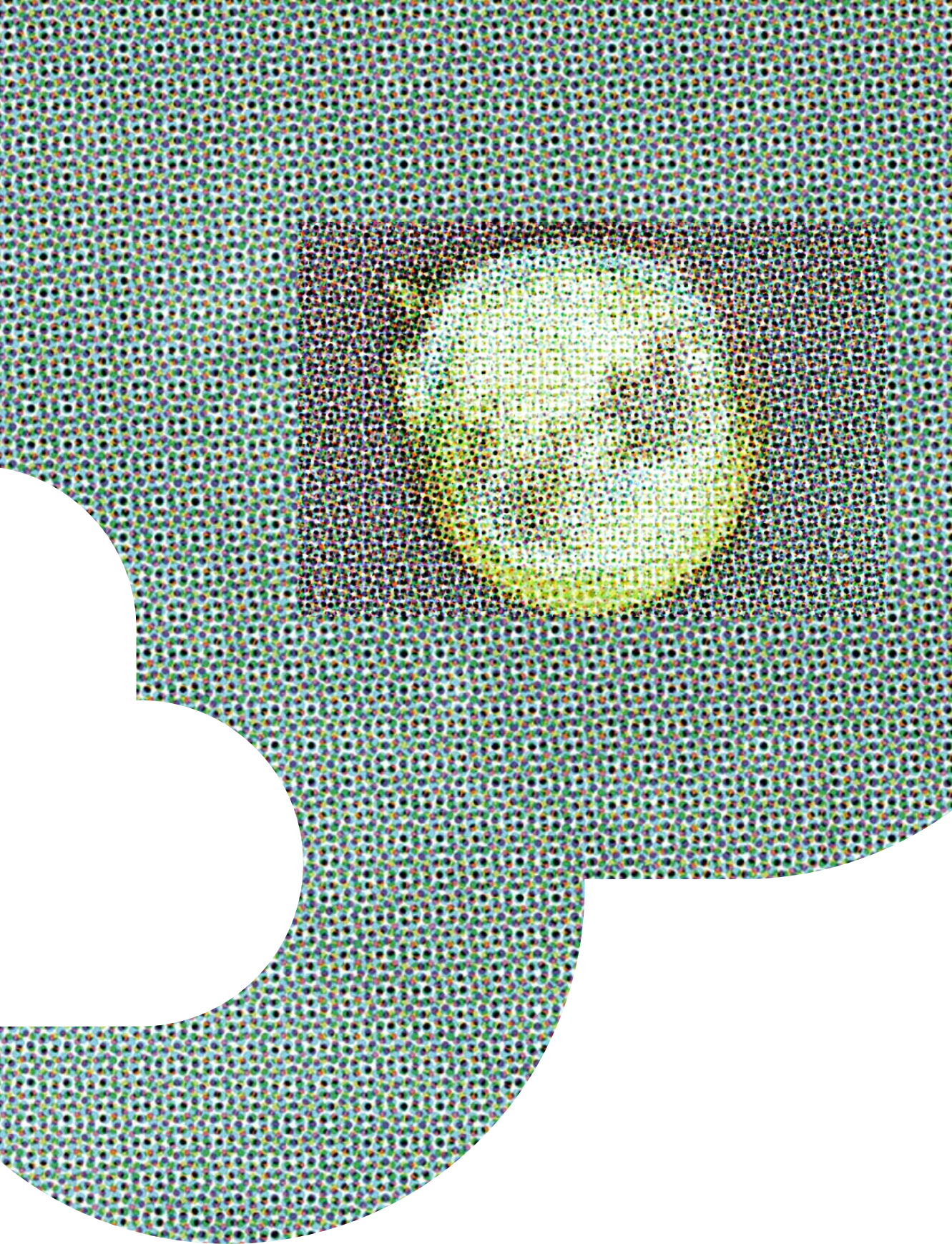
Trifonov has won several honours and awards, including the Kurchatov Prize for Basic Research (1971). He has filled

the positions of Kleeman Professor of Molecular Biophysics (1982–2002) and Adjunct Professor of Lomonosov Moscow State University (1999), and is a member of several learned societies.

Trifonov was appointed professor emeritus in 2003. He continues to be a leader at the Genome Diversity Center at the University of Haifa, and has been a professor at Masaryk University in Brno, Czech Republic, since 2007.

The Nature and Organization of Genomes, Their Sequence Structure and Evolution





Jack W. Szostak

* 1952

Howard Hughes Medical Institute, Boston, USA

 **October 21, 2004**

Jack W. Szostak is an English-born American biochemist and geneticist. He received his bachelor's degree in cell biology from McGill University in Montreal in 1972 and a PhD in biochemistry from Cornell University in Ithaca, New York, in 1977. After working as a research associate at Cornell from 1977 to 1979, Szostak took a position as assistant professor in the Department of Biological Chemistry of the Sidney Farber Cancer Institute (now the Dana-Farber Cancer Institute) at Harvard Medical School. His early research was concerned with the process of genetic recombination during meiosis, and he centred his investigations on telomeres. In 1980 Szostak met Elizabeth H. Blackburn, who had elucidated the genetic sequence of telomeres in the protozoan *Tetrahymena*. They conducted an experiment in which *Tetrahymena* telomeres were attached to the ends of yeast chromosomes and discovered that the yeast utilized the foreign telomeres as their own. The yeast also added its own telomere DNA to the *Tetrahymena* DNA, indicating that a cellular mechanism exists for telomere maintenance. Blackburn and Carol W. Greider, then a graduate student in Blackburn's laboratory, later discovered that this maintenance process is regulated by an enzyme called telomerase. Szostak's later work with yeast demonstrated that the loss of telomerase activity leads to premature cell aging and cell death.

Szostak remained at Harvard Medical School and in 1988 became professor in the Department of Genetics. He also held a position in the Department of

Molecular Biology at Massachusetts General Hospital. In addition to his investigations into telomeres, Szostak was the first to create a yeast artificial chromosome (1983), which can be used to clone DNA and consists of a vector (or carrier) molecule that contains the yeast genes necessary for replication and a DNA segment of interest.

By 1991 Szostak had shifted the focus of his research to RNA and its role in evolution. Using only simple molecules, he developed techniques to generate functional RNA in a test tube. The goal of this research was to synthesize a self-replicating protocell susceptible to Darwinian evolution, which could then serve as a model to investigate the transition from chemical to biological life on early Earth.

In 1998 Szostak became a Howard Hughes Medical Institute Investigator and was elected a member of the National Academy of Sciences. He was also elected a member of the American Academy of Arts and Sciences and a fellow of the New York Academy of Sciences.

Jack Szostak was awarded the 2009 Nobel Prize for Physiology or Medicine, along with Blackburn and Greider, for his discoveries concerning the function of telomeres, which play a vital role in determining cell life span. In addition to the 2009 Nobel Prize, he has received a variety of other awards during his career, including the Albert Lasker Basic Medical Research Award in 2006 (shared with Blackburn and Greider).

Photo: Jussi Puikkonen

The Origin of Life and the Emergence of Darwinian Evolution



Barry Dickson

* 1962

Institute of Molecular Pathology (IMP), Vienna, Austria

 **November 18, 2004**

Barry Dickson is an Australian neurobiologist who studies the development of neuronal networks in the fruit fly *Drosophila melanogaster*.

Barry Dickson originally studied mathematics and obtained a degree from the University of Melbourne. Then, after reading the book *The Eighth Day of Creation* by Horace Freeland Judson, he swapped mathematics for biology. He moved to Switzerland and in 1992 obtained his PhD at the University of Zurich studying the development of the insect eye. During a postdoctoral stay in Berkeley, he came in contact with neurobiology. His research focus shifted to the developing central nervous system. When Barry Dickson returned to Switzerland, he set up his first independent research group at the University of Zurich, and in 1998 accepted a position as Group Leader at the IMP.

In 2003, Barry Dickson was appointed Senior Scientist at the newly established Institute of Molecular Biotechnology (IMBA) of the Austrian Academy of Sciences. Dickson not only moved his lab, but also shifted his research focus and embarked on a project to explain the origins of complex innate behaviours, and ultimately to understand how these behaviours are modified by experience.

Barry Dickson's scientific achievements were recognized through a number of prestigious awards and honours. In 2000, he was selected into the EMBO Young Investigator Programme and later was appointed EMBO member.

In June 2005 he published a breakthrough paper showing that the mating ritual of *Drosophila* – as an example of complex innate behaviour – is orchestrated by the activity of a single “master-gene”, fruitless. In 2006, Dickson became scientific director of the IMP. One of his most challenging projects during this time was setting up a library of 15,000 transgenic fly strains that would be available via mail-order to researchers around the world. The “Vienna *Drosophila* Resource Center” (VDRC) was officially founded in 2007 and continues to be a valuable resource for geneticists. In 2013, Barry Dickson moved to the Janelia Farm Research Campus of the Howard Hughes Medical Institute, where he continues to study neural circuits in the *Drosophila* nervous system. Using the fly as a model system, the lab focuses on the fly's mating behaviours.

In 2005, he received Austria's major science award, the Wittgenstein Prize, from the federal government and in 2006 he was awarded the Remedios Caro Almela Prize for Research in Developmental Neurobiology. In 2009, Dickson was elected AAAS Fellow.

Wired for Sex:
How Reproductive
Behaviours Are
Programmed into
a Fly's Brain

Ernst Hafen

* 1956

University of Zurich, Switzerland

 **March 17, 2005**

Ernst Hafen studies the genes involved in growth control and metabolism using *Drosophila* as a model system. He has made several contributions to the field of developmental biology and cell biology. These include the development of an *in situ* hybridization method and its application of the localization of transcripts from homeotic genes and segmentation genes, the characterization of genes and the corresponding signalling pathways involved in photoreceptor cell fate specification and in the control of cell and body size.

Ernst Hafen studied molecular and cellular biology at the Biocenter in Basel. In 1983 he obtained his PhD in developmental biology. Following a postdoctoral stay at the University of California at Berkeley, he moved to the Institute of Zoology at the University of Zurich as an assistant professor in 1987 and was promoted to full professor in 1997.

Ernst Hafen has received several prestigious awards, including the Ernst Jung Prize, the Friedrich Miescher Award, and the Otto Naegeli Award.

He has helped develop joint centres of ETH and the University of Zurich, including SystemsX, Life Science Zurich, and the Life Science Zurich Learning Center. Furthermore, Ernst Hafen is co-founder and scientific advisor of the biotech start-up The Genetics Company.

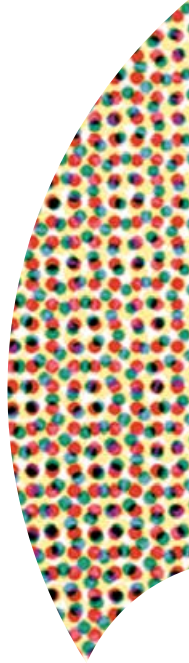
Ernst Hafen was elected President of ETH Zurich on 1 December 2005. Only one year later he announced his resignation.

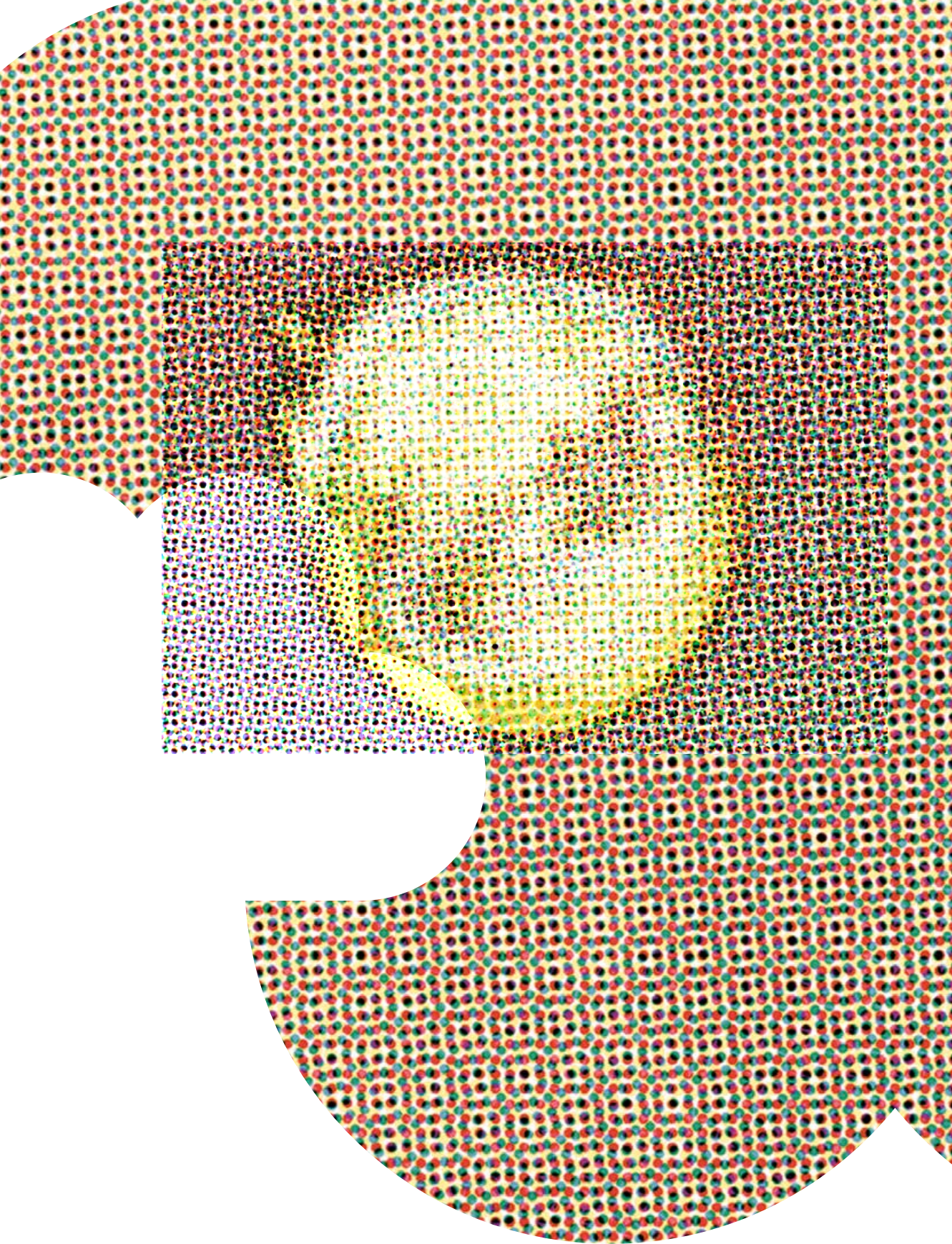
Since then, he has been a professor at the Institute of Molecular Systems Biology at ETH Zurich, where he initiated and subsequently headed the WingX project, which deals with the multidisciplinary systems biology of fruit fly wings.

In 2012 Hafen established the Data and Health Association with the aim to advance the debate on the collection and use of individual medical data in Switzerland. Linked to this is the deepening of the discussion on the scientific, ethical, social, legal and political aspects of information about personal data in the field of health and medicine.



Genetic
Dissection of
Insulin Signalling
and Growth in
Drosophila





Marc-André Sirard

* 1958

Université Laval, Quebec, Canada

📅 April 20, 2005

Marc-André Sirard graduated in 1981 from Université de Montréal, Canada. He obtained his PhD in 1985 in reproductive physiology at the Université Laval, Quebec, Canada, and then pursued postdoctoral studies at the University of Wisconsin (USA). In 1987, he came back to Université Laval as an assistant professor and was promoted to full professorship in the Department of Animal Science in 1995. In 1996 he founded the Centre de Recherche en Biologie de la Reproduction, a renowned centre that brought together top Canadian scientists in reproductive biology and in 2000 obtained the first Canadian Research chair in the field of animal reproduction and genomics. In 2001, he became the vp for Research at TGN Biotech, based in Quebec, a start-up biotechnology company with Laval University.

Sirard is renowned as one of the pioneers who developed bovine *in vitro* maturation (IVM) and fertilization (IVF) in the mid-1980s. In fact, he was among the first to use laparoscopy in the cow to retrieve bovine oocytes and culture them in rabbit oviducts, producing live progeny. Furthermore, Sirard developed a unique approach to optimize follicular quality, which resulted in the publication of the best procedure to harvest oocytes for commercial IVF. The main goal of his research is to describe and understand the genetic programme at the start of embryonic life.

His work on animal reproduction has made it possible to considerably enrich the medical arsenal used to combat

human infertility as well as a number of diseases. The method he developed to produce the first bovines conceived *in vitro* is now used around the world.

Aware of the new issues raised by this research, Professor Sirard took the initiative to create a consultative group to deal with the consequences of using assisted-reproduction methods. The group includes ethics specialists, legal scholars, anthropologists, geneticists, clinicians and biologists. Their aim is to set out guidelines for and restrict interventions in reproduction before the technologies become available, not after.

Prof. Sirard was elected for three consecutive seven-year terms as a Canadian Research chair for animal reproduction and genomics. In 2018 he was awarded the ETS Pioneer Award.

Gene Expression in Bovine Oocytes and Embryos: Prospect and Challenges



My new field of studies since 2005 is focusing on epigenetics, which complements the discovery of Mendel and is a real tribute to life complexity. Mendel started the understanding of inheritance but it is not finished yet.

Sir Alec Jeffreys

* 1950

University of Leicester, UK

May 5, 2005

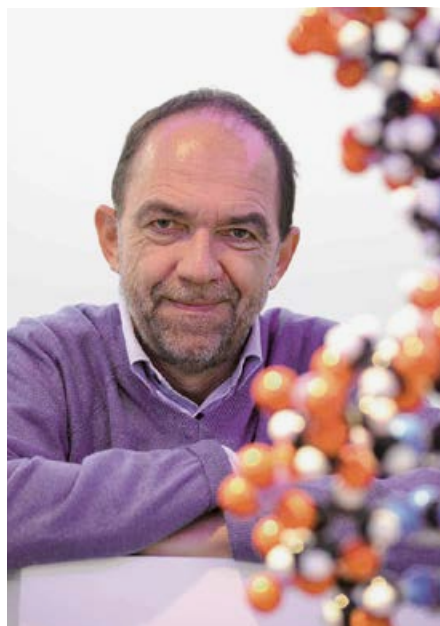
Sir Alec Jeffreys is a British geneticist who developed techniques for genetic fingerprinting and DNA profiling which are now used worldwide in forensic science to assist police detective work and to resolve paternity and immigration disputes.

Alec Jeffreys studied biochemistry and genetics at Merton College, Oxford, where he graduated in 1972, and completed his doctoral degree focusing on mitochondria in mammalian cells in 1975. Following an EMBO Postdoctoral Fellowship at the University of Amsterdam where, with Dr. Richard Flavell, he was one of the first to discover split genes, he moved in 1977 to the Department of Genetics at the University of Leicester.

Sir Alec's research at Leicester focused on exploring human DNA diversity and the mutation processes that create this diversity. He was one of the first to discover inherited variation in human DNA, and went on to invent DNA fingerprinting, showing how it can be used to resolve questions of identity and kinship, thus creating the field of forensic DNA. He then investigated how variation is generated in human DNA, by developing new and very powerful techniques to detect spontaneous changes in genetic information as it is transmitted from parent to child.

Sir Alec's work has received widespread recognition, including his election to the Royal Society in 1986. The Royal Society named him the Wolfson Research Professor for the Royal Society in 1991. He

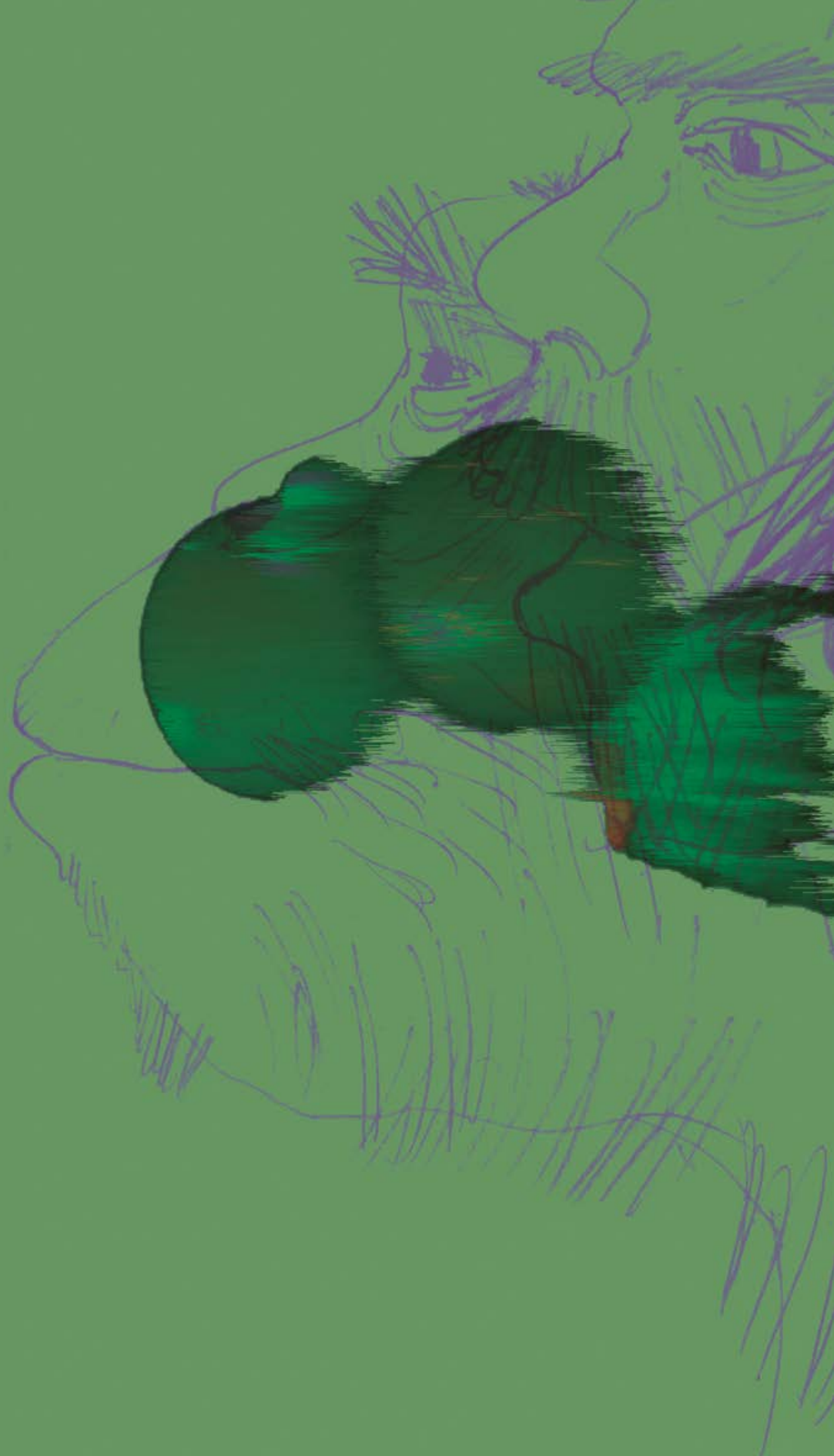
received a Knighthood for service to the science of genetics in 1994 and conferment of the title of Honorary Freeman of the City of Leicester in 1993. In 2004 Jeffrey received the Royal Medal for introducing DNA analysis into forensic science.

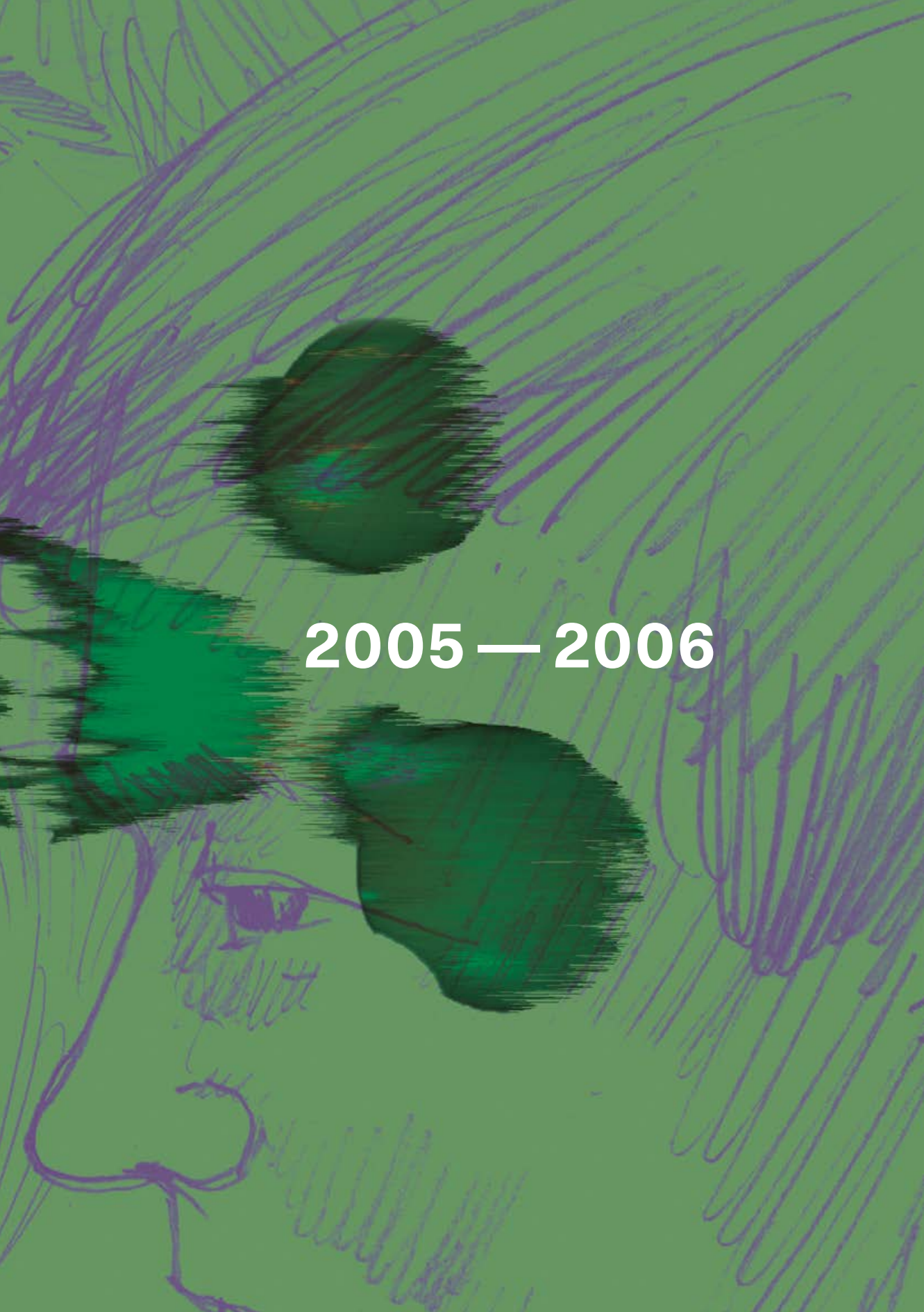


Other awards include the Lasker Award (2005) and the Heineken Prize (2006). In 2007 he was voted Morgan Stanley Greatest Briton. The Royal Society awarded him the Copley Medal for outstanding achievement in any branch of science in 2014. He remained at the University of Leicester until his retirement in 2012.

Genetic Fingerprinting and Beyond





The background is a vibrant green field filled with dense, overlapping purple and blue scribbles and strokes, creating a textured, energetic feel. In the lower-left corner, there is a faint, light-colored sketch of a human profile, facing right. The text "2005 — 2006" is centered in the middle of the image in a clean, white, sans-serif font.

2005 — 2006

Steven McKnight

* 1949

University of Texas, Southwestern Medical Center, Dallas, USA

📅 October 3, 2005

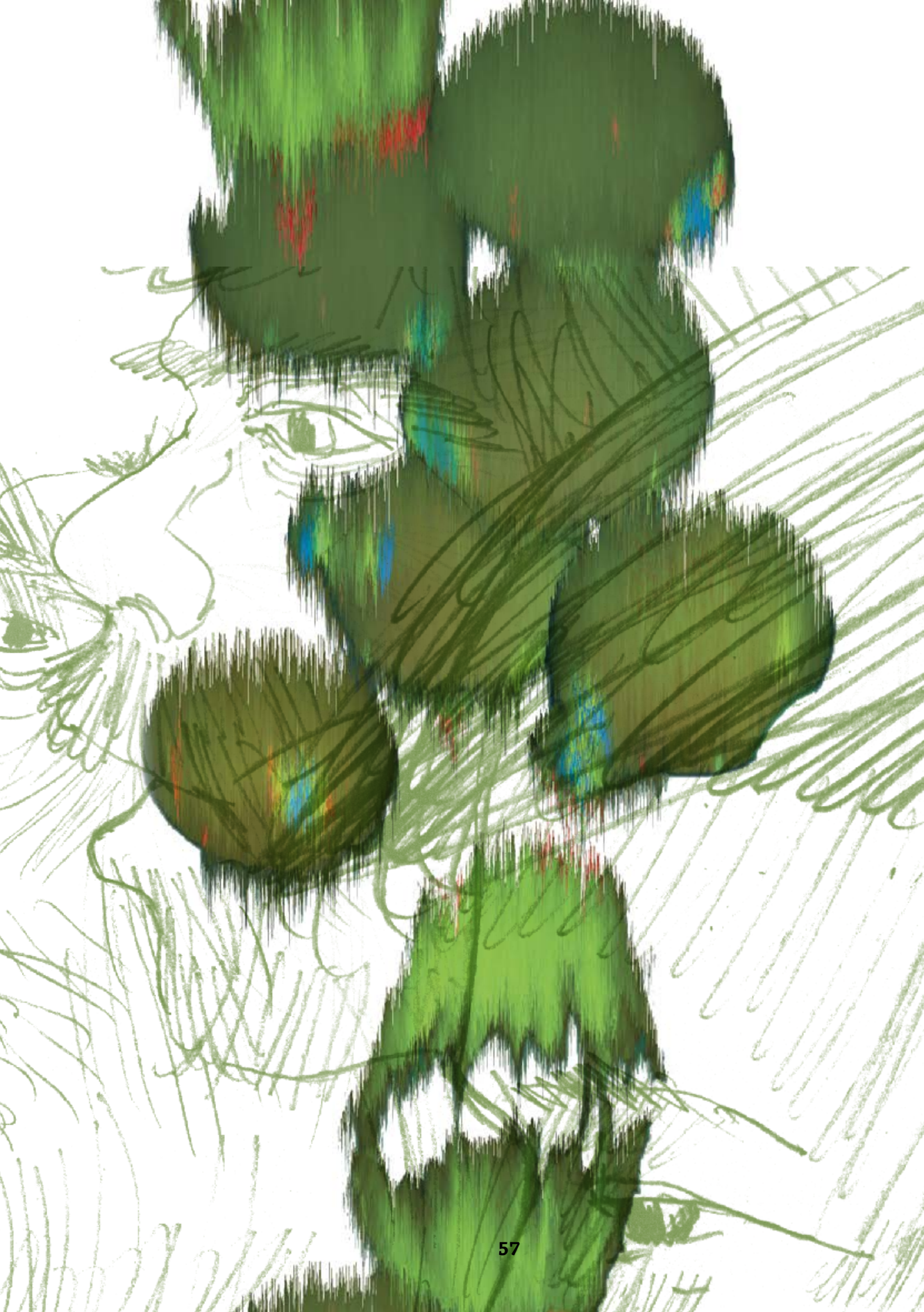
Steve McKnight received his bachelor's degree in biology from the University of Texas in 1974 and his PhD degree in biology from the University of Virginia in 1977. He conducted postdoctoral research at the Carnegie Institution of Washington under the mentorship of Donald Brown and was appointed as a staff member at that institution in 1983. He was appointed as a Howard Hughes Medical Institute investigator in 1988. His research focus at the Carnegie Institution was on gene regulation. He used molecular biological methods to define the regulatory DNA sequences constituting the promoter of the herpes simplex virus thymidine kinase gene, and then employed biochemical methods to purify gene-specific transcription factors, including members of the C/EBP and GABP families of transcription factors.

In 1991 Dr. McKnight left academia to co-found Tularik, a San Francisco-based biotechnology company devoted to the discovery of ethical drugs acting to treat disease via the regulation of gene expression. In 1995 Dr. McKnight moved from Tularik to UT Southwestern and in 1996 he was appointed chairman of the Department of Biochemistry. At UT Southwestern Dr. McKnight has directed an active research laboratory and has guided the Department of Biochemistry to substantial growth in the disciplines of chemistry, biochemistry and biophysics. Dr. McKnight is a member of the National Academy of Sciences, the Institute of Medicine and the American Academy of Arts and Sciences.

McKnight's awards and honours include: the Eli Lilly and Company-Elanco Research Award, the Award in Molecular Biology of the National Academy of Sciences, Member of the National Academy of Sciences, Member of the American Academy of Arts and Sciences, the National Institutes of Health Director's Pioneer Award, Fellow of the American Association for the Advancement of Science, and the Wiley Prize.

Schizophrenia, Stem Cells and Sprouty Signalling





Kim Ashley Nasmyth

* 1952

Institute of Molecular Pathology (IMP), Vienna, Austria

📅 November 10, 2005

Professor Kim Nasmyth is an English geneticist best known for his work on the segregation of chromosomes during cell division. He attended Eton College and then the University of York where he studied biology and graduated in 1974. For his PhD research, he joined the lab of Murdoch Mitchison at the University of Edinburgh and focused on cell cycle regulation in yeast – a topic that would remain at the centre of his scientific interest.



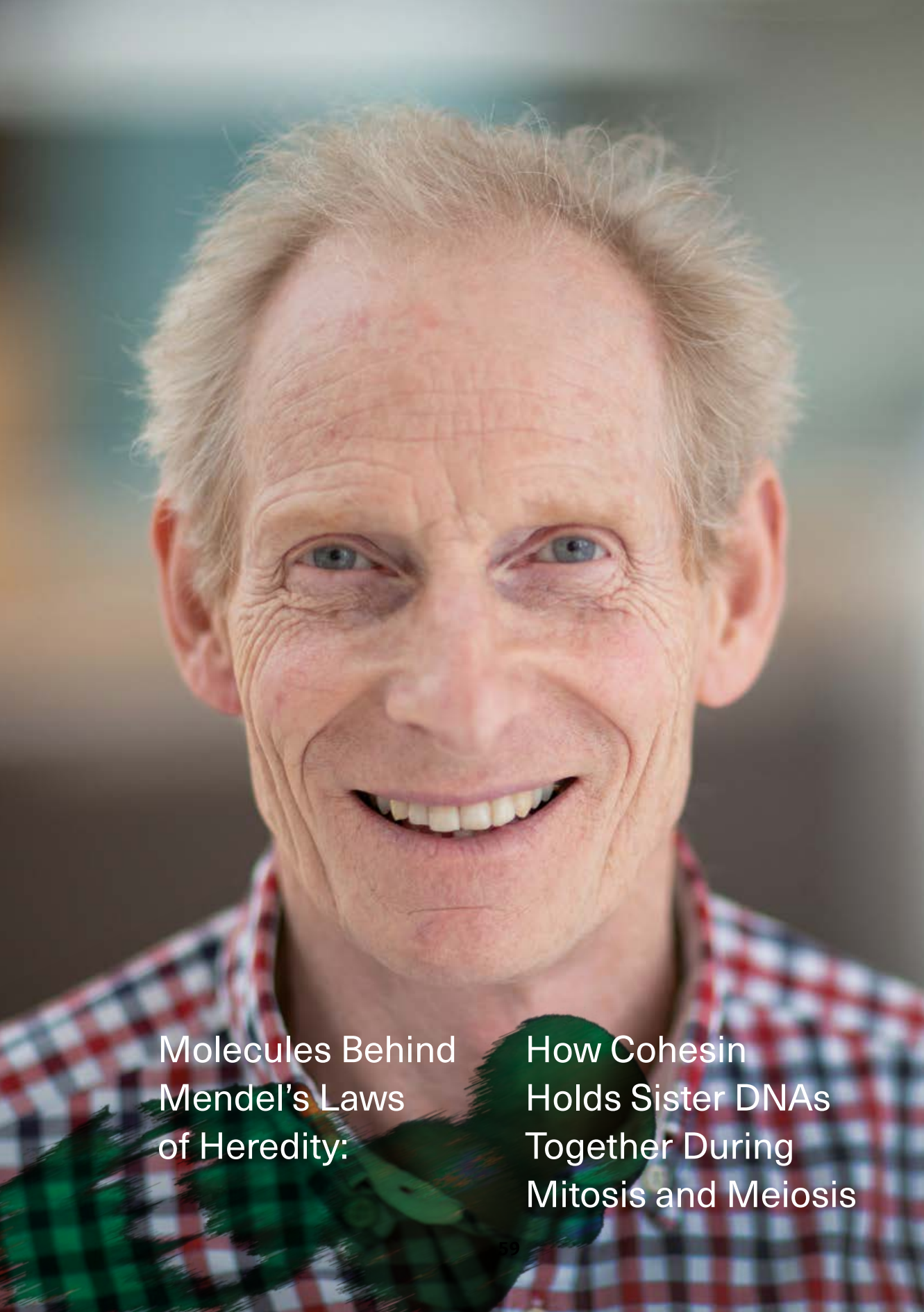
After a postdoctoral fellowship at the University of Washington in Seattle and at Cold Spring Harbor Laboratory in New York, Kim Nasmyth became a staff member at the MRC Laboratory of Molecular Biology in Cambridge. Here he studied yeast mating type genes and demonstrated that gene expression can be regulated through specific control elements distant from the start of transcription. He also identified cell-cycle specific transcription factors.

In 1987, Max Birnstiel recruited Kim Nasmyth to the newly founded Research Institute of Molecular Pathology in Vienna. Among the most important scientific achievements of his team was

the discovery of the cohesin complex that holds sister chromatids together until they separate during anaphase. They also discovered separase, the protease that triggers loss of cohesion at the metaphase to anaphase transition. Cohesin and separase are essential for the correct distribution of the genetic material to daughter cells.

In 1997, Kim Nasmyth succeeded Max Birnstiel as director of the IMP and relocated to the University of Oxford in 2006 to take over the Whitley Chair of Biochemistry. He served as head of the Department of Biochemistry in Oxford for five years and was a Professorial Fellow in Biochemistry at Trinity College. Nasmyth continues to head a research group at the Department of Biochemistry in Oxford.

His work has been recognized by several awards, including the Louis Jeantet Prize (1997), the Austrian Wittgenstein Prize (1999), the Croonian Lecture of the Royal Society (2002), the Boveri Award (2003) for Molecular Cancer Genetics, the Gairdner Foundation Prize (2007), the Golden Medal of the Faculty of Natural Sciences of Charles University in Prague, the Breakthrough Prize (2018), and the Biochemistry Society Centenary Award (2021). He is a fellow of the Royal Society, a member of the Austrian Academy of Sciences, and a foreign honorary member of the American Academy of Arts and Sciences.



Molecules Behind
Mendel's Laws
of Heredity:

How Cohesin
Holds Sister DNAs
Together During
Mitosis and Meiosis

Richard Henderson

* 1945

MRC Laboratory of Molecular Biology, Cambridge, UK

📅 March 30, 2006

Richard Henderson is a Scottish molecular biologist and biophysicist and pioneer in the field of electron microscopy of biological molecules.

Henderson studied physics at the University of Edinburgh and received his doctorate at the University of Cambridge in 1969. His interest in membrane proteins led to his work on voltage-gated sodium channels as a postdoctoral researcher at Yale University. Returning to the MRC Laboratory of Molecular Biology in Cambridge in 1973, Henderson worked with Nigel Unwin to study the structure of the membrane protein bacteriorhodopsin by electron microscopy. In 1990 Henderson published an atomic model of bacteriorhodopsin by electron crystallography. This model was the second-ever atomic model of a membrane protein. Henderson has worked at the Medical Research Council Laboratory of Molecular Biology in Cambridge since 1973, and was its director between 1996 and 2006. The techniques Henderson developed for electron crystallography are still in use.

Together with Chris Tate, he developed conformational thermostabilization: a method that allows any protein to be made more stable while still holding a chosen conformation of interest. This method has been critical in crystallizing and determining the structures of several G protein-coupled receptors (GPCRs). Henderson and Tate founded the MRC start-up company Heptares Therapeutics (now Sosei-Heptares), which continues to develop new drugs targeting

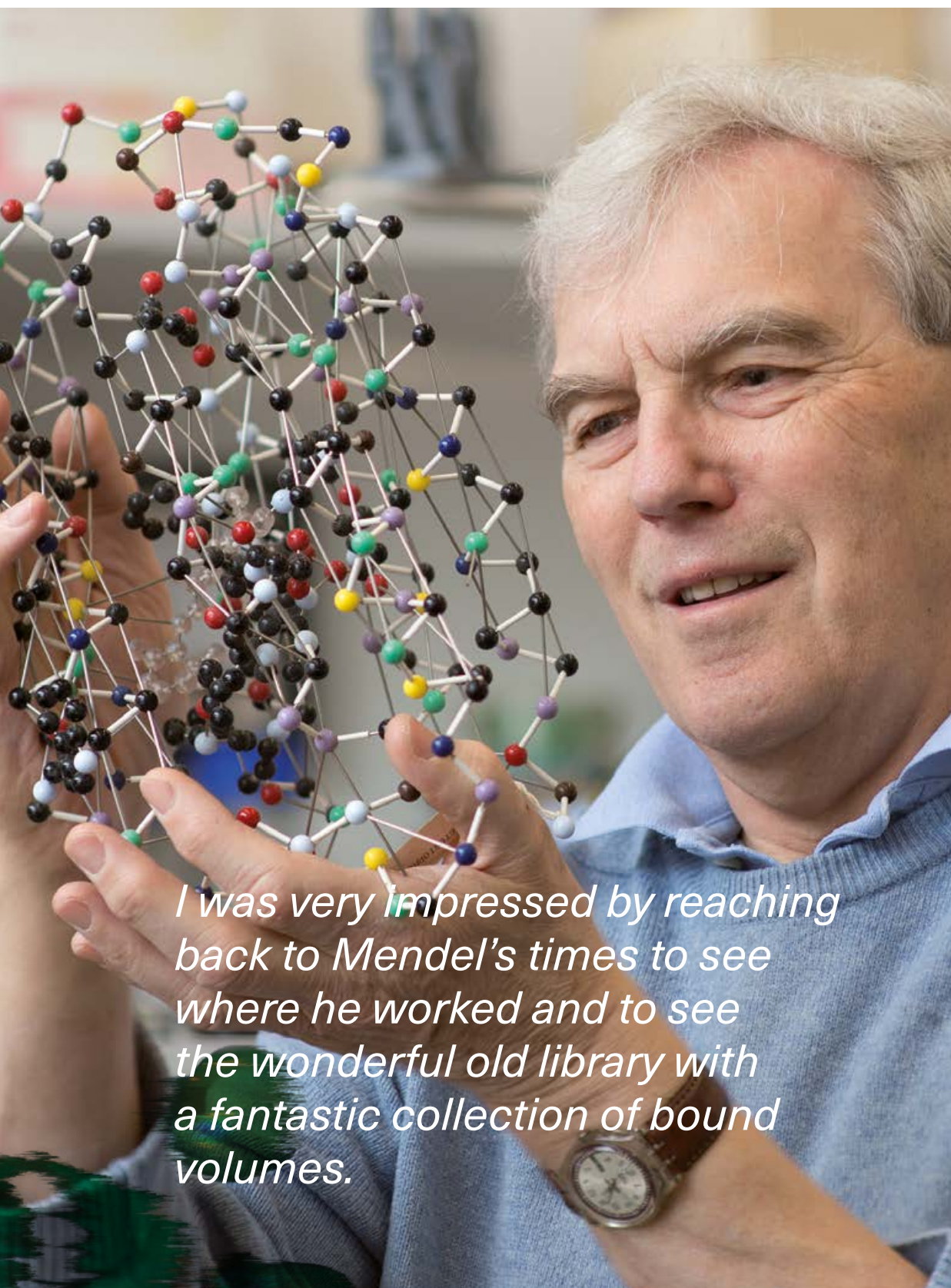
medically important GPCRs linked to a wide range of human diseases.

For his seminal contributions to many aspects of electron microscopy of biomolecules, he was honoured with a number of awards and fellowships, including as a Fellow of the Royal Society, a Foreign Associate of the US National Academy of Sciences, the William Bate Hardy Prize in 1978, the Sir Hans Krebs Medal by the Federation of European Biochemical Societies in 1984, and the Louis-Jeantet Prize for Medicine in 1993.

In 2016 Henderson was awarded the Copley Medal of the Royal Society, and the Nobel Prize in Chemistry in 2017 together with Jacques Dubochet and Joachim Frank for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution. In 2018 he was appointed Member of the Order of the Companions of Honour (CH) in the Queen's Birthday Honours and in the same year he was awarded the Royal Medal of the Royal Society of Edinburgh.

High Resolution Electron Microscopy in Biological Structure Determination





I was very impressed by reaching back to Mendel's times to see where he worked and to see the wonderful old library with a fantastic collection of bound volumes.

Jiří Bártek

* 1953

Institute of Tumour Biology, Danish Cancer Society, Copenhagen, Denmark

 **April 6, 2006**

Jiří Bártek is Czech-born scientist, the head of the Genome Integrity Unit at the Danish Cancer Society Research Center in Copenhagen, Denmark. His work focuses on molecular mechanisms of cell cycle control and genome integrity maintenance, and aberrations of these pathways in human disease, particularly cancer.

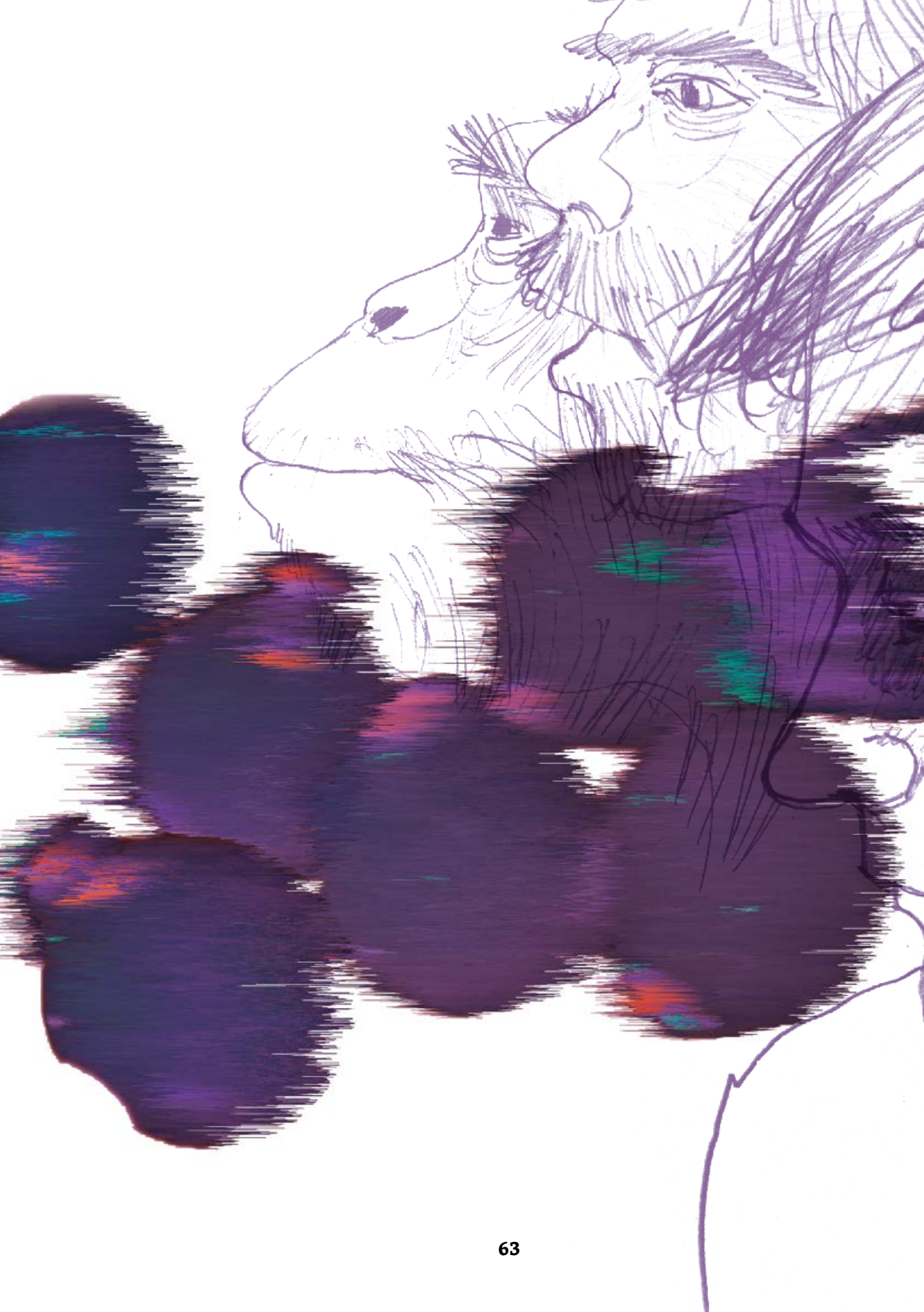
Bártek and colleagues discovered several cell cycle checkpoints ensuring that our cells sense and respond to various stressors that damage DNA and studied differences in these processes between normal and cancer cells. He also pioneered the thesis that cancer cells may depend on some mechanisms that represent as cancer vulnerabilities in innovative cancer treatment. His group identified several such vulnerabilities and suggested how these could be used to sensitize cancer. He and his colleagues also helped to understand mechanisms of cancer cell resistance to standard-of-care treatments and found ways to overcome it, together with identification of biomarkers to guide cancer therapy.

Bártek studied medicine at Palacký University in Olomouc, Czech Republic, and obtained his PhD in 1983 at the Institute of Molecular Genetics of the Czech Academy of Science in Prague. Before moving to his current position in Copenhagen in 1992, he worked as a postdoctoral fellow at the Imperial Cancer Research Fund in London and the German Cancer Research Center in Heidelberg, and as a group leader at the Cancer Research Institute in Brno and as head of a department at the Institute of Haematology in Prague. His

work has been acknowledged by a number of prestigious awards in Denmark, Sweden, Israel and the Czech Republic, including the 1998 Prize of the Danish Association for Cancer Research, the 2003 Novo Nordisk Prize, and the G. J. Mendel Honorary Medal for Merit in the Biological Sciences. He was elected as a member of EMBO in 2000.

Bártek is a founding member of the European Academy of Cancer Sciences (2009) and was elected to the Danish Royal Academy of Sciences and Arts in 2012. In 2013 he was awarded the Silver Medal of Merits from the Senate of the Czech Republic.

DNA Damage Response: Molecular Mechanisms and Relevance for Cancer



Václav Pačes

* 1942

Institute of Molecular Genetics, Czech Academy of Sciences, Prague, Czech Republic

 **April 13, 2006**

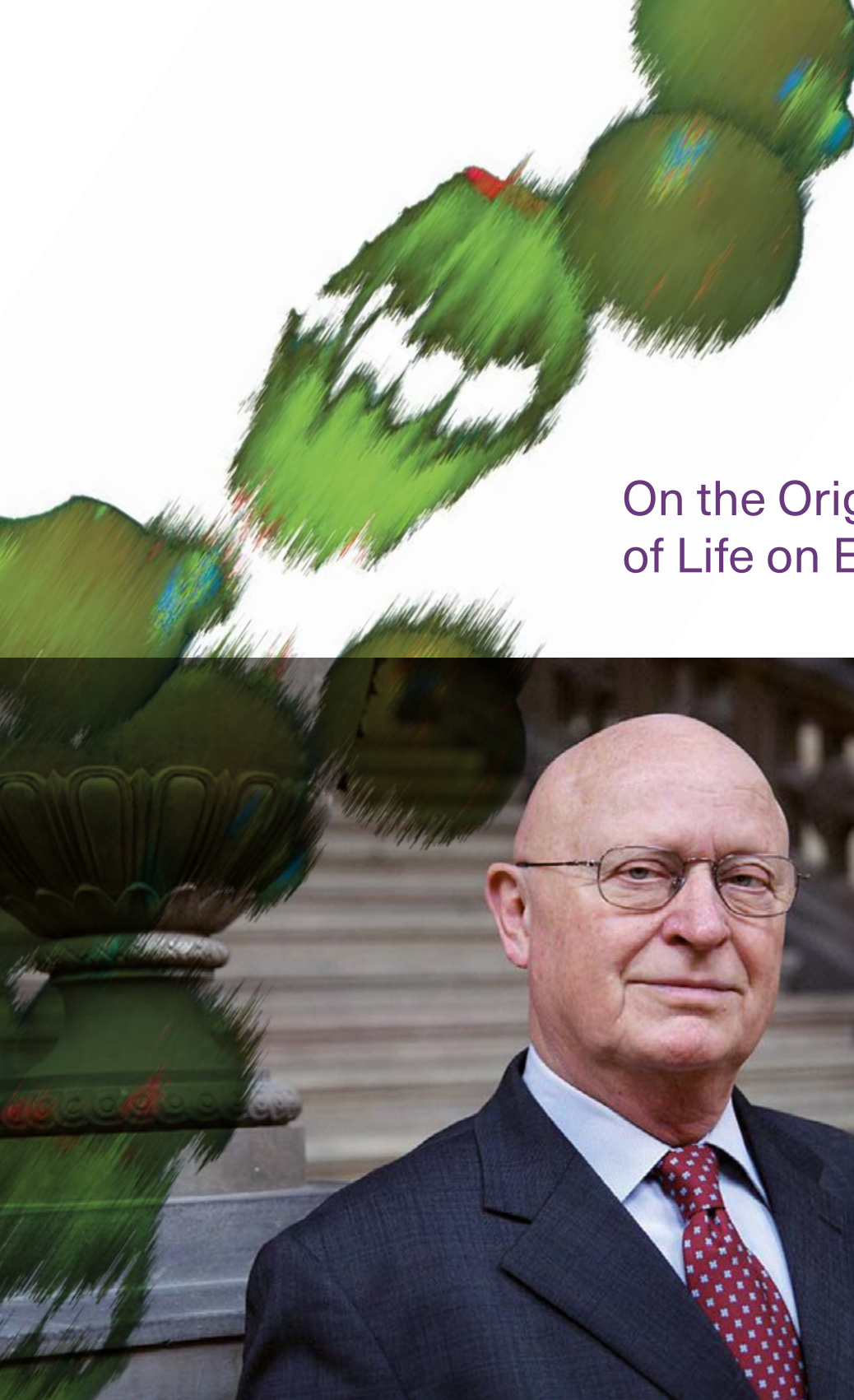
Václav Pačes is Czech biochemist and a well-known figure in the popularization of science in the Czech Republic.

Pačes studied biochemistry at the Faculty of Science at Charles University in Prague, Czech Republic. After obtaining a master's degree in 1965 he joined the Institute of Organic Chemistry and Biochemistry of the Czechoslovak Academy of Sciences, where he obtained his PhD in 1968. He then spent a year as a postdoctoral fellow at the University of Chicago and another year at McMaster University in Hamilton, Canada. Since 1976 he has worked at the Institute of Molecular Genetics in the field of genomics, where he was asked to establish a methodology for DNA sequencing. A complete sequence of bacteriophage PZA was finished in 1986, which made his group one of the very first to read the complete DNA information of any organism. Professor Pačes followed on his studies of DNA with a focus on its regulatory role and evolutionary importance. He spent another year (1990–91) as a visiting professor at Yale University in New Haven, USA, and later became one of the first Czech members of EMBO.

From 1999 to 2005 he served as the Director of the Institute of Molecular Genetics in Prague and is a founding member of the Czech Learned Society.

Pačes served as chair of the Czech Academy of Sciences, and from 2010 until 2012 as chair of the Czech Learned Society.

*In Brno you have
the only Mecca
of science in the
Czech Republic –
the place where
modern life
science originated.
And that is why,
but not the only
reason why, we all
appreciate being
invited to the
lecture here.*



On the Origin of Life on Earth



Sir Adrian Bird

* 1947

*Buchanan Professor of Genetics, Wellcome Trust Centre for Cell Biology,
University of Edinburgh, UK*

May 18, 2006

Professor Adrian P. Bird is a British geneticist and the world's leading expert in understanding the molecular mechanism underlying Rett Syndrome.

Adrian Bird graduated in biochemistry from the University of Sussex and obtained his PhD at Edinburgh University in 1970. Following postdoctoral experience at Yale University and the University of Zurich, he joined the Medical Research Council's Mammalian Genome Unit in Edinburgh. In 1987 he moved to the Institute for Molecular Pathology in Vienna. After returning to Edinburgh

a Governor of the Wellcome Trust, one of the world's largest medical research charities, from 2001–2011. He has received numerous awards and honours, including the Louis-Jeantet Prize for Medicine, the Gairdner Prize, the Shaw Prize and the 2020 Brain Prize. He is a Fellow of the Royal Societies of London and Edinburgh and of the Academy of Medical Sciences.

Professor Bird's research focuses on the basic biology of DNA methylation and other epigenetic processes. He identified CpG islands as gene markers in the vertebrate genome and discovered proteins that read the DNA methylation signal to influence chromatin structure. Mutations in one of these proteins, MeCP2, cause the severe neurological disorder Rett Syndrome, which he showed to be reversible and therefore potentially curable. Professor Bird's recent work indicates that DNA base composition can be read as a signal to influence cell fate.

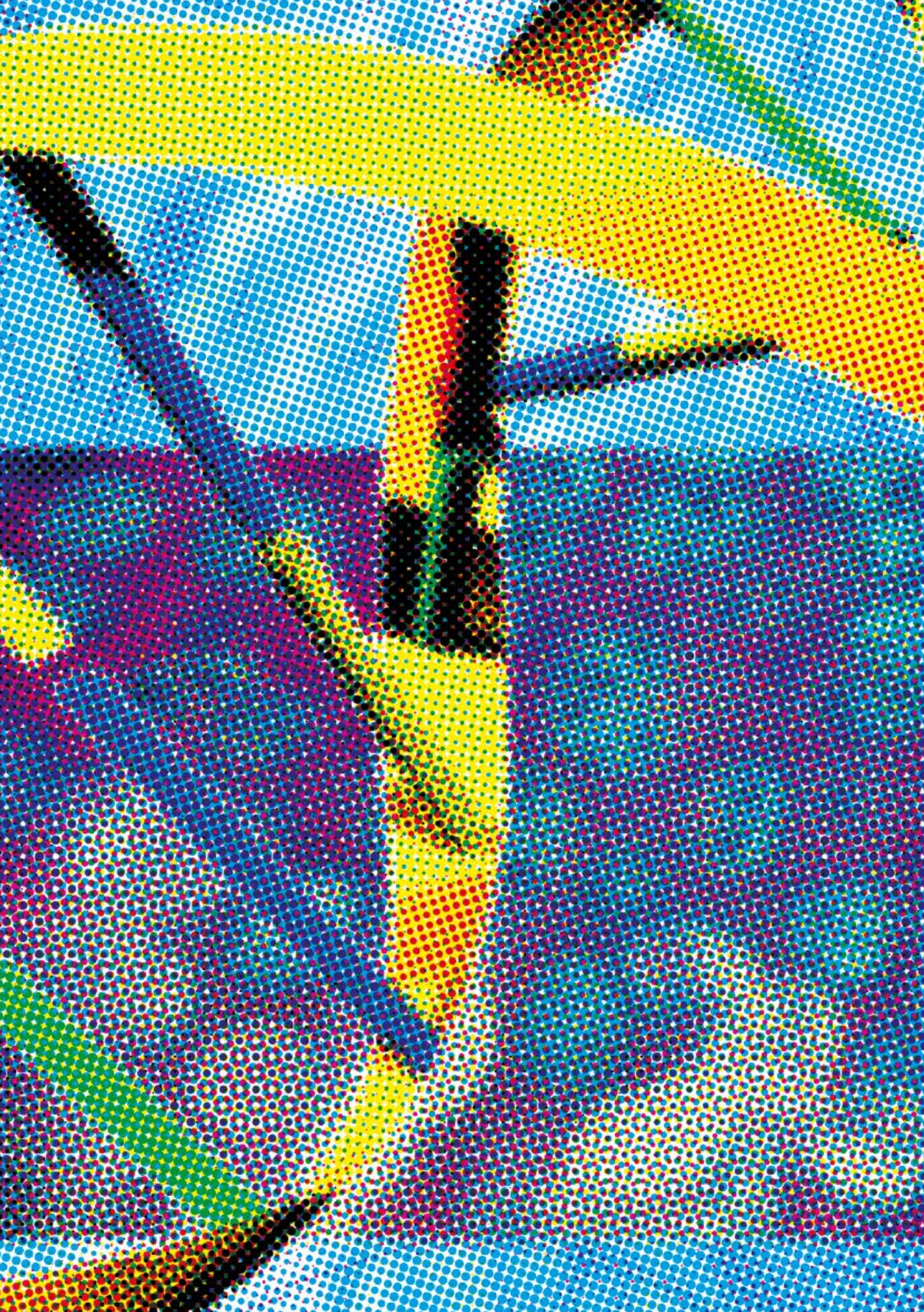


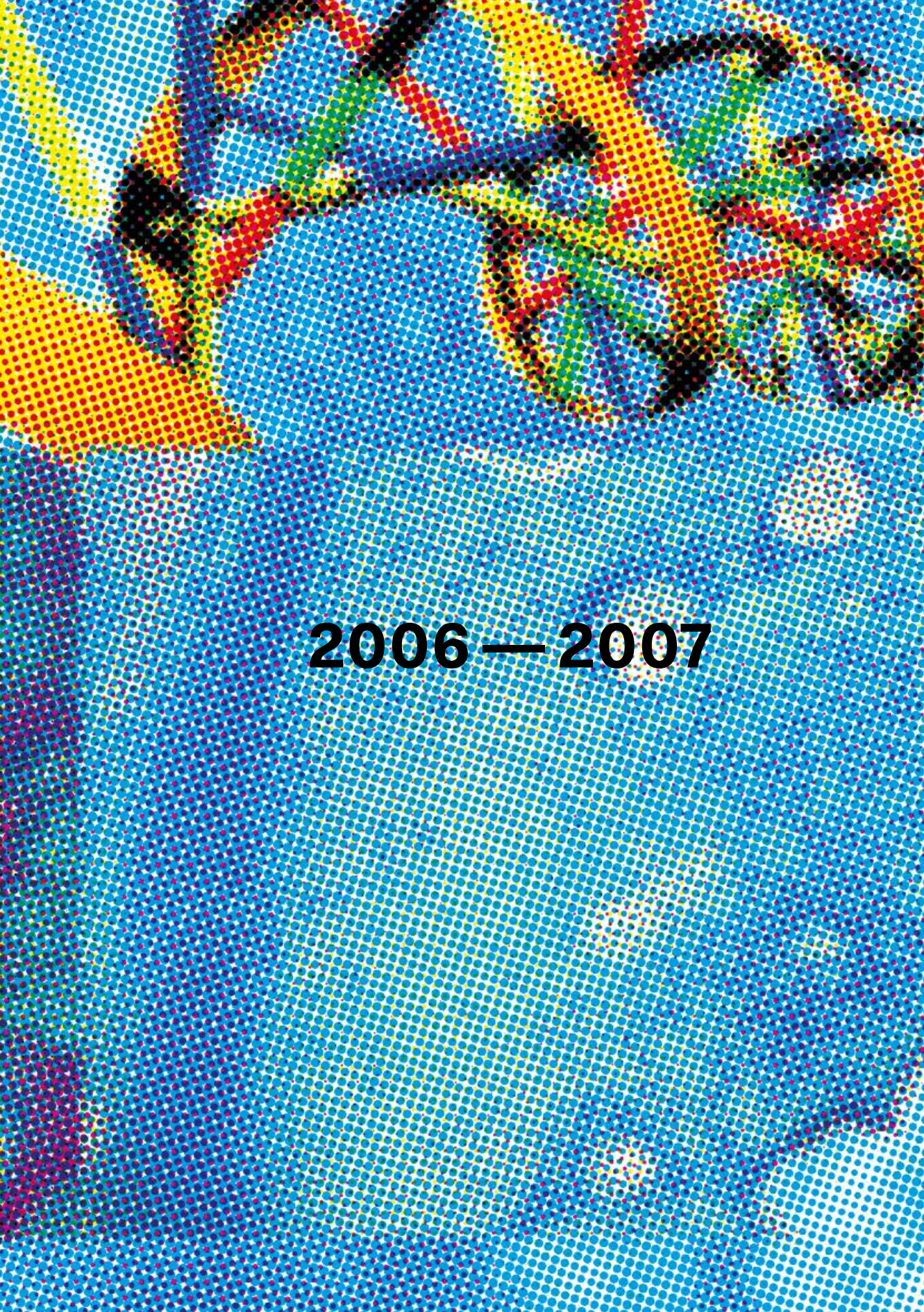
Proteins that Read the DNA Methylation Signal

in 1990 he became Buchanan Professor of Genetics and played a prominent role in setting up the Wellcome Trust Centre for Cell Biology, where he was Director from 1999–2010. Professor Bird was



*To visit Gregor Mendel's monastery,
the birthplace of genetics and hence
modern biology, was a special
privilege that I will always cherish.*





2006 — 2007

Sir John Gurdon

* 1933

The Gurdon Institute, University of Cambridge, UK

 **October 12, 2006**

Sir John Gurdon is British developmental biologist who was the first to demonstrate that egg cells are able to reprogram differentiated (mature) cell nuclei, reverting them to a pluripotent state, in which they regain the capacity to become any type of cell. Gurdon's work ultimately came to form the foundation for major advances in cloning and stem cell research.

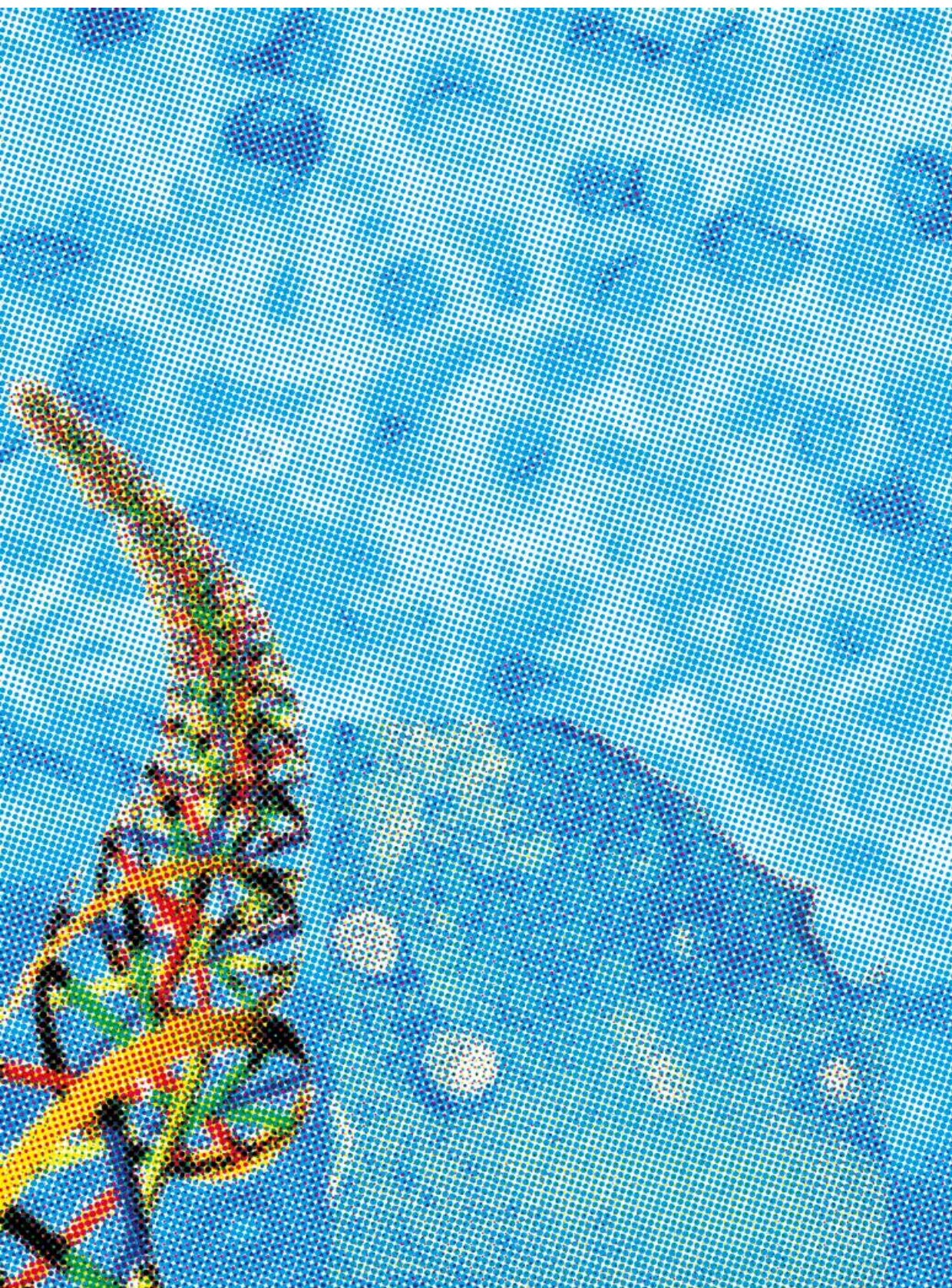
Gurdon studied classics at prestigious Eton College and intended to continue his classics studies at Christ Church, Oxford, but was not accepted. Instead, after being tutored in zoology, he gained acceptance to that department at Oxford, earning a BS in 1956. In that year he began his graduate studies in the laboratory of embryologist Michail Fischberg and initiated a series of experiments on nuclear transfer in the African frog *Xenopus laevis*. He proceeded to generate cloned tadpoles from differentiated *Xenopus* intestinal cell nuclei, demonstrating that egg cells could undifferentiate previously differentiated nuclei and that normal embryos could be produced by this technique. Gurdon's results were at that time greeted with scepticism. After completing a PhD in 1960, Gurdon received a yearlong postdoctoral fellowship to conduct research at the California Institute of Technology in Pasadena, where he investigated the genetics of bacteriophages. He then returned to Oxford, becoming a faculty member in the zoology department and continuing his work to characterize nuclear changes that take place during cell differentiation. He later moved to the Wellcome

Trust/Cancer Research Campaign Institute (later the Wellcome Trust/Cancer Research UK Gurdon Institute), a Cambridge-based institution that he cofounded in 1989 and that in 2004 was named for him. He directed the Institute until 2001, after which he focused on research full time.

Gurdon received numerous awards throughout his career – notably the 1985 Royal Medal of the Royal Society and the 2003 Copley Medal of the Royal Society. He was made a fellow of the Royal Society in 1971 and a foreign associate of the US National Academy of Sciences in 1980. He was knighted in 1995.

Sir John Gurdon was awarded the 2009 Albert Lasker Basic Medical Research Award, and the 2012 Nobel Prize in Physiology or Medicine “for the discovery that mature cells can be reprogrammed to become pluripotent” (shared with Shinya Yamanaka).

Nuclear Reprogramming as a Route to Cell Replacement



Ronald Plasterk

* 1957

Netherlands Institute for Developmental Biology, Utrecht, Netherlands

📅 October 26, 2006

Ronald Plasterk is director of the Hubrecht Laboratory. His research is in the area of genetics and functional genomics. He focuses on the mechanism and regulation of DNA transposition, and on the mechanisms of RNA interference and microRNAs, including the functions of RNAi as a natural defence against the uncontrolled duplication of transposons.

Plasterk studied biology at Leiden University and economics at the University of Amsterdam. In 1981, he obtained both an MSc degree *cum laude* in biology and a propaedeutic diploma in economics. In 1984, he was awarded a PhD degree in Mathematics and the Natural Sciences by Leiden University. His study focused on transposon sequences in DNA. As a doctoral researcher from 1981 to 1984, Plasterk also was a member of the Leiden city council for the Labour Party.

Between 1985 and 1986, he worked as a postdoctoral researcher at the California Institute of Technology in Pasadena. There he studied the transposon sequences in DNA in the parasite *Borrelia hermsii*. Between 1986 and 1987 he was a postdoc at the MRC Laboratory of Molecular Biology in Cambridge, where he studied *Caenorhabditis elegans*, a nematode that is used as a model organism.

In 1987 he returned to the Netherlands where he became group leader and member of the board of the Netherlands Cancer Institute in Amsterdam. In 1989 he became director of the research school of oncology at the Institute, where he remained until 2000. In February 2000

he became director of the Netherlands Institute for Developmental Biology, also known as the Hubrecht Laboratory, an institute of the Royal Netherlands Academy of Arts and Sciences (KNAW). He combined this with a position as professor in developmental genetics at Utrecht University from May 2000.



Since 2001 Plasterk has been a member of the Royal Netherlands Academy of Arts and Sciences, a member of the Health Council, which advises the Minister of Health, Welfare and Sport, and member of many advisory boards, including the Wellcome Trust and EMBO.

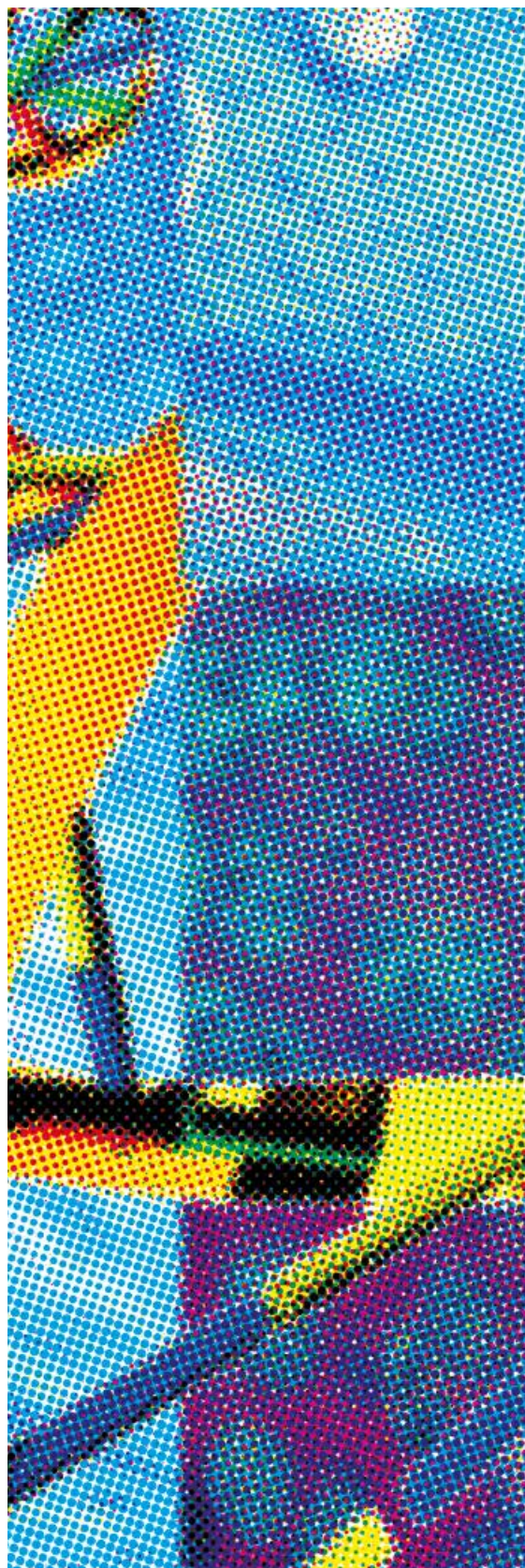
In 2007 Dr. Plasterk was appointed Minister of Education, Culture and Science. After his post as Minister he became a member of the House of Representatives for the Dutch Labour Party (PvdA) and acted as party spokesperson for





finances. In November 2012 Dr. Plasterk was appointed Minister of the Interior and Kingdom Relations. Plasterk retired from national politics in 2017 and in December 2017 was named as Chief Scientific Officer (CSO) for myTomorrows. Plasterk has also served as a professor of Novel Strategies to Access to Therapeutics at the University of Amsterdam since October 2018. In the same year Plasterk founded the startup company Frame Therapeutics, a pharmaceutical company that specializes in Cancer treatment vaccines. Plasterk is also a prolific author, having written more than a dozen books and articles since 1990 about molecular biology, molecular genetics, education and atheism.

miRNAs for Animal Development



Elizabeth Blackburn

* 1948

University of California, San Francisco, USA

 **October 31, 2006**

Elizabeth H. Blackburn is an Australian-born American molecular biologist and biochemist with a focus on telomeres and their maintenance.

In the early 1970s Blackburn earned her bachelor's and master's degrees in biochemistry from the University of Melbourne. She then enrolled as a graduate student in molecular biology at the University of Cambridge in England and received her PhD in 1975. In the same year she began her postdoctoral research in the laboratory of Joseph Gall at Yale University in New Haven, USA. Gall's research was concerned primarily with the structure and replication of chromosomes, and Blackburn brought her training in early DNA sequencing methods to investigate the ends of chromosomes of a protozoan called *Tetrahymena*. She sequenced the DNA of the organism's telomeres and in doing so discovered that telomeres are composed of variable numbers of short repeating segments of DNA.

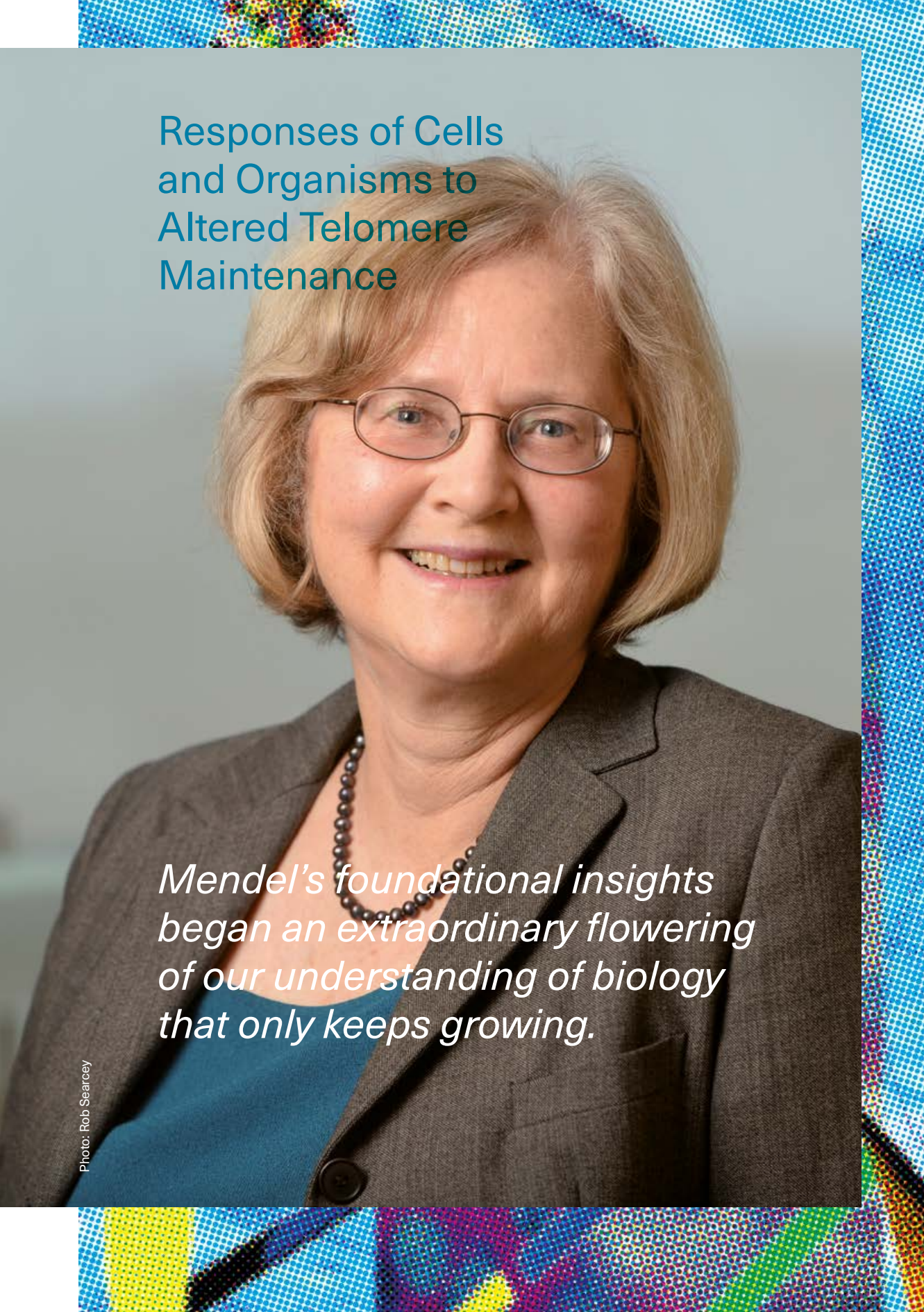
In 1978 Blackburn became an assistant professor of molecular biology at the University of California, Berkeley, and continued her investigations of the telomeres of *Tetrahymena*. In 1980 she met Jack William Szostak, then studying yeast DNA recombination, and the two collaborated in order to understand telomere function, combining yeast and *Tetrahymena* as model organisms for their investigations. In 1985 Blackburn and Carol W. Greider, who was then a graduate student in Blackburn's laboratory, reported their discovery of telomerase, a novel enzyme that replenishes the ends

of chromosomes, and they continued studies of its fundamental role in maintaining chromosomes.

Blackburn became a professor at the University of California, San Francisco (UCSF) in 1990, and from 1993 to 1999 served as chair of the Department of Microbiology and Immunology. Blackburn's later research involved further investigation of the molecular composition and cellular functions of telomeres and telomerase, as well as studies on the interactions of these cellular components and their roles in cancer and human aging.

Throughout her career Blackburn has received many honorary degrees and awards, including the Gairdner Foundation International Award (1998) and the Albert Lasker Basic Medical Research Award (2006). Blackburn was elected a fellow of the Royal Society of London in 1992 and a Foreign Associate of the American National Academy of Sciences in 1993.

Elizabeth Blackburn was awarded the 2009 Nobel Prize in Physiology or Medicine, together with Carol Greider and Jack Szostak, for their discoveries of the molecular and functional nature of telomeres and of the enzyme telomerase. In 2015 she was appointed President of the Salk Institute, in California, retiring in 2018. Currently, as Professor Emerita at the University of California San Francisco, she continues pursuing her broad interests in science policy and her involvement in collaborative telomere biology studies in humans.



Responses of Cells and Organisms to Altered Telomere Maintenance

*Mendel's foundational insights
began an extraordinary flowering
of our understanding of biology
that only keeps growing.*

Rodney Rothstein

* 1947

Columbia University Irving Medical Center, New York, USA

📅 November 9, 2006

Rodney Rothstein is a professor of genetics and development and systems biology at the Columbia University Irving Medical Center in New York. He is a pioneer in the use of recombination to alter genomes and has employed these methods to isolate novel genes involved in the maintenance of genome stability. He is also an expert in yeast genetics, which he uses as a model system for studying how cells respond to DNA damage.



Rothstein graduated from the University of Illinois, Chicago with a degree in biology in 1969 and from the University of Chicago in 1975 with a PhD in genetics, followed by postdoctoral studies at the University of Rochester and Cornell University in Ithaca, New York. He was a faculty member at UMDNJ in Newark before joining the faculty of Columbia University Medical Center in 1984.

Research in the Rothstein lab has focused on several genes involved in maintaining

genome stability, including factors that are important in addressing aberrations such as double-strand breaks in DNA and the function of checkpoints for monitoring the progression of cellular processes throughout the cell cycle.

Dr. Rothstein has served as a member of the National Science Foundation Advisory Panel for Eukaryotic Genetic Biology (1984–1988) and of the National Advisory Council for Human Genome Research (1993–1997) and served on many study sections from 2005 to 2019. He received an NIH Merit Award in 2005 and has had continuous funding since starting his lab in 1979.

In 2009, Dr. Rothstein received the Edward Novitski Prize from the Genetics Society of America in recognition of his outstanding creativity in solving genetic problems. He was awarded Doctor Honoris Causa in Medicine from Umeå University, Sweden (2012). He is a fellow of the American Society for Microbiology (2007), the American Association for the Advancement of Science (2008) and the American Academy of Arts and Sciences (2011), and he is a member of the National Academy of Sciences (2015).

Choreography of the DNA Damage Response in Budding Yeast





I was deeply honoured to be included as one of the speakers in the Mendel Lectures. It was indeed a thrill to visit the Mendel Museum and see first hand the birthplace of modern genetics. The academic community owes a debt of gratitude to the amazing efforts of Gustav Ammerer, and Anna and Kim Nasmyth for making sure that this historic place is a lasting tribute to Gregor Mendel and his ground-breaking work.

Wilhelm Ansorge

* 1944

ETH Zurich EMBL Heidelberg, and visiting EPFL – ETH Lausanne, Switzerland

📅 April 19, 2007

Wilhelm Jan Ansorge is a German-Czech scientist, born in Czechoslovakia. He developed novel scientific instrumentation and software enabling major advances in analyzing genomes, genes and proteins in cellular and molecular biology, as well as in various medical fields.

Ansorge graduated from the Faculty of Mathematics and Physics at Charles University in Prague. After completing his dissertation in 1968 and serving two years as assistant professor at the Faculty of Mathematics and Physics at Charles University, he joined Texas



Instruments for four years in Dallas, USA (working on the development of semiconductor technology). Then he worked for six years at CERN, the Particle Physics Research Centre in Geneva, in

the development of superconducting magnets for accelerators. Thereafter he worked for 25 years at EMBL, the European Molecular Biology Laboratory in Heidelberg, as the head of the Genomics Technology Department. At EMBL he developed the fluorescence DNA sequencer (1986), the first functional automated system capable of reliably sequencing large genomic DNA. The feasibility of sequencing the human genome with this automated technology was demonstrated by his team on human HPRT (60kb) gene locus (Genomics, 1990). This work for the first time applied the paired-end sequencing approach developed by the team for the project, increasing accuracy and simplifying mapping. This method is now standard in genome sequencing.

In 1991 he revealed a next-generation high throughput planar fluorescence technique for DNA sequencing by synthesis without gels with convertible terminators, and the DNA Chip technique.

He developed automated systems for microinjection and image analysis in single cells, and the electro-transfection of cells. His team produced the first complete human genome Chip array, and a technique for fast screening of monoclonal antibodies.

In 1999, Dr. Ansorge was elected a member of EMBO, and in 1992 was named Honorary Doctor by Charles University. In 1993, Dr. Ansorge was granted the first European chair, sponsored by the European Union, and in 1994 named visiting professor at Charles University.

In 2009 he was elected a foreign member of the Council of the Czech Academy of Sciences.

During his career he authored over 400 publications, and applied for and was granted more than 30 patents in genomics and technology, leading to license agreements with and commercial products made by leading European companies.

Genomes, Proteomes and Single Cell Analysis



The Mendel Lectures organization, in taking care of the place of Mendel's historical activities, motivates young people to find interest and excitement in science. The visitor is overwhelmed by its cross-disciplinary, quantitative, and systematic work.

Richard Losick

* 1943

Harvard University, Cambridge, Massachusetts, USA

📅 April 26, 2007

Richard Marc Losick is an American molecular biologist. He is the Maria Moors Cabot Professor of Biology at Harvard University and a past Professor at the Howard Hughes Medical Institute.

He received his AB in chemistry at Princeton University in 1965 and his PhD in biochemistry at the Massachusetts



Institute of Technology in 1968. Upon completion of his graduate work, Professor Losick was named a Junior Fellow of the Harvard Society of Fellows when he began his studies on RNA polymerase and the regulation of gene transcription in bacteria. He joined the Harvard faculty in 1972.

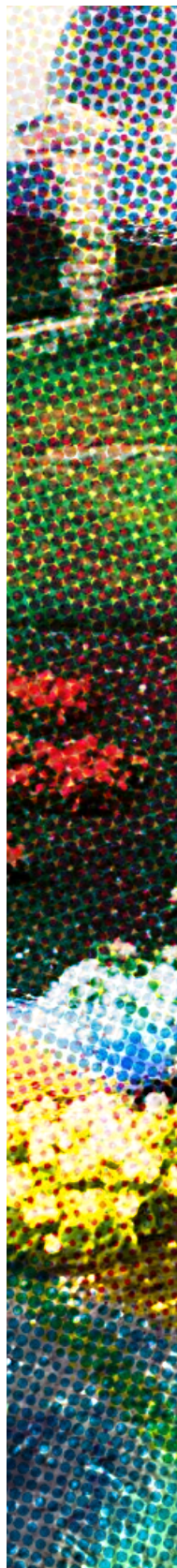
Richard Losick studies gene control in bacteria, including RNA polymerase, gene transcription and its control, and

development in microorganisms, with a special interest in the developmental process of spore formation in the soil bacterium *Bacillus subtilis*.

Professor Losick is a past chairman of the Department of Cellular and Developmental Biology and the Department of Molecular and Cellular Biology at Harvard University. He received the Camille and Henry Dreyfuss Teacher-Scholar Award, and he is a member of the National Academy of Sciences, a Fellow of the American Academy of Arts and Sciences, a member of the American Philosophical Society, a Fellow of the American Association for the Advancement of Science, and a Fellow of the American Academy of Microbiology.

Professor Losick is the 2007 recipient of the Selman A. Waksman Award of the National Academy of Sciences. He was awarded the Canada Gairdner International Award in 2009 and the Louisa Gross Horwitz Prize for Biology or Biochemistry by Columbia University in 2012.

Surprises in How Microbes Cope with Uncertainty





Speaking at the Mendel Museum was both inspiring and ironic: I as a scientist who studies bacteria was speaking on the hallowed grounds that gave birth to the rules of inheritance in diploid organisms. Of course, Mendel's concepts of recessive and dominant apply to bacteria as well as to pea plants.

Jan Ellenberg

* 1967

European Molecular Biology Laboratory, Heidelberg, Germany

May 10, 2007

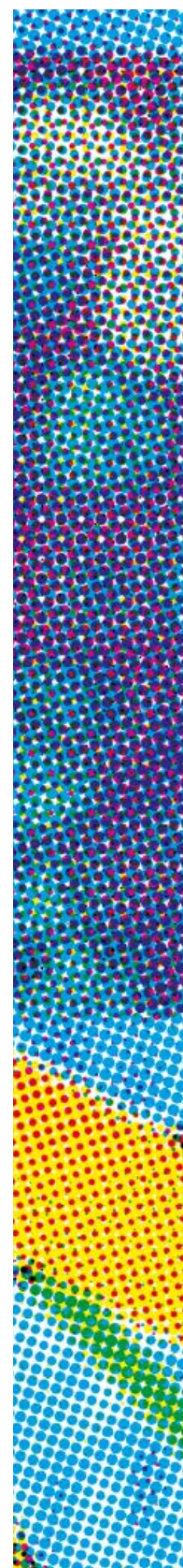
Jan Ellenberg is a German molecular biologist. In 2004 he was the first to receive the Walther Flemming Medal, a prize that is awarded annually by the German Society for Cell Biology to scientists up to 38 years of age.

Ellenberg graduated in biology at the University of Hamburg in 1994. From 1995 to 1998 he worked on his pre-doctoral research at the National Institutes of Health (NIH) in Bethesda, USA. He received his PhD in biochemistry in 1998 at the Free University of Berlin, and then returned to the NIH for another year. In 1999 he became a group leader in the Gene Expression and Cell Biology / Biophysics programmes at the European Molecular Biology Laboratory in Heidelberg. Since 2004 he has been a coordinator of the EMBL Center for Molecular and Cellular Imaging and in 2006 he was appointed a coordinator of the Gene Expression Unit. Ellenberg became a senior scientist at EMBL the same year. In 2010, he became the head of the Cell Biology and Biophysics Unit, and since 2021 he has been the head of the new EMBL Imaging Centre.

The Ellenberg group studies cell division and nuclear organization, focusing on chromatin structure, the formation and segregation of chromosomes, as well as nuclear pore complex structure and assembly in human cells and mammalian pre-implantation embryos. For these purposes, the lab uses and develops advanced quantitative fluorescence microscopy techniques to not only visualize but also understand the underlying molecular mechanisms.

Jan Ellenberg has coordinated European and EMBL efforts to make imaging technologies more accessible to researchers. For his scientific merits within cell biology plus his engagement in the integration of bio-sciences, he was conferred the honorary degree of doctor of philosophy at the Åbo Akademi University in Turku, Finland, in 2016. In 2016 Jan Ellenberg received an ERC Advanced Grant for the study of cell division errors during early mammalian development. In 2017 he became a member of the Academia Europaea and was named Allen Distinguished Investigator of the Paul G. Allen Frontiers Group. In 2018 he was elected a member of the German Academy of Sciences Leopoldina.

Imaging How Living Cells Divide: From Single Proteins to Genome Wide Screening









2007—2008

Titia de Lange

* 1955

Rockefeller University, New York, USA

📅 October 2, 2007

Titia de Lange is a Dutch cell biologist and a leading expert on telomeres. She is the Director of the Anderson Center for Cancer Research, the Leon Hess Professor and the head of Laboratory Cell Biology and Genetics at Rockefeller University.

Titia de Lange studied biochemistry at the University of Amsterdam and received a PhD in biochemistry from the University of Amsterdam for her work at the Netherlands Cancer Institute. In 1985, she accepted a postdoctoral position with Harold Varmus (the 1989 Nobel prize laureate) at the University of California, San Francisco. There, she isolated human telomeric DNA and was the first to show that tumour telomeres are shortened. De Lange joined Rockefeller University as an assistant professor in 1990.

The goal of de Lange's research is to understand how telomeres protect chromosome ends and what happens when telomere function is lost during the early stages of tumorigenesis before telomerase is activated. De Lange's group was instrumental in the discovery of shelterin, the protein complex that binds to telomeres and prevents DNA damage signalling and inappropriate DNA damage repair at chromosome ends. In 1995 she identified TRF1 and found that it is crucial in the regulation of telomere length. She next discovered TRF2, which she showed protects telomeres from DNA damage signalling and end-to-end fusions. Using electron microscopy with Jack Griffith she discovered that t-telomeres are in a lariat configuration, termed the t-loop. T-loops hide the end of the telomere,

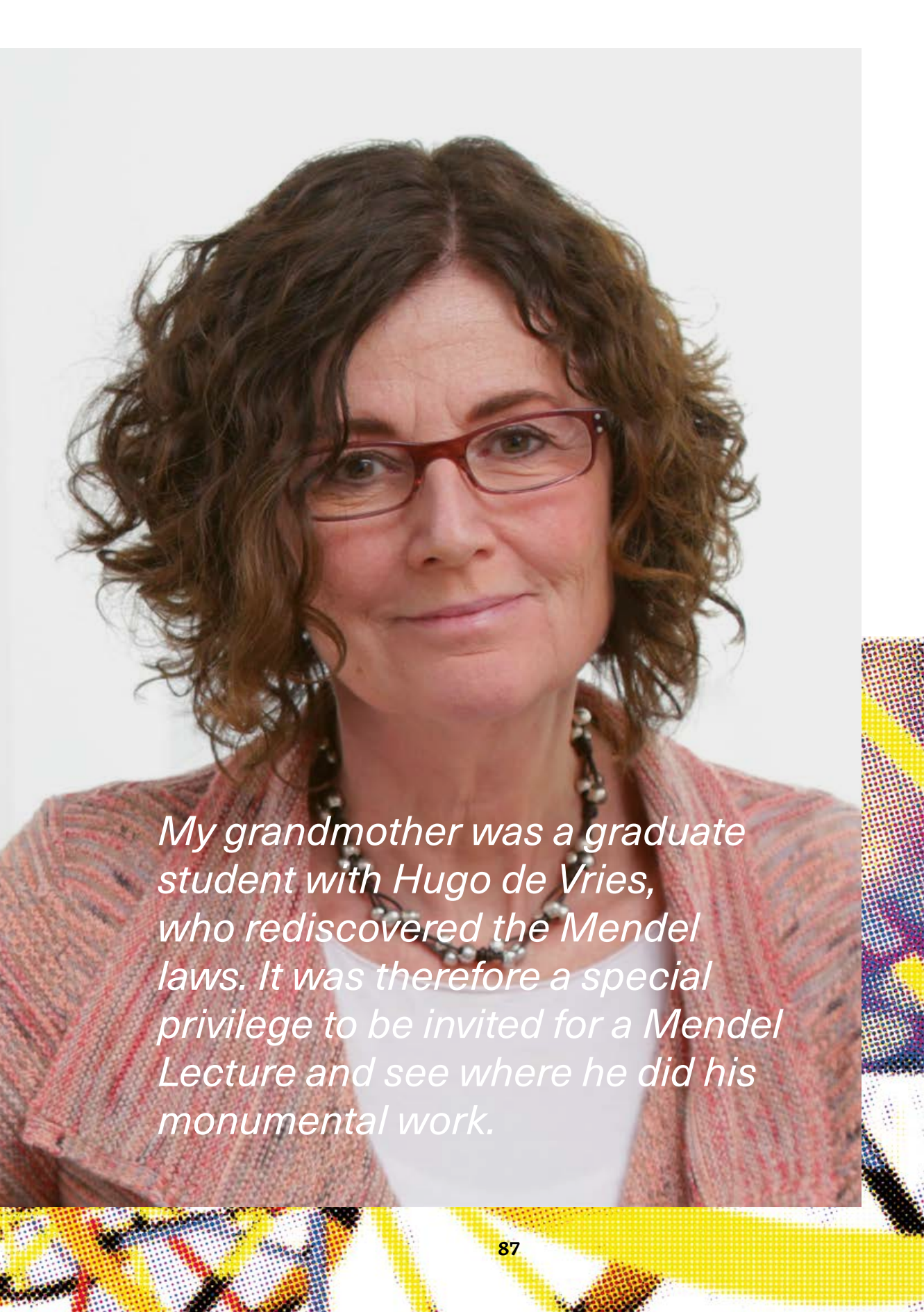
thereby safeguarding telomeres from the DNA damage response. More recently, de Lange showed that telomere shortening has a dual role in cancer development: on one hand, telomere shortening limits cancer development; on the other, telomere loss can drive genome instability in checkpoint deficient cancer cells.

For her scientific contributions, de Lange was elected a member of the Royal Dutch Academy of Sciences, the European Molecular Biology Organization, the American Academy of Arts and Sciences, and is a foreign associate of the National Academy of Sciences, and a member of the National Academy of Science Institute of Medicine. She received the first Paul Marks Prize for Cancer Research in 2000.

Titia de Lange is the recipient of the 2011 Vilcek Prize in Biomedical Science, the 2012 Heineken Prize, the inaugural 2013 Breakthrough Prize in Life Sciences, and the 2014 Canada Gairdner International Award.

How Telomeres Deal with the DNA Damage Response





My grandmother was a graduate student with Hugo de Vries, who rediscovered the Mendel laws. It was therefore a special privilege to be invited for a Mendel Lecture and see where he did his monumental work.

Walter Jakob Gehring

* 1939

Biozentrum, University of Basel, Switzerland

📅 November 8, 2007

Walter Gehring was a Swiss developmental biologist. He trained as a classical zoologist, gaining his first research experience with radar studies of bird migration. He studied zoology at the University of Zurich, where he obtained his PhD in 1965. His model organism of choice from the time of his PhD work onward was the fruit fly *Drosophila melanogaster*. Gehring also found a gain-of-function allele of Antennapedia, which transformed fruit fly antennae into legs. The realization that tissues can be transformed from one into another through transplantation or mutation defined Gehring's research path and inspired his quest to identify the molecular basis of tissue identity. After earning his PhD, he moved to Yale University in 1965, first as a postdoctoral fellow, then being quickly promoted to assistant and then associate professor of developmental biology. In 1972, he returned to Switzerland as a founding member of the Biozentrum of the University of Basel.

Gehring was probably best known for the discovery of the Homeobox in 1984, a gene segment coding for the evolutionarily conserved DNA binding Homeodomain, which is present in many related transcription factors such as the homeotic or Hox proteins that specify different regions along the anterior-posterior body axis in animals throughout the animal kingdom. His second major impact was the discovery of the conserved function of the Eyeless/Pax6 gene family in eye development, leading to the pioneering concept that corresponding organs in different animals are specified by conserved transcription factors. Both these

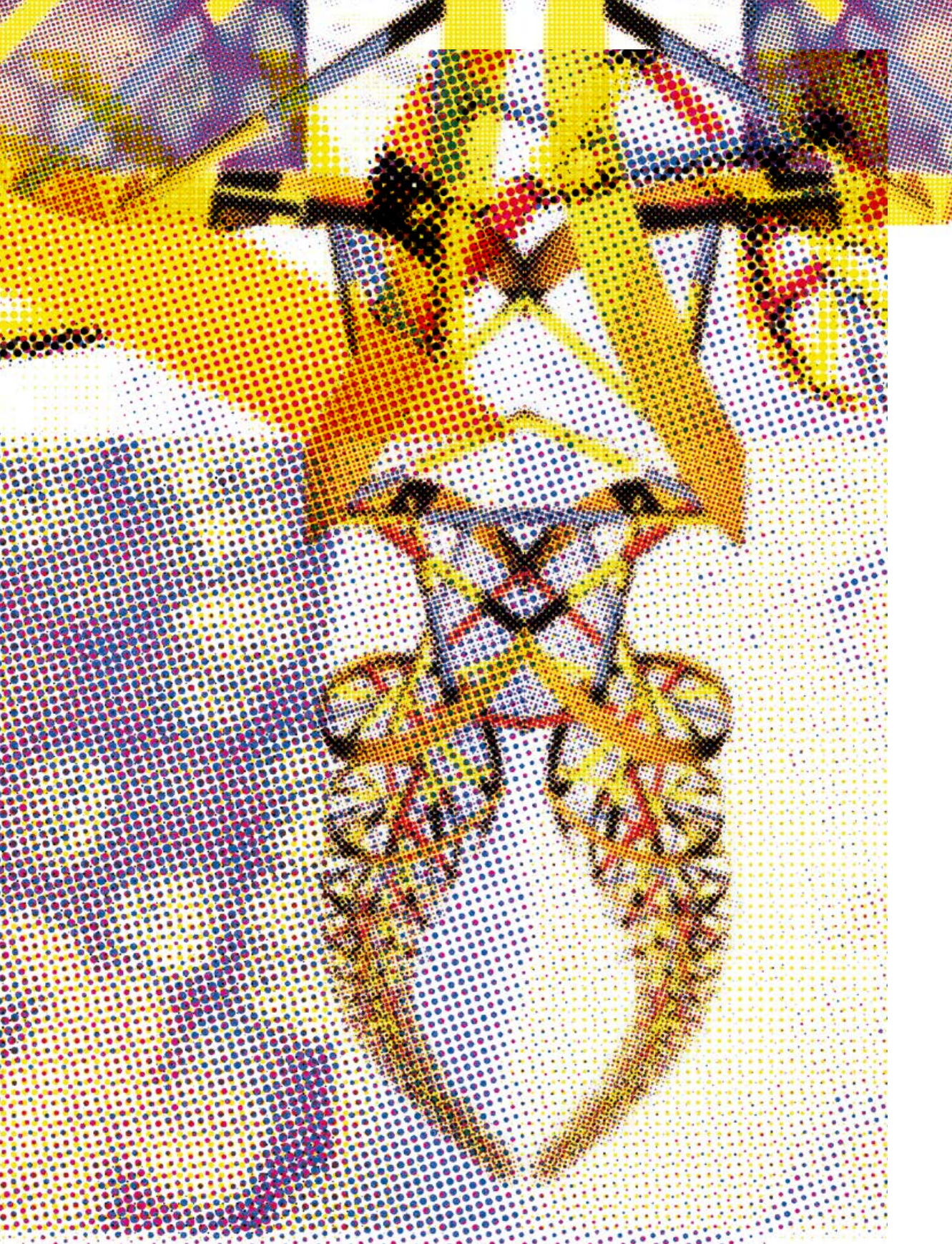
discoveries had immense impacts in biology and changed how developmental biology was approached, both at the experimental level, where suddenly interesting genes were easily cloned through their homology to other patterning genes, and at the level of perception as developmental studies in model organisms immediately became paradigmatic for human organogenesis and disease.

Gehring's outstanding research contributions were recognized by many prestigious awards, including the Jeantet Prize for Medicine (1987), the March of Dimes Prize in Developmental Biology (1997), the Kyoto Prize for Basic Science (2000), and the Balzan Prize for Developmental Biology (2002). He was elected to several national academies, including the Royal Society of London and the US National Academy of Science. Professor Gehring acted as president of the International Society for Developmental Biologists (ISDB) and as secretary-general of the European Molecular Biology Organization (EMBO).

Walter Gehring served as professor of cell biology at the University of Basel until his retirement in 2009. He was honoured with the "Grosses Bundesverdienstkreuz" of the Federal Republic of Germany in 2010.

Walter Gehring died in 2014.

The Master Control Gene of Eye Development and the Evolution of Light Reception



Svante Pääbo

* 1955

Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

📅 November 29, 2007

Svante Pääbo is a Swedish geneticist specializing in the field of evolutionary genetics. He is one of the founders of paleogenetics, and has worked extensively on the Neanderthal genome.

Svante Pääbo studied the history of science, Egyptology and Russian at the



Faculty of Humanities, and at the Faculty of Medicine, at Uppsala University. He earned his PhD there in 1986, and after a short period at the Imperial Cancer Research Fund in London, he spent three years as a postdoc at the Department of Biochemistry, University of California at Berkeley, USA. After his return to Europe, he became a full Professor of General Biology at the University of Munich, Germany (1990–1997). In 1997 he was appointed a director of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany.

Pääbo studies genomic and functional differences between humans and their closest living and extinct relatives. Over more than 30 years, he has developed methods to retrieve DNA from archaeological and paleontological remains.

In May 2010, Pääbo and his colleagues published a draft sequence of the Neanderthal genome. He and his team concluded that Neanderthals interbred with modern humans in Eurasia. Based on a genome sequence determined from a small bone from Siberia, he discovered the Denisovans, Asian relatives of Neanderthals. He has shown that genetic variants contributed to present-day humans from Neanderthals have functional consequences, for example, for the risk of falling severely ill upon infection with the SARS-CoV-2 virus.

Professor Pääbo has received numerous awards, including the Gottfried Wilhelm Leibniz Prize of the Deutsche Forschungsgemeinschaft, the Louis-Jeantet Prize for Medicine, the Gruber Prize in Genetics, the Breakthrough Prize in Life Sciences, the Lomonosov Large Gold Medal of the Russian Academy of Sciences, and the Japan Prize. Pääbo is a member of numerous academies, including the Royal Swedish Academy of Sciences, the National Academy of Sciences of the USA, and the Royal Society.

Of Humans, Neanderthals and Apes



Elliot Meyerowitz

* 1951

California Institute of Technology, Pasadena, USA

 March 6, 2008

Elliot Meyerowitz is an American plant scientist who has pioneered the use of the mustard plant *Arabidopsis thaliana* as a model species for plant genetics and development studies.



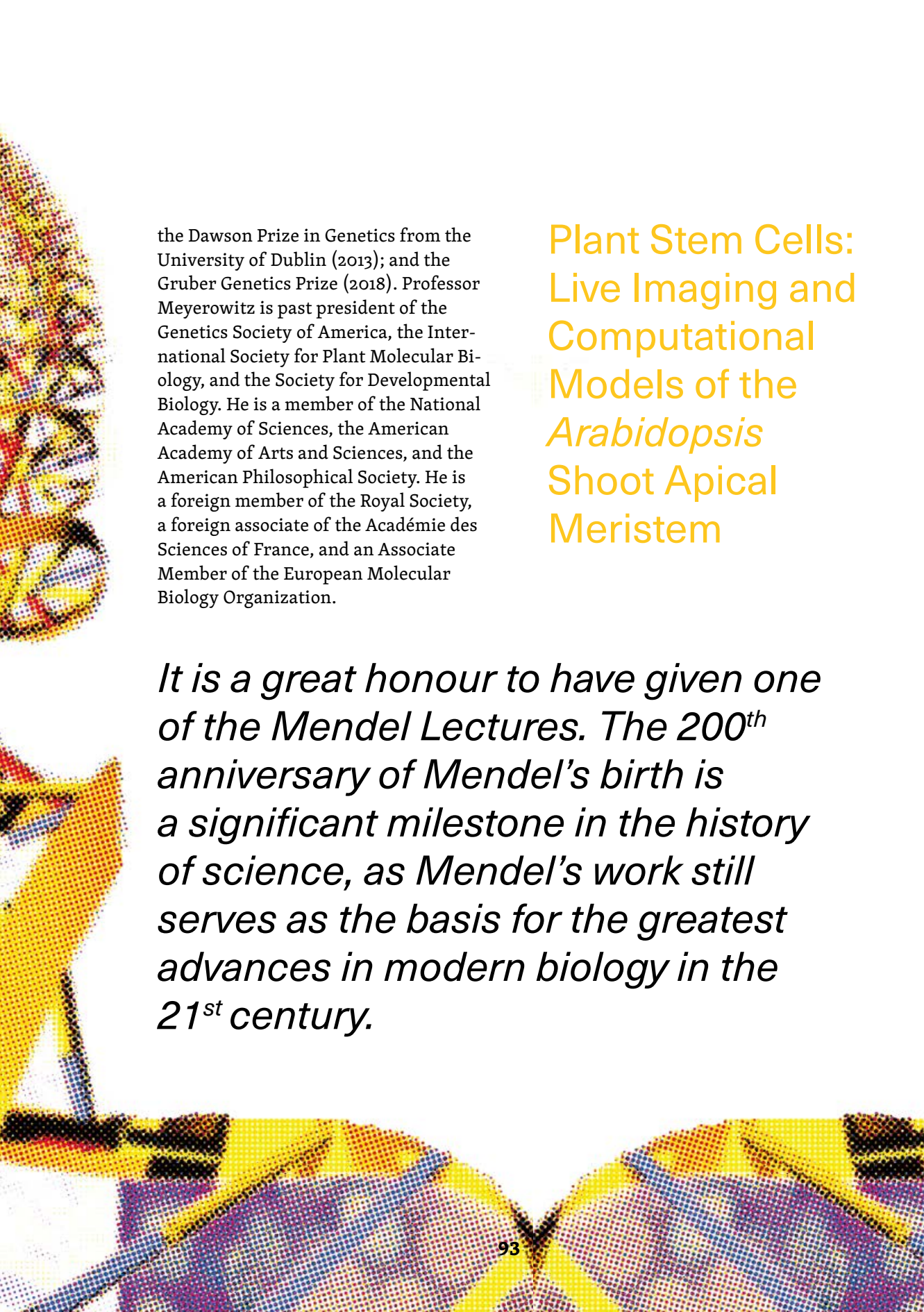
Meyerowitz completed his undergraduate work at Columbia University in biology (1973). He graduated with a master's degree in biology from Yale University in 1975 where he also obtained his PhD in 1977. From 1977 to 1979 he was a postdoctoral fellow in the Biochemistry Department at the Stanford University School of Medicine, developing and using methods for the molecular cloning of genes from *Drosophila* in the early days of gene cloning and genomics. Since 1980 he has been a faculty member in the Division of Biology at the California Institute of Technology, where he became the George W. Beadle Professor of Biology in 2002 and served as Division Chair from 2000

to 2010. Meyerowitz was on leave from his position at Caltech from 2011 to 2013 to serve as the inaugural Director of the Sainsbury Laboratory at the University of Cambridge, where he continues to contribute as a Distinguished Associate. Since 2013, when he returned to Caltech, he has been an Investigator at the Howard Hughes Medical Institute.

The Meyerowitz laboratory works on understanding the mechanisms of plant development using live imaging as well as computational approaches. His work is well known for its contribution to the understanding of the genetic and molecular basis of plant hormone reception. Much of his laboratory's research is directed to the study of the shoot apical meristems of flowering plants – the collection of stem cells at the tip of each branch that is the source for the cells that make stems, leaves, and flowers. The Meyerowitz laboratory detailed how flower formation is controlled, resulting in the ABC Model of flower development; discovered the first plant hormone receptor; and identified the genes that control cell numbers in the plant growing tip, providing a fundamental framework to help build the field of plant development.

Among his honours are the Genetics Society of America Medal (1996); the International Prize for Biology awarded by the Japanese Society for the Promotion of Science (1997); the Lounsbery Award of the US National Academy of Sciences (1999); the R.G. Harrison Prize of the International Society of Developmental Biologists (2005); the Balzan Prize (2006);





the Dawson Prize in Genetics from the University of Dublin (2013); and the Gruber Genetics Prize (2018). Professor Meyerowitz is past president of the Genetics Society of America, the International Society for Plant Molecular Biology, and the Society for Developmental Biology. He is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, and the American Philosophical Society. He is a foreign member of the Royal Society, a foreign associate of the Académie des Sciences of France, and an Associate Member of the European Molecular Biology Organization.

Plant Stem Cells: Live Imaging and Computational Models of the *Arabidopsis* Shoot Apical Meristem

It is a great honour to have given one of the Mendel Lectures. The 200th anniversary of Mendel's birth is a significant milestone in the history of science, as Mendel's work still serves as the basis for the greatest advances in modern biology in the 21st century.

Stephen C. West

* 1952

Cancer Research UK, Clare Hall Laboratories, UK

 **April 10, 2008**

Stephen Craig West is a British biochemist and molecular biologist specializing in research on DNA recombination and repair. He is known for pioneering studies on genome instability diseases including cancer.

West obtained his, BSc in 1974 and his PhD in 1977, both from Newcastle University. After finishing his PhD, he moved to the United States to work as a postdoc in the Department of Molecular Biophysics and Biochemistry at Yale University. In 1985, he moved back to the UK to set up a research group at the Imperial Cancer Research Fund's Clare Hall Laboratories at South Mimms. He is now a Senior Group Leader at the Francis Crick Institute in London.

West's research focuses on mechanisms of genetic recombination and DNA strand break repair. In particular, he has defined relationships between defective DNA repair processes and human diseases such as inheritable breast cancer and neurological disorders. While at Yale, West purified and characterized RecA protein, and in doing so discovered many key aspects of how cells mediate DNA-DNA interactions and strand exchange. Parallel studies were carried out by the groups led by Charles Radding (also at Yale) and Robert Lehman (Stanford University). The work at these three laboratories provided the groundwork for our current understanding of the enzymatic mechanisms of recombination. After moving to the UK in 1985, West continued his work in bacterial systems. He identified RuvC as the first cellular enzyme that

resolves recombination intermediates and characterized how this nuclease cuts Holliday junctions. West's laboratory then moved into eukaryotic systems, where he discovered eukaryotic Holliday junction resolvases including GEN1 and the SMX complex. West was the first to purify the human RAD51 protein (the eukaryotic ortholog of RecA), and to show that it promotes homologous pairing and strand exchange reactions similar to those mediated by RecA. In addition, he purified and then visualized the BRCA2 breast cancer tumour suppressor.

West is a member of the European Molecular Biology Organization and a Fellow of the Royal Society, and has been awarded numerous prizes, including the 2007 Louis-Jeantet Prize for Medicine.

Stephen Craig West was elected Foreign Associate of the National Academy of Sciences in 2016, and an International Honorary Member of the Academy of Arts and Sciences in 2021. He was awarded the Leeuwenhoek Medal (2002) and the GlaxoSmithKline Medal (2010) of the Royal Society, the Genetic Medal (2012) and the Lifetime Achievement in Cancer Research Prize by Cancer Research UK (2018).

DNA Strand-Break Repair and Relationship to Human Disease

A middle-aged man with a grey beard and balding head is smiling at the camera. He is wearing a light blue short-sleeved polo shirt and white trousers. He is standing in a modern, brightly lit laboratory or office space with white walls and equipment in the background. The image is framed by a decorative border on the right side consisting of a yellow and black halftone pattern.

To present a lecture at the home and workplace of Mendel is the dream of every geneticist.

Richard M. Durbin

* 1960

Department of Genetics, University of Cambridge, UK

 **April 17, 2008**

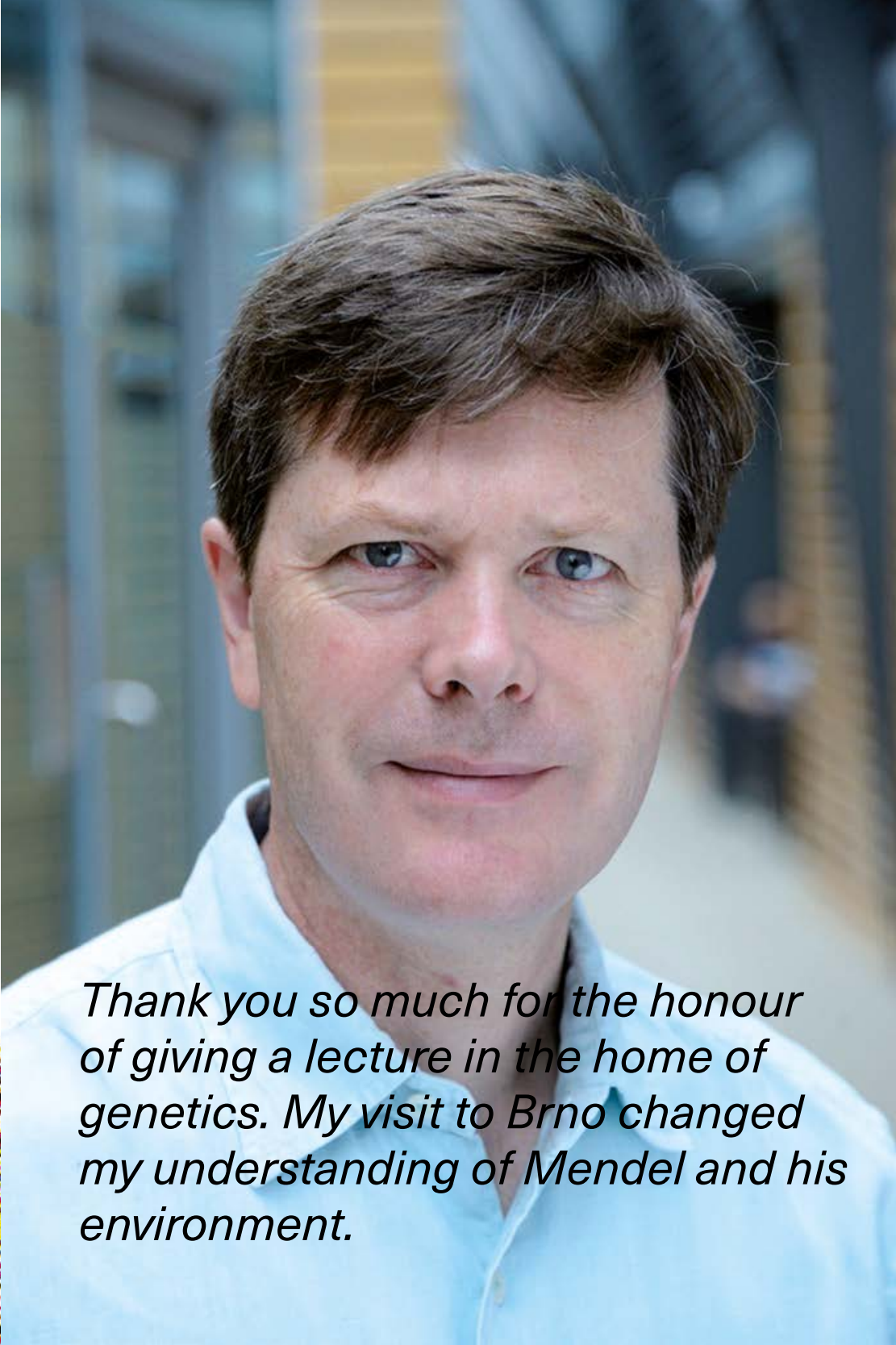
Richard Michael Durbin is a British computational biologist. He graduated from the University of Cambridge in 1982. Then he continued at Cambridge, studying for his PhD the development and organization of the nervous system of *Caenorhabditis elegans* while working at the Laboratory of Molecular Biology (LMB). In 1988 he moved to Stanford University, USA, for his postdoc, then returned to the UK in 1992 to the Wellcome Sanger Institute in Cambridge, where he worked for 25 years on genome sequencing and related areas before moving in 2017 to be Al Kindi Professor in the Department of Genetics, University of Cambridge.

Richard Durbin played a significant role in a series of large scale genome sequencing projects, contributing to the assembly and gene sequence analysis for the initial Human Genome Project, co-leading the 1000 Genomes Project to characterize genetic variation in 2504 humans from around the world, and co-founding the Earth Biogenome Project, which aims to assemble high quality reference genome sequences for all eukaryotic species. Alongside involvement in large projects he has developed numerous methods for computational sequence analysis. These include gene finding (e.g. GeneWise) and Hidden Markov model methods for sequence alignment and matching (e.g. HMMER) and for finding demographic history (PSMC). Using these methods, Durbin worked with colleagues to build a series of important genomic data resources, including the protein family database Pfam, the genome database Ensembl, and the gene family database

TreeFam. Recently he started a research programme in evolutionary genomics, applying whole genome sequencing to study speciation and adaptation in the dramatic cichlid fish radiation of the East African great lakes.

Richard M. Durbin was a joint winner of the Mullard Award of the Royal Society in 1994, won the Lord Lloyd of Kilgerran Award of the Foundation for Science and Technology in 2004, and was elected a Fellow of the Royal Society (FRS) in 2004 and a member of the European Molecular Biology Organization (EMBO) in 2009. The Royal Society awarded its Gabor Medal to Durbin in 2017 for his contributions to computational biology.

Sequencing Hundreds of Human Genomes



Thank you so much for the honour of giving a lecture in the home of genetics. My visit to Brno changed my understanding of Mendel and his environment.

Sir Paul Nurse

* 1949

Rockefeller University, New York, USA

 **May 5, 2008**

Sir Paul Nurse is an English geneticist and cell biologist. He was awarded the 2001 Nobel Prize in Physiology or Medicine along with Leland Hartwell and Tim Hunt for their discoveries of protein molecules that control the division of cells in the cell cycle.

He received his BSc degree in biology in 1970 from the University of Birmingham and his PhD degree in 1973 from the University of East Anglia. Nurse continued his postdoctoral research at the laboratory of Murdoch Mitchison at the University of Edinburgh for the next six years (1973–1979). He also spent several months at both the University of Bern and the University of Copenhagen to gain experience in genetic analysis of the fission yeast (*Schizosaccharomyces pombe*).

Beginning in 1976, Paul Nurse identified the gene *cdc2* in fission yeast. This gene is the key regulator of the progression of the cell cycle from G1 phase to S phase and the transition from G2 phase to mitosis. In 1987 Nurse also identified the corresponding human homologue of this gene, *CDK1*, which codes for a cyclin dependent kinase. He showed that *CDK1* is responsible for reversible chemical modification (phosphorylation), discovering the key component of the molecular mechanism that drives cells through the cell cycle.

After a period at the University of Sussex, in 1984 he joined the Imperial Cancer Research Fund (Cancer Research UK). He left in 1988 to chair the Department of Microbiology at the University of Oxford. He then returned to the ICRF as Director

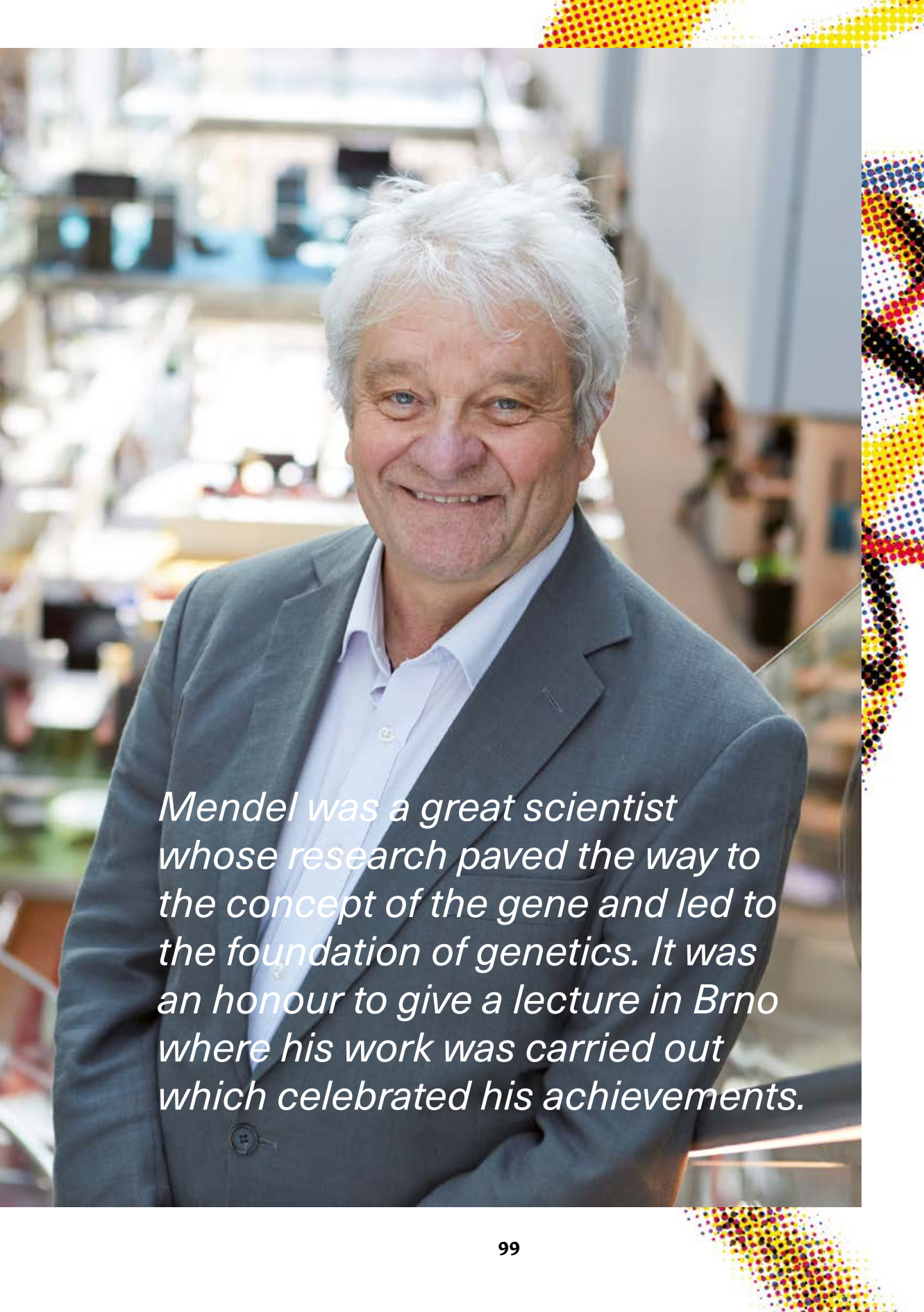
of Research in 1993, and in 1996 was named Director General of the ICRF, and CEO of Cancer Research UK in 2002. In 2003, he became President of Rockefeller University in New York City where he continued to work on the cell cycle of fission yeast.

Paul Nurse has received numerous awards and honours. He was elected an EMBO Member in 1987 and a Fellow of the Royal Society (FRS) in 1989, and the Founder Member of the Academy of Medical Sciences in 1998. He has received the Royal Society's Royal and Copley Medals and is a foreign associate of the US National Academy of Sciences. He received the Gairdner Award in 1992, the Albert Lasker Award for Basic Medical Research in 1998, was knighted in 1999, awarded the French Legion d'Honneur in 2002, and the Order of the Rising Sun, Japan, in 2018.

In 2010, he was elected President of the Royal Society for a five-year term and became the first Director and Chief Executive of the UK Centre for Medical Research and Innovation, now the Francis Crick Institute.

The Great Ideas of Biology





Mendel was a great scientist whose research paved the way to the concept of the gene and led to the foundation of genetics. It was an honour to give a lecture in Brno where his work was carried out which celebrated his achievements.



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.

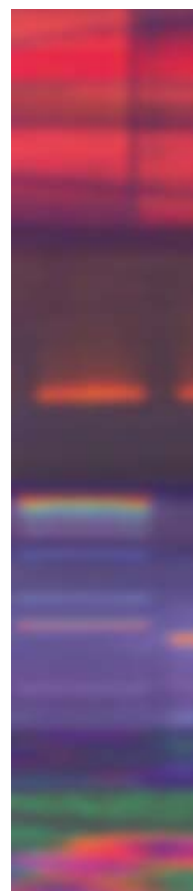
Andrea Musacchio graduated in biology from the Tor Vergata University in Rome in 1990. He later moved to the European Molecular Biology Laboratory in Heidelberg to carry out his PhD work in the area of biochemistry and structural biology. After receiving his PhD degree from the University of Heidelberg 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.

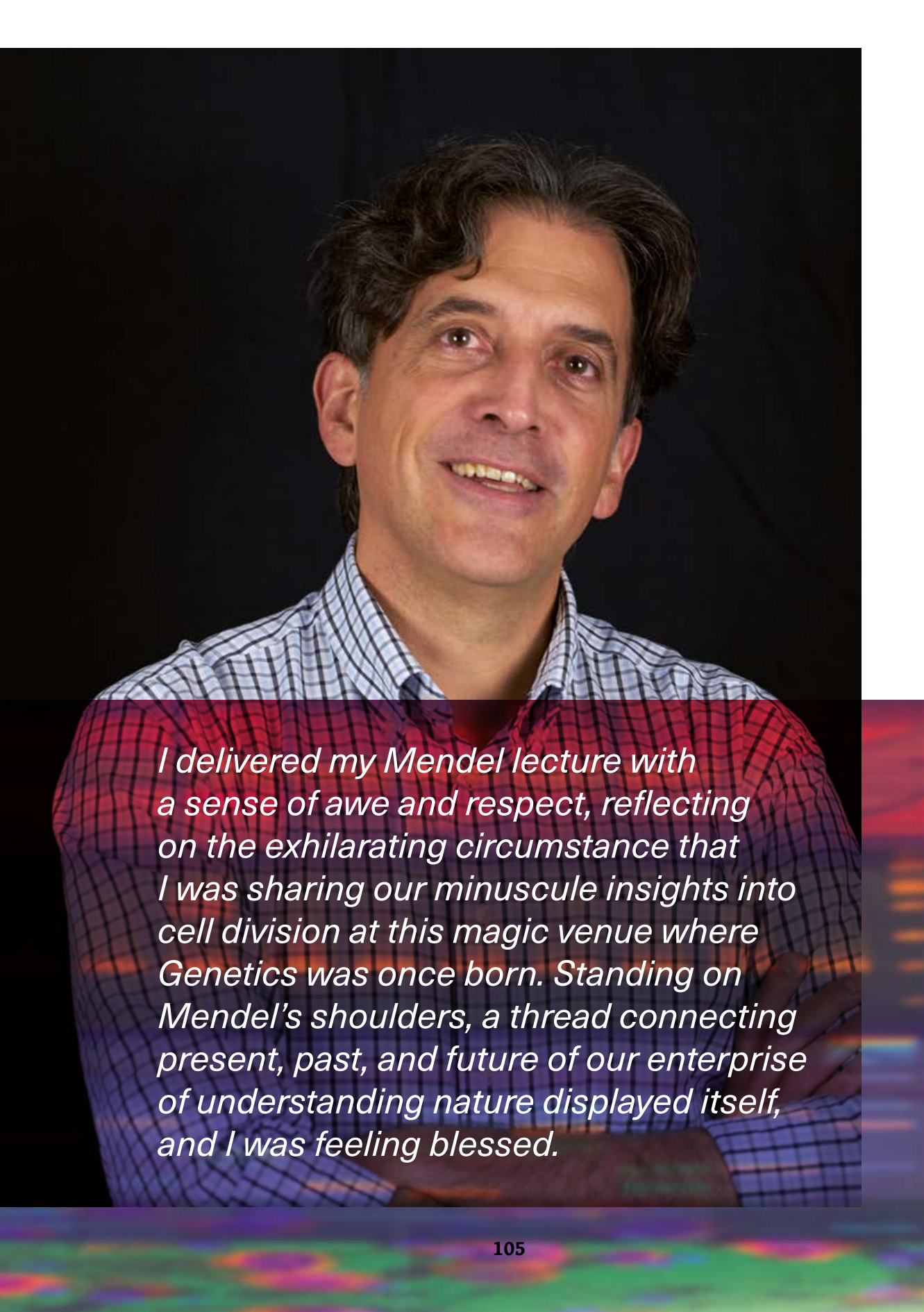
Late in 1998, Musacchio gained a position at the European Institute of Oncology in Milan, where he started directing a research group investigating the molecular mechanisms of mitosis with emphasis on the spindle assembly checkpoint using a combination of structural, biochemical, and cell biological 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 Frisé

* 1966

Karolinska Institute, Stockholm, Sweden

📅 March 26, 2009

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

Frisé 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.



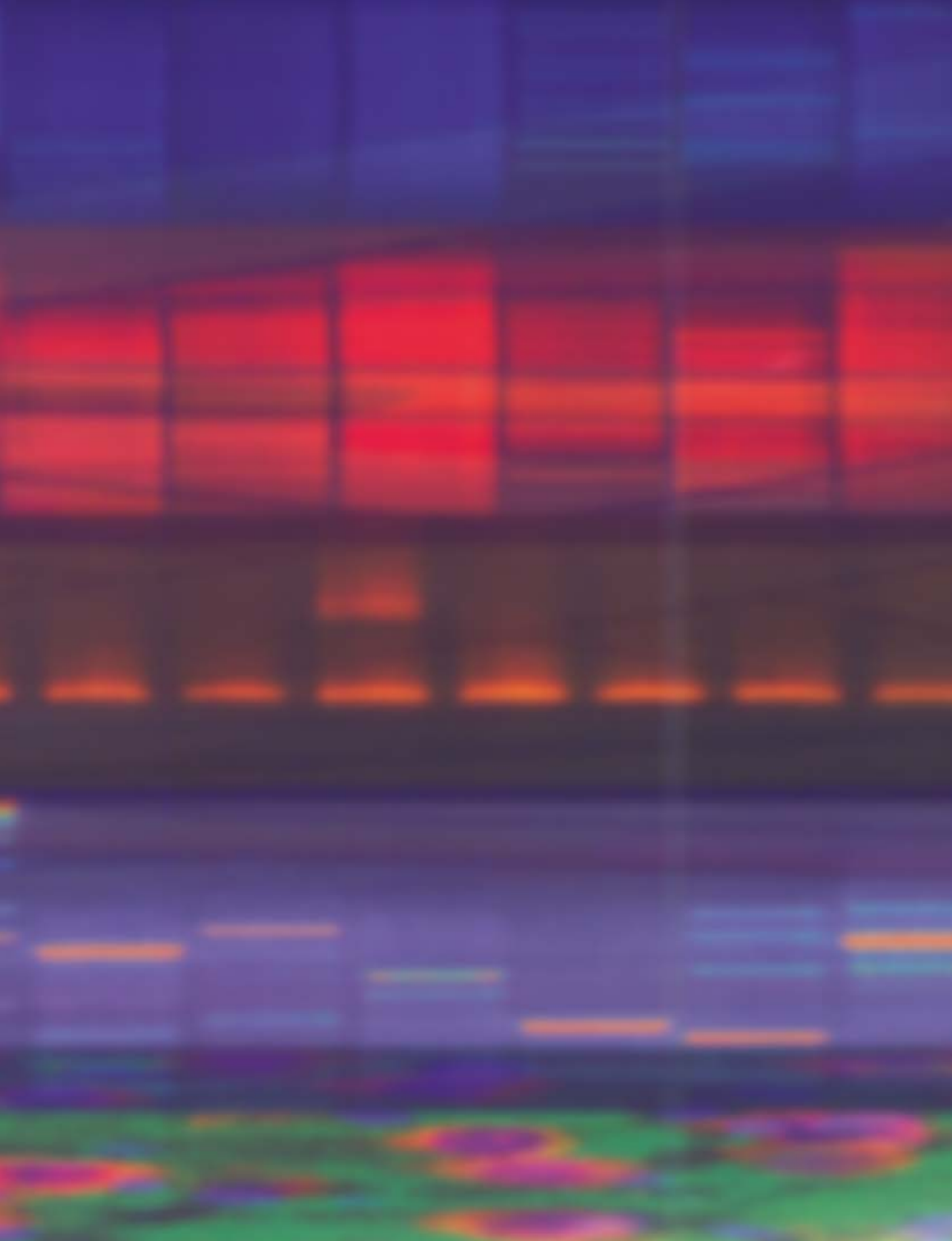
Frisé's group is interested in the role of stem cells in cell turnover in healthy and pathological situations. Many of their projects focus on stem cells in the brain and spinal cord and adult neurogenesis. They are also interested in cell renewal in the heart and use the intestine as a stem cell and cancer model system. They have developed a method to study cell turnover by analyzing the integration in DNA of ^{14}C 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.

Frisé 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 Frisé 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 Translating Genetic Information

A portrait of a middle-aged man with short, graying hair, wearing round glasses, a light blue button-down shirt, and a dark blue suit jacket. He is looking directly at the camera with a slight smile. The background is a blurred cityscape at night with red and blue lights.

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

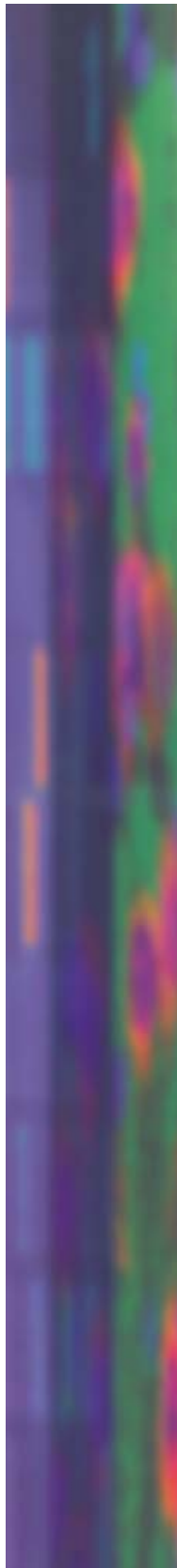




Photo: Robert Taylor

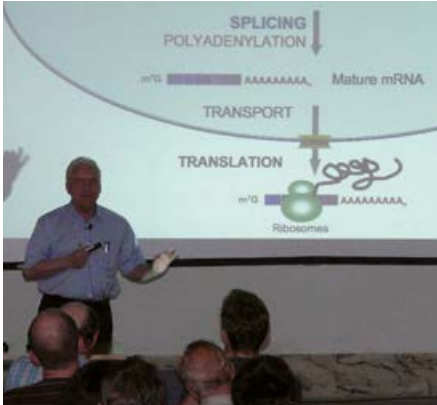
Walter Keller

* 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.

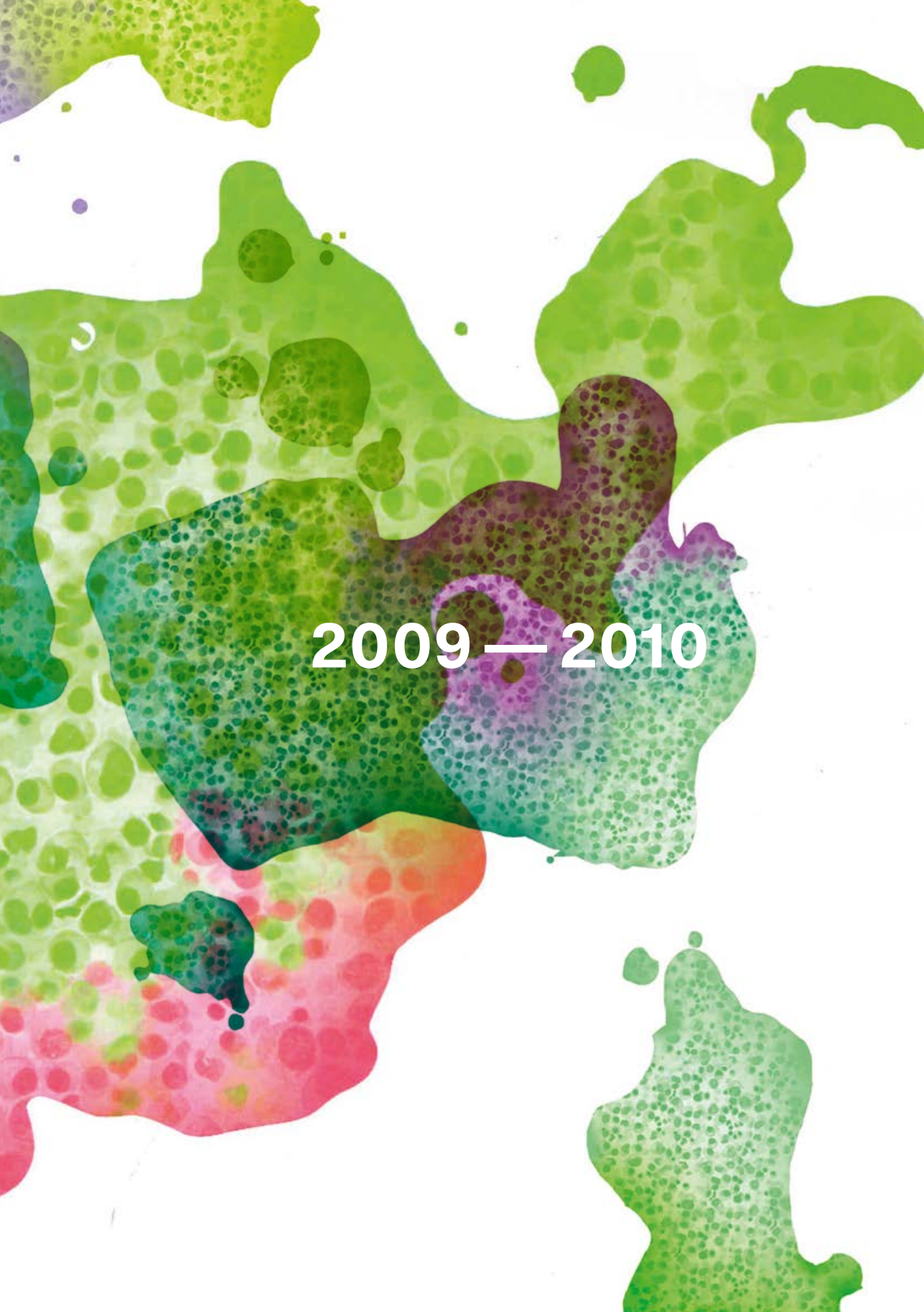
Keller has been a member of the European Molecular Biology Organization (EMBO) since 1978, was elected as a member of Academia Europaea in 1989, was awarded the 1998 Louis-Jeantet Prize for Medicine, and in 2007 obtained the Lifetime Achievement Award for Science from the RNA Society.

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









2009 — 2010

Meinrad Busslinger

* 1952

Research Institute of Molecular Pathology IMP, Vienna, Austria

📅 October 15, 2009

Meinrad Busslinger is a biochemist and immunologist, renowned for his work on B cells.

Busslinger studied natural sciences at the Swiss Federal Institute of Technology (ETH) in Zurich, where he majored in biochemistry in 1976. He received a PhD degree in molecular biology in 1981 from the University of Zurich. After a postdoctoral stay at the MRC Institute Mill Hill in London, he became a group leader at the Institute of Molecular Biology II of the University of Zurich (1983). Here, he discovered a new set of histone genes of the sea urchin and identified a tissue-specific transcription factor (TSAP) as an essential regulator of these genes.



In 1987, Busslinger was recruited to join the newly founded Research Institute of Molecular Pathology (IMP) in Vienna, Austria, as one of the first senior scientists. In 1996, he was appointed professor at the University of Vienna. In 2007, he became the IMP's Director of Academic Affairs and, in 2013 Scientific Deputy Director. At the IMP, Busslinger shifted his research focus from sea urchin embryogenesis to B cell immunology, promoted by the identification of a B-cell-specific

transcription factor as a mammalian homologue of the sea urchin regulator TSAP. This B-cell-specific transcription factor, Pax5, was defined as an essential regulator of B cell development. To date, Pax5 is known to function as a guardian of B cell identity from early to late B cell development and to function as an important tumour suppressor or oncoprotein in B cell leukaemia. He has also investigated the role of other transcription factors in regulating distinct aspects of B cell development and immunity.

Busslinger became a member of the European Molecular Biology Organization (EMBO) in 1990, the Academia Europaea in 2000, the Austrian Academy of Sciences in 2009, and the Swiss Society for Allergy and Immunology in 2015. He received the Wittgenstein Award in 2001, the Virchow Medal from the University of Würzburg in 2010, and the Prize of the City of Vienna for Natural Sciences in 2020.

Lineage Commitment and Developmental Plasticity of Lymphocytes



Jason Chin

* 1973

Medical Research Council Laboratory of Molecular Biology, Cambridge, UK

📅 October 22, 2009

Jason Chin is a British chemist and biologist, whose work focuses on approaches to systematically expand the genetic code of eukaryotic cells.

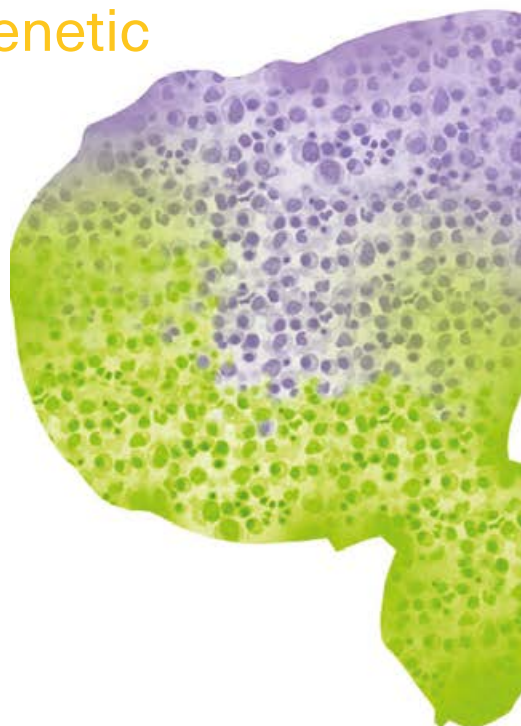
Chin was an undergraduate at Oxford University, where he obtained his MA in chemistry in 1996. For his PhD studies he moved to Yale University, obtaining his degree in 2001. He was a Damon Runyon Fellow at the Scripps Research Institute where he developed the first approaches that are now widely used for defining protein interactions by genetically encoding photocrosslinking amino acids. Chin moved to Cambridge in 2003. He became an EMBO Young Investigator in 2005 and a tenured group leader in 2007. He was awarded the Francis Crick Prize by the Royal Society in 2009.

During his career he has pioneered the development and application of methods for reprogramming the genetic code of living organisms, allowing for the site-specific incorporation of designed unnatural amino acids into proteins in diverse cells and organisms. These approaches make previously inaccessible protein carry post-translational modifications (lysine acetylation, methylation and ubiquitination) possible, providing new insights into their role in the regulation of protein structure and function. Additional approaches include rapid control of enzymatic activity and protein transport in cells with millisecond pulses of light as well as allowing rapid, specific and efficient labelling of proteins *in vivo*.

Chin received the Royal Society of Chemistry's Corday Morgan Prize in 2010. The same year he was also awarded the EMBO Gold Medal and was elected a member of EMBO. He was the inaugural recipient (2011) of the Louis-Jeantet Young Investigator Career Award, was inducted into the European Inventors Hall of Fame in 2013, and was elected a Fellow of the Academy of Medical Sciences in 2016.

Chin is currently a programme leader at the Medical Research Council Laboratory of Molecular Biology (MRC-LMB), where he is also head of the Centre for Chemical and Synthetic Biology (CCSB). He holds a joint appointment in the Department of Chemistry at the University of Cambridge and is also a fellow in Natural Sciences at Trinity College, Cambridge.

New Genetic Codes





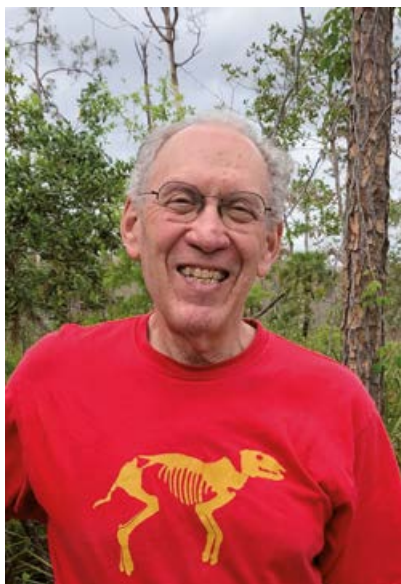
James E. Haber

* 1943

Brandeis University, Waltham, USA

📅 November 23, 2009

James E. Haber received his PhD in biochemistry at the University of California, Berkeley. During his postdoctoral work at the University of Wisconsin, Madison and at the first Cold Spring Harbor Yeast Genetics course he was introduced to the genetics of the yeast *Saccharomyces cerevisiae*. He joined the Department of Biology at Brandeis University in 1972.



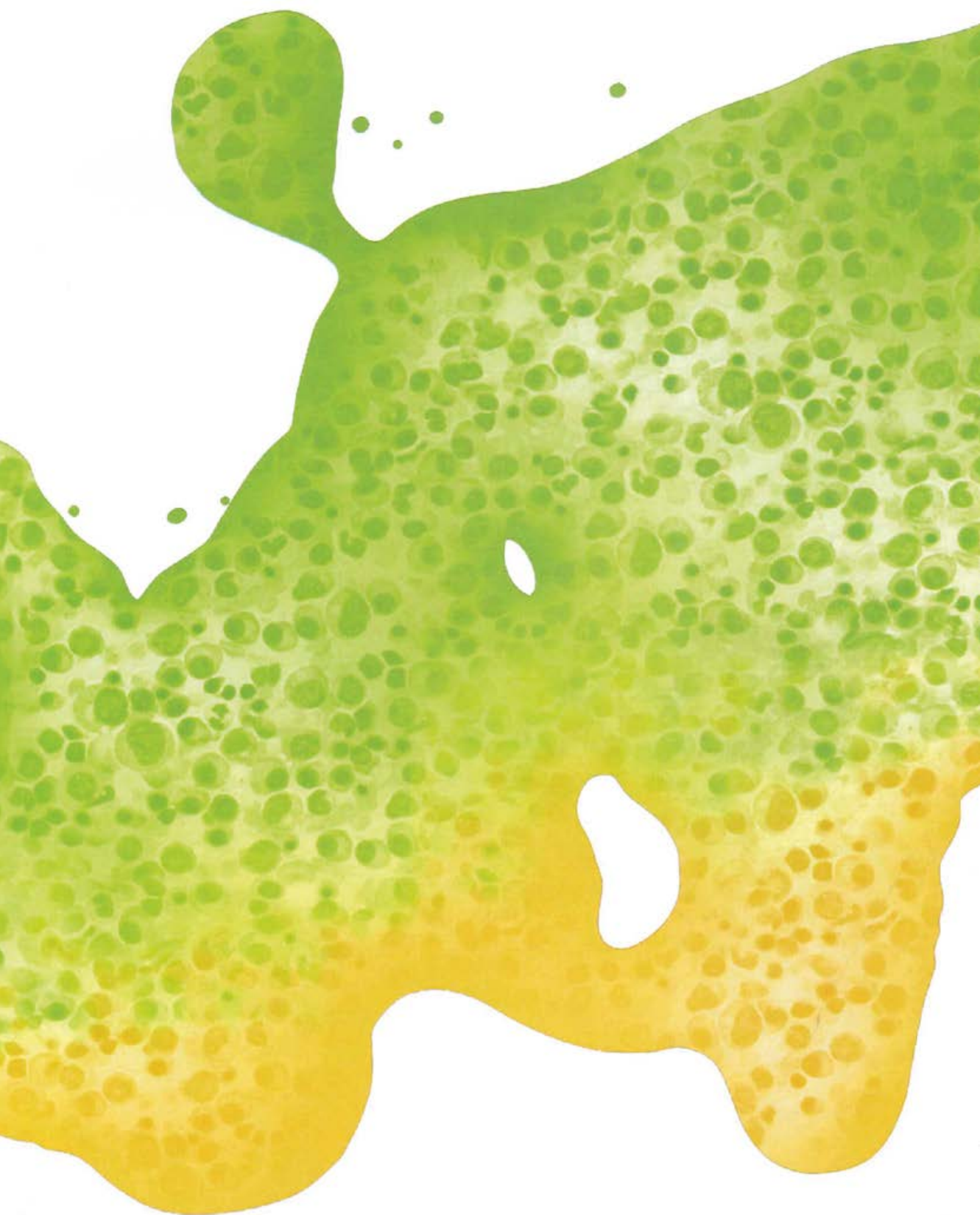
Haber has focused his research on genome instability, especially the repair of chromosome double-strand DNA breaks and the role of DNA damage checkpoints. He has pioneered the real-time monitoring of DNA repair by using Southern blots, PCR and chromatin immuno-precipitations. Using this approach, Haber defined distinct molecular steps in different mechanisms of repair of double-strand breaks and identified the factors influencing them. His lab also investigates the DNA damage response by

which cells arrest mitosis when they suffer a single chromosome break. Recently his lab has also used microscopic monitoring of DNA segments to determine how they locate a template to enable repair to take place.

Haber became a Fellow of the American Academy of Microbiology in 1996, a John Simon Guggenheim Fellow in 1999, and a Fellow of the American Association for the Advancement of Science in 2005. He was elected Director of the Genetics Society of America in 2003 and then Secretary in 2006.

In 2009 he became a Fellow of the American Academy of Arts and Sciences and in 2010 a member of the National Academy of Sciences. In 2011 he received the Genetics Society of America's Thomas Hunt Morgan Medal for Lifetime Achievement in Genetics. He is now the Abraham and Etta Goodman Professor of Biology and Director of the Rosenstiel Basic Medical Sciences Research Center at Brandeis University. In 2017 Haber was a Specially Appointed Professor at the Tokyo Institute of Technology. He has published a textbook entitled *Genome Stability*.

Multiple Mechanisms to Repair a Broken Chromosome



Azim Surani

* 1945

Gurdon Institute, University of Cambridge, UK

📅 April 28, 2010

Azim Surani, a developmental biologist, was born in Kenya and received his PhD in 1975 at Cambridge University under the supervision of Sir Robert Edwards. He joined the Animal Research Station in 1979 and Babraham Institute in 1986. On election as Marshall-Walton Professor in 1992, he joined the Wellcome Trust/Cancer Research UK Gurdon Institute, Cambridge University, where he has been Director of Germline and Epigenetics Research since 2013.

Surani co-discovered mammalian genomic imprinting in 1984, and established the underlying epigenetic mechanism for the functional differences between the mammalian parental genomes during development and the roles of individual imprinted genes. He also discovered the genetic basis for mouse and human germ cell specification and the mechanism of epigenetic resetting, including the erasure of DNA methylation, towards a ground state for genomic totipotency. His continuing research focuses on establishing models of human germline development from pluripotent stem cells in culture to explore the properties of the germline and their contributions to human development and disease.

Surani was elected a Fellow of the Royal Society in 1990 and a Fellow of the Academy of Medical Sciences in 2001. He has received several awards for his work, including the Gabor Medal in 2001 and the Rosenstiel Award with Davor Solter and Mary Lyon for “pioneering work on epigenetic gene regulation in mammalian embryos” in 2006.

Azim Surani was awarded a Royal Medal in 2010, received the McEwan Award for Innovation from the International Society for Stem Cell Research in 2014, and the Canada Gairdner International Award in 2018 with Davor Solter for the discovery of mammalian genomic imprinting and epigenetics that causes parent-of-origin specific gene expression and its consequences for development and disease.

Germ Cell Specification in Mice





Kai Simons

* 1938

Max-Planck-Institute of Molecular Cell Biology and Genetics, Dresden, Germany

 **May 13, 2010**

Kai Simons is a Finnish professor of biochemistry and cell biology and a physician. He introduced the concept of lipid rafts, as well as coined the term “trans-Golgi network” and proposed its role in protein and lipid sorting.

Kai Simons received his MD degree from the University of Helsinki in 1964, and his doctoral thesis focused on vitamin B12 absorption. After that he began a post-doctoral fellowship at Rockefeller University in New York, where he worked on blood plasma proteins. He returned to Helsinki in 1967, where he became a Fellow of the Finnish Medical Research Council at the University of Helsinki. He was a biochemistry professor in from 1971 to 1979 at the medical faculty of this university. There he started his classical work on Semliki Forest virus. The envelope of the virus became the simplest biomembrane known and was used as a tool for studying membrane structure and assembly. These studies led to the elucidation of the life cycle of the virus and demonstrated how the virus gets into and out of the host cell.

In 1975, he moved to the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, where he started the Cell Biology Program. During this time, together with Gerrit van Meer, Simons proposed a new model for membrane organization and coined the term “lipid rafts” for the dynamic nanodomains that support membrane sub-compartmentalization and play an important role in different membrane functions including signal transduction.

In 2001 Kai Simons moved to Dresden to help establish the new Max Planck Institute for Molecular Cell Biology and Genetics. Since 2006 he has been a director emeritus there. In 2007–2008 Simons was co-director of the Shanghai Institute for Advanced Studies of the Chinese Academy of Science.

For his contributions to cell biology, Simons has received the Anders Jahre Prize for Medical Research; the Runeberg Prize, Finland; the Laurens van Deenen Medal, University of Utrecht; the Schleiden Medal of the Academy Leopoldina; and the Äyräpää Prize, Finland, as well as the Robert Koch Gold Medal. Simons is a foreign member of the National Academy of Sciences, USA, and was the President of the European Life Scientist Organization.

In 2012 he started a biotech company called Lipotype GmbH, of which he is the CEO. With Lipotype, Kai Simons is now focusing on translating lipidomics and lipid analysis to clinical and industrial applications.

Cell Membrane Organization and Lipid Rafts





What a privilege it was to talk about my own research in the monastery where Mendel did his work with revolutionary results.

Ueli Schibler

* 1947

University of Geneva, Switzerland

May 13, 2010

Ueli Schibler is a Swiss biologist. His research has contributed significantly to the field of chronobiology and the understanding of circadian clocks in the body.

Schibler studied biology at the University of Bern, where he obtained his PhD in 1975. From 1975–78 Schibler worked as a postdoctoral fellow at the Fox Chase Cancer Center in Philadelphia. He then joined the Swiss Institute for Experimental Cancer Research (ISREC) and in 1984 was appointed as a full professor at the University of Geneva.

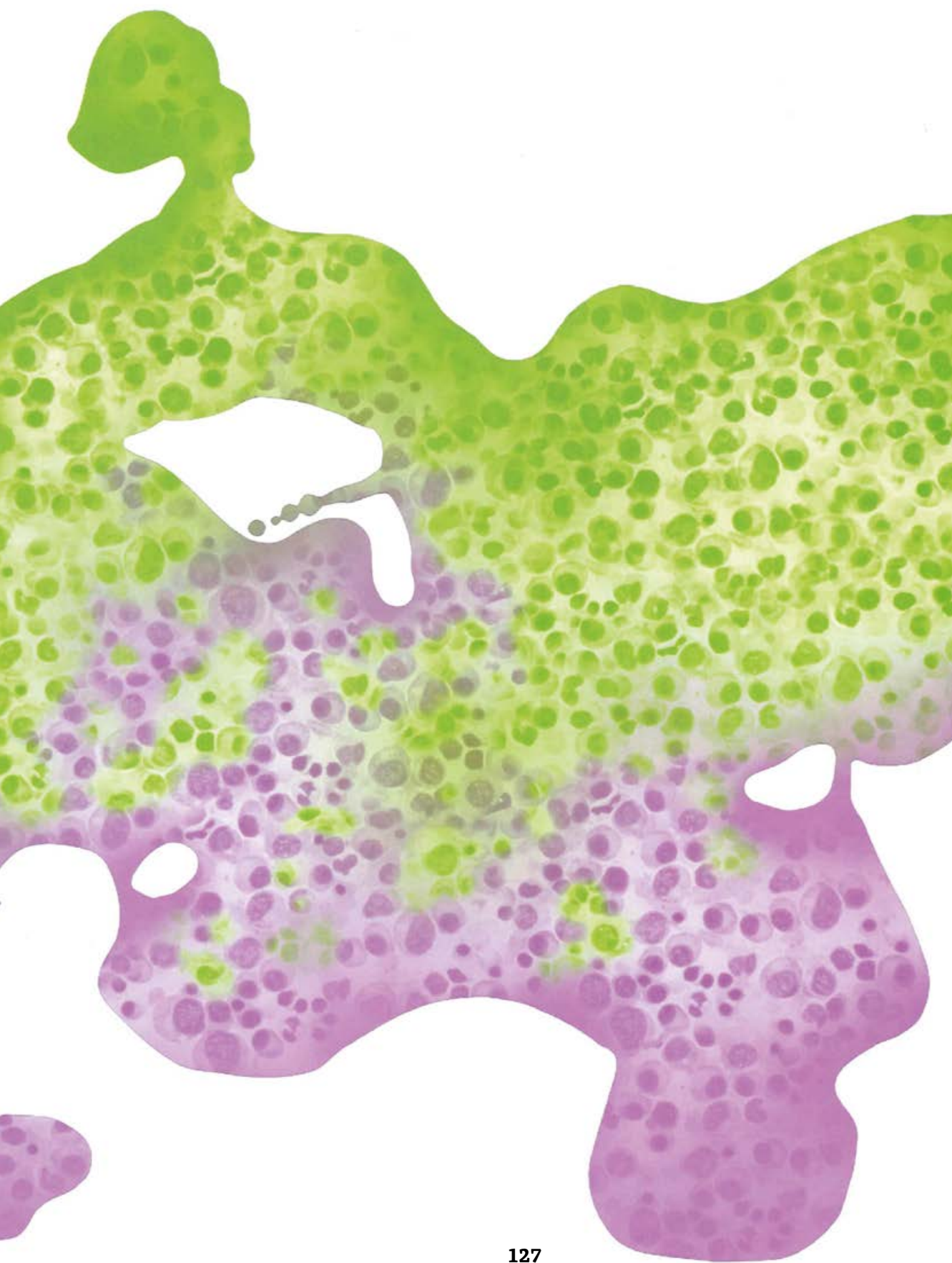


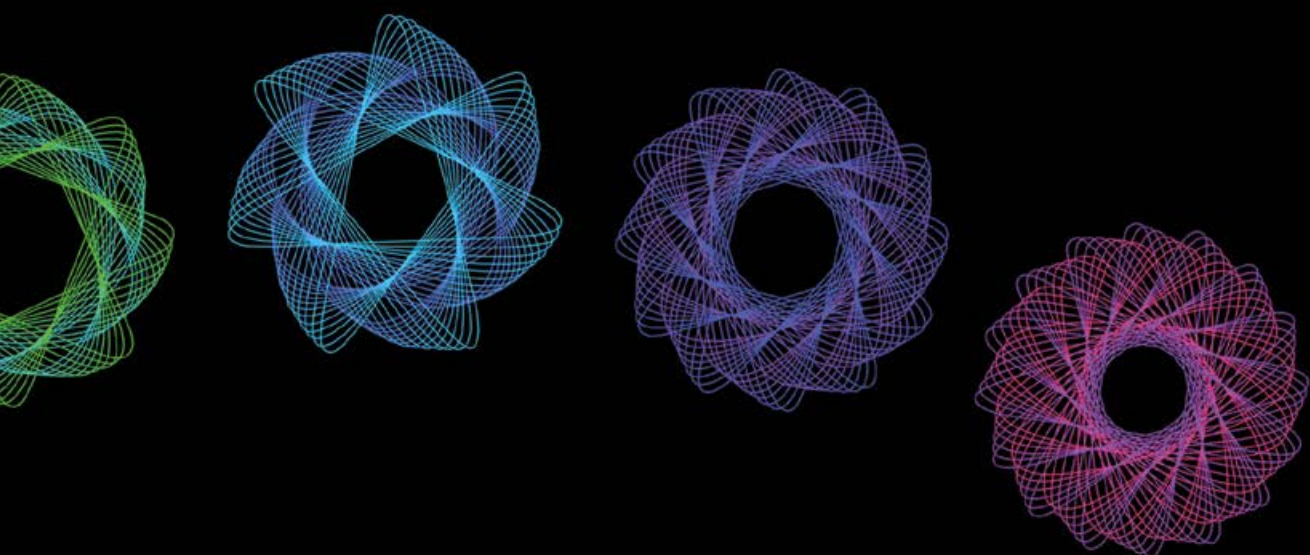
Schibler was thrust into the world of chronobiology on a single chance discovery. While examining transcription of serum albumin gene in the liver, his research team discovered a DNA Binding Protein (DBP) for the albumin promoter that happened to be rhythmic in its expression. While they initially thought that the underlying mechanism was the rhythmic secretion of hormones, it became clear that the rhythmic expression of DBP was driven instead

by self-sustained and cell-autonomous circadian oscillators that are operative in virtually all tissues. In addition, he studied the mechanism by which peripheral oscillators are synchronized, and discovered additional pathways involved in the phase-resetting of peripheral clocks including signalling by hormones, body temperature and actin dynamics.

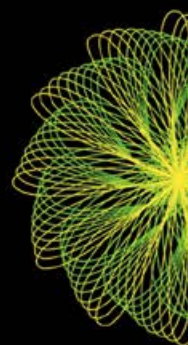
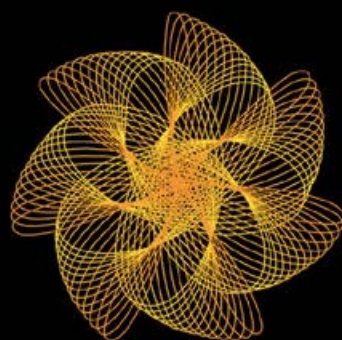
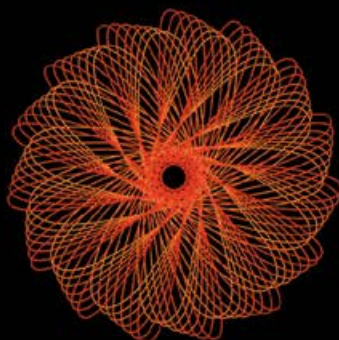
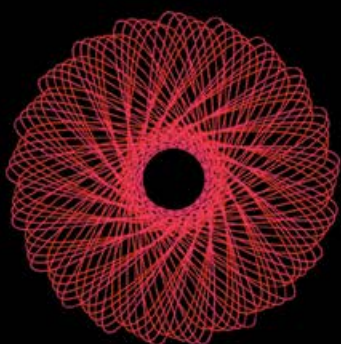
Schibler is a member of several scientific associations, including the European Molecular Biology Organization, the European Academy of Sciences, the Swiss Academy of Medical Sciences, the Faculty of 1000, and the Union of Swiss Societies in Experimental Biology. Schibler has received the Friedrich Miescher Award of the Swiss Biochemical Society (1983), the Clöëtta Prize of Medicine (1986), the Otto Naegeli Prize of Medicine (1996), and the Louis-Jeantet Prize of Medicine (2000).

Circadian Gene Expression in Mammals: How Does the Brain Talk to the Body?





2010 — 2011



Michael N. Hall

* 1953

Biozentrum, University of Basel, Switzerland

📅 October 21, 2010

Michael N. Hall is an American and Swiss molecular biologist and a world leader in the fields of TOR signalling and cell growth control.



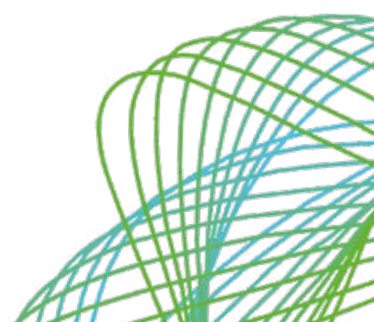
Michael N. Hall earned a Bachelor of Science in Zoology from the University of North Carolina at Chapel Hill in 1976, and a PhD in Molecular Genetics from Harvard University in 1981. Hall was a postdoctoral fellow at the Institut Pasteur in Paris and at the University of California, San Francisco. He joined the Biozentrum of the University of Basel, Switzerland, in 1987, and became a full professor in 1992. From 1995 to 1998 and from 2002 to 2009 he was head of the Division of Biochemistry, and from 2002 until 2009 was Deputy Director of the Biozentrum.

In 1991, Hall and colleagues discovered TOR (Target of Rapamycin) and subsequently elucidated its role as a central controller of cell growth and metabolism. TOR is a conserved, nutrient-, energy- and

insulin-activated protein kinase and plays a key role in aging and disease development (e.g. cancer, obesity, diabetes). The discovery of TOR led to a fundamental change in how we think of cell growth. It is not a spontaneous process that just happens when building blocks (nutrients) are available, but rather a highly regulated, plastic process controlled by TOR-dependent signalling pathways. The Hall group also discovered the two TOR complexes TORC1 and TORC2, and originally characterized both signalling branches mediated by these two complexes. Insights into TOR signalling pathways have led to new therapeutic strategies.

Hall is a member of the US National Academy of Sciences and the Swiss Academy of Medical Sciences, and has received numerous awards including the Louis-Jeantet Prize for Medicine (2009), the Marcel Benoist Prize for Sciences or Humanities (2012), the Breakthrough Prize in Life Sciences (2014), the Canada Gairdner International Award for Biomedical Research (2015), and the Albert Lasker Basic Medical Research Award (2017).

TOR Signalling in Growth and Metabolism





Iain Campbell

* 1953

University of Oxford, UK

📅 November 4, 2010

Iain Donald Campbell was a Scottish biophysicist and academic, Emeritus Research Fellow at the University of Oxford.



Professor Iain Campbell obtained both his BSc degree and PhD at the St. Andrews University. In 1992 he was appointed Professor of Structural Biology at the University of Oxford.

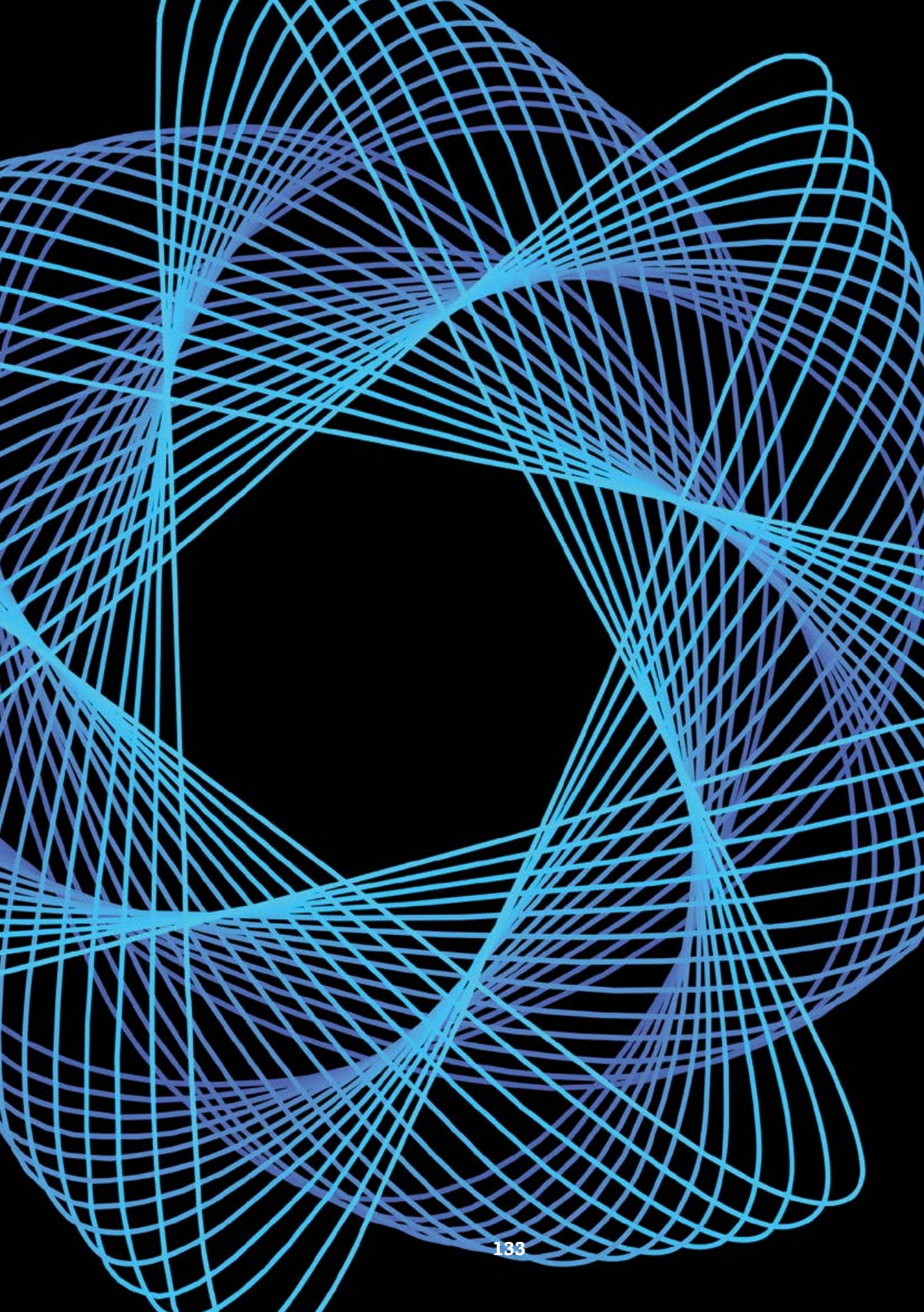
Dr. Campbell was interested in the structure and interactions of modular proteins that are involved in a variety of cell adhesion and signalling events. Of particular interest are the proteins involved in the formation of integrin adhesions – dynamic assemblies of modular proteins that form and dissolve as cells migrate.

Iain Campbell received many honours and awards, including the Novartis Medal and the Croonian Lecture by the Royal Society in 2006. He was elected a Fellow of the Royal Society (FRS) in 1995 and a member of the European Molecular Biology Organization (EMBO).

Iain Campbell died in 2014.

Cell Migration and Protein- Protein Interactions





Dame Linda Partridge

* 1950

University College London, UK

📅 April 7, 2011

Professor Dame Linda Partridge is a British geneticist who studies the biology and genetics of ageing and age-related diseases, such as Alzheimer's and Parkinson's disease.



Linda Partridge graduated from the University of Oxford and there also obtained her PhD. After three years of postdoctoral research at the University of York, she moved to the University of Edinburgh where she became professor of Evolutionary Biology. In 1994 she moved to University College London (UCL) as the Weldon Professor of Biometry. In 2007 she became a director of the Institute of Healthy Ageing at University College London and in 2008 a founding director at the new Max Planck Institute of the Biology of Ageing in Cologne, Germany.

Linda Partridge's research is directed to understanding both how the rate of ageing evolves in nature and the mechanisms by which healthy lifespan can be extended in laboratory model organisms. Her work has focused in particular on the role of nutrient-sensing pathways, such as the insulin/insulin-like growth factor signalling pathway, and on dietary

restriction. Her more recent work has been directed towards developing pharmacological treatments that ameliorate the human ageing process to produce a broad-spectrum improvement in health during ageing.

Partridge was awarded the Linnean Society of London's prestigious Darwin-Wallace Medal in 2008. In 2009 she was appointed Dame Commander of the Order of the British Empire for services to science and received the Croonian Lectureship from the Royal Society. In 2009 she was named a Woman of Outstanding Achievement 2009 by the UK Resource Centre for Women (UKRC) in Science, Engineering and Technology. She is a member of many important science and research organizations including EMBO and the American Academy of Arts and Sciences, and she is a Fellow of the Royal Society.



The New Biology of Ageing



My time in Brno with the scientists there is one of my fondest memories. I loved the town, the Mendel Museum and the events around the Mendel Lecture. It is an honour to be included in this celebration both of Mendel himself and 20 years of the Mendel Lectures.

David John Sherratt

* 1945

Department of Biochemistry, University of Oxford, UK

 **April 14, 2011**

David J. Sherratt is a British biochemist and geneticist distinguished for his work to elucidate aspects of bacterial genetics that are important for conferring potency and antibiotic resistance.



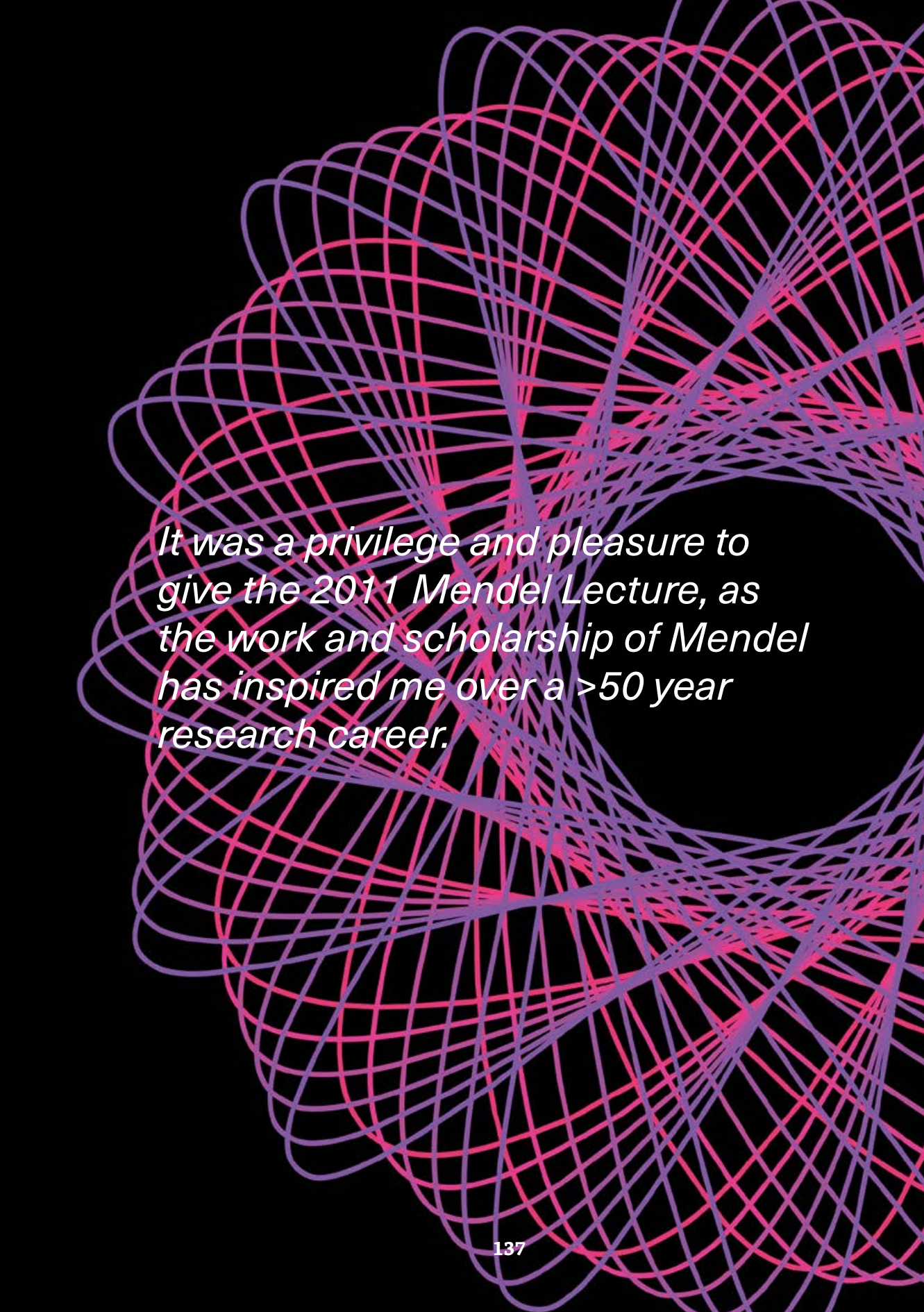
David J. Sherratt graduated from the University of Manchester in 1966 with a BSc in Biochemistry and was awarded a PhD by the University of Edinburgh in 1969. From Edinburgh he went for a postdoctoral position at the University of California for two years, working on the newly characterized plasmid ColE1. Sherratt returned to the UK in 1971 to become a lecturer at the University of Sussex. In 1980 he moved to Glasgow University to become Chair of Genetics and in 1993 he became the Iveagh Professor of Microbiology at the University of Oxford and a Fellow of Linacre College.

His research is aimed at understanding how DNA replication, recombination and chromosome segregation shape bacterial chromosome organization in the context of the living cell. Using quantitative and super-resolution live cell imaging he observes where genes and molecular machines are positioned as a cell proceeds through its growth and division cycles, and what happens when normal cellular behaviour is perturbed by different methods.

David J. Sherratt is a Fellow of the Royal Society, the Royal Society of Edinburgh, the American Academy for Microbiology, and the American Academy for the Advancement of Science. He is a past president of the UK Genetics Society. He was awarded many prizes, including the Royal Society Leeuwenhoek Medal and Lecture, and the Genetics Society Prize Medal.



A Passion for DNA



It was a privilege and pleasure to give the 2011 Mendel Lecture, as the work and scholarship of Mendel has inspired me over a >50 year research career.

Steven Henikoff

* 1946

Fred Hutchinson Cancer Research Center, Seattle, USA

 **May 5, 2011**

Dr. Steven Henikoff is a molecular biologist who studies the structure, function and evolution of our DNA molecules, or chromosomes.



Steven Henikoff obtained his BS in Chemistry in 1968 at the University of Chicago and PhD in biochemistry and molecular biology in 1977 at Harvard University. He did a postdoctoral fellowship at the Department of Zoology at the University of Washington. Henikoff is currently an Investigator of the Howard Hughes Medical Institute, a Member of the Basic Sciences Division of the Fred Hutchinson Cancer Research Center, and an affiliate professor of genome sciences at the University of Washington.

Henikoff's research interests lie in the inherited differences in gene expression between cells and tissues and how that differential expression is mediated by specialized proteins. To better understand such inheritance that does not rely on DNA sequence, Henikoff and his team are developing and applying genomic tools to the study of proteins of the epigenome: histones, transcription

factors, nucleosome remodelers, and RNA polymerase II. He is credited with helping build the infrastructure for analyzing the human genome. In 1992, he and his wife, Jorja Henikoff, developed a computational method (the BLOSUM substitution matrices) that researchers have used to compare relatedness among all living things, making it possible to uncover the roots of human diseases through the study of simpler organisms.

In 2005, Henikoff was elected to the National Academy of Sciences, and in 2015 was awarded the Genetics Society of America Medal.

Histone Variant Dynamics and Epigenetics





Hans Clevers

* 1957

Netherlands Institute of Developmental Biology, Utrecht, Netherlands

 **May 12, 2011**

Hans Clevers is a Dutch developmental biologist first to identify living stem cells in the intestine and is one of the world's leading researchers on adult stem cells, their role in cancer and their potential for regenerative therapy.

He obtained his MD in 1984 and his PhD in 1985 from the University of Utrecht, the Netherlands, studying signal transduction in T lymphocytes. After a four-year period at Harvard University, he returned to the Utrecht Medical Center where he became a professor in and chairman of the Department of Immunology at the Faculty of Medicine (1991–2002). In 2002 he became a professor of molecular genetics, and from 2002–2012 he was a director of the Hubrecht Institute in Utrecht. From 2012–2015 he was president of the Royal Netherlands Academy of Arts and Sciences (KNAW). From 2015–2019 he was director of research for the Princess Máxima Center for Pediatric Oncology. From 1981 to date he has run his research lab in Utrecht, since 2002 at the Hubrecht Institute.

Clevers' group was originally focused on T lymphocyte transcription factors. With the discovery that Tcf factors are the final effectors of Wnt signalling, they changed their interests to the biology of Wnt signalling in intestinal self-renewal and cancer. He discovered the stem cells of intestinal crypts and established them as a pre-eminent model to visualize and study adult stem cells in mammals. His research resulted in technologies to grow human stem cells into mini-organs (organoids) that behave cellularly and

molecularly like the organ the stem cell derived from. This has offered means to replace animal experimentation and generate disease models directly from patients, opening new avenues for regenerative medicine.

Professor Clevers is a member of the Royal Netherlands Academy of Sciences, EMBO, the National Academy of Sciences of the USA, the Royal Society (London), the Academie des Sciences (Paris), and the Academia Europaea. He is a recipient of multiple awards including the Dutch Spinoza Award in 2001, the Louis-Jeantet Prize in 2004, and the Breakthrough Prize in Life Sciences in 2013. He was made a Chevalier de la Legion d'Honneur in 2004. In 2012 he became Knight of the Order of the Netherlands Lion.

Wnt Signalling, Lgr5 Stem Cells and Cancer



*Driving to Brno to give a seminar
at the birthplace of genetics has
been one of the most memorable
moments of my scientific life.*

Jeff Errington

* 1956

Newcastle University, UK

📅 May 26, 2011

Jeff Errington is an eminent British cell and molecular biologist with an interest in fundamental biological problems, especially the cell cycle and cell morphogenesis in bacteria.



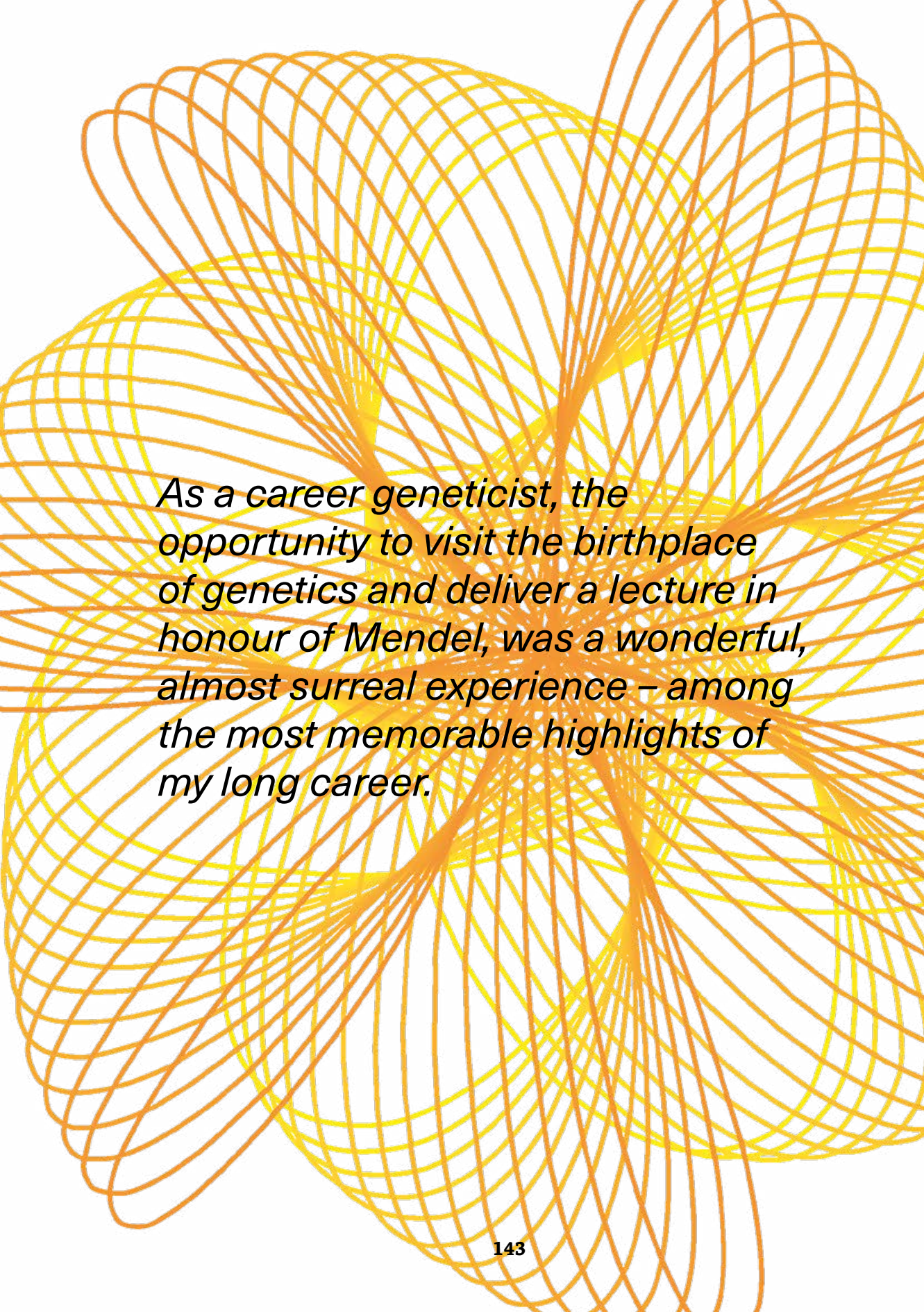
He graduated from the University of Newcastle-upon-Tyne in 1977 in genetics/zoology with a BSc and was awarded a PhD in bacterial genetics by the East Mallang Research Station and Thames Polytechnic in 1981. In 1986 he was awarded an MA at the University of Oxford. Professor Errington spent 25 years at Oxford and in 2005 he moved to Newcastle University where he established the Centre for Bacterial Cell Biology.

Dr. Errington is an international authority on bacterial cell structure and proliferation. He has made important contributions to our understanding of the molecular biology of endospore formation in *Bacillus*

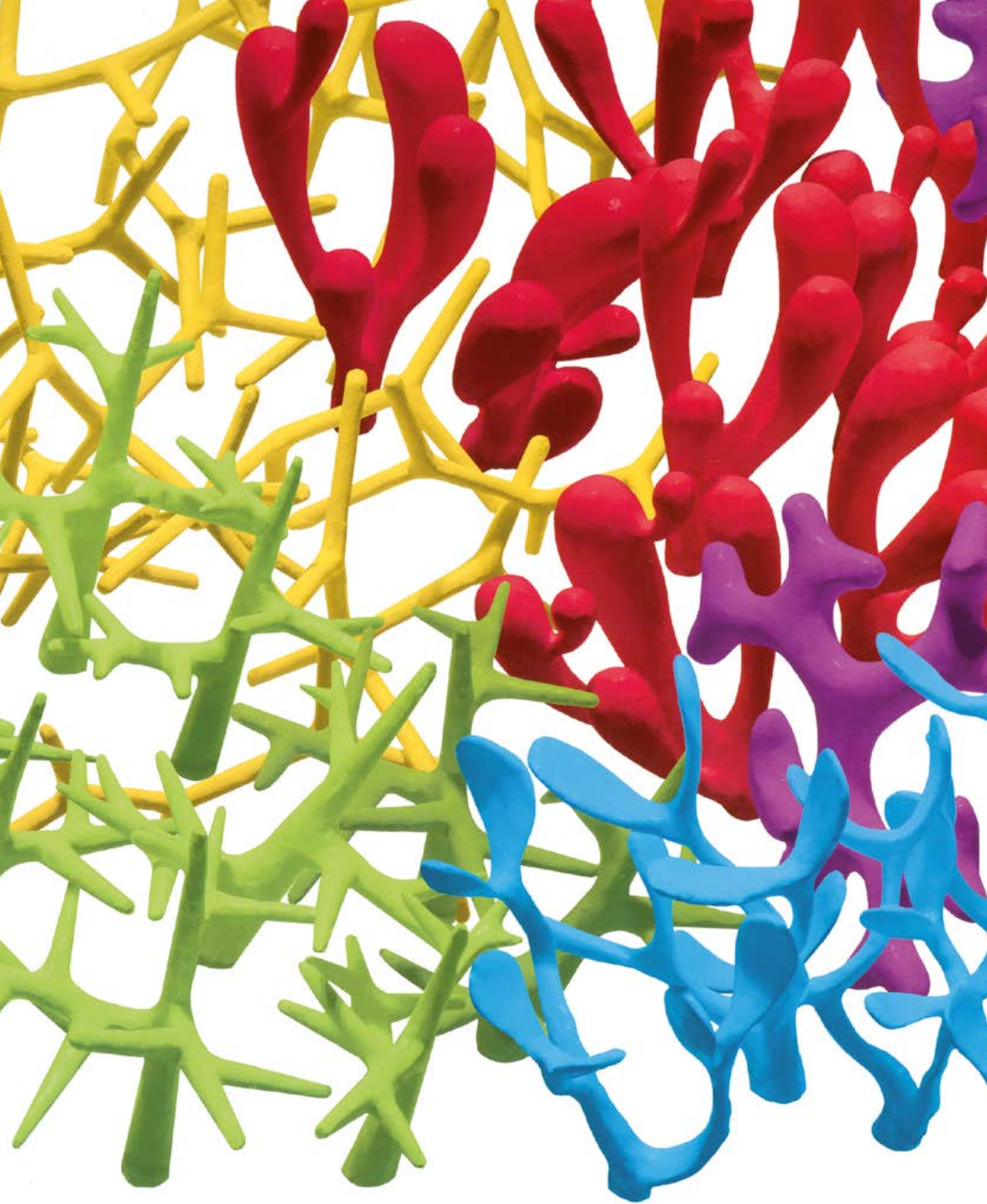
subtilis. The discovery that bacterial cells contain actin (MreB) and that MreB proteins orchestrate the cell wall's synthetic machinery and thereby govern cell shape, led to an explosion of interest in bacterial cell morphogenesis. Recently, he showed how bacteria can survive β -lactam killing by conversion into a cell wall deficient (L-form) state, highlighting the potential importance of L-forms in antibiotic evasion and recurrent infection. The unexpectedly simple mechanism his lab uncovered for L-form division provided a highly plausible model for the proliferation of primitive cells – a key step in the early evolution of cellular life.

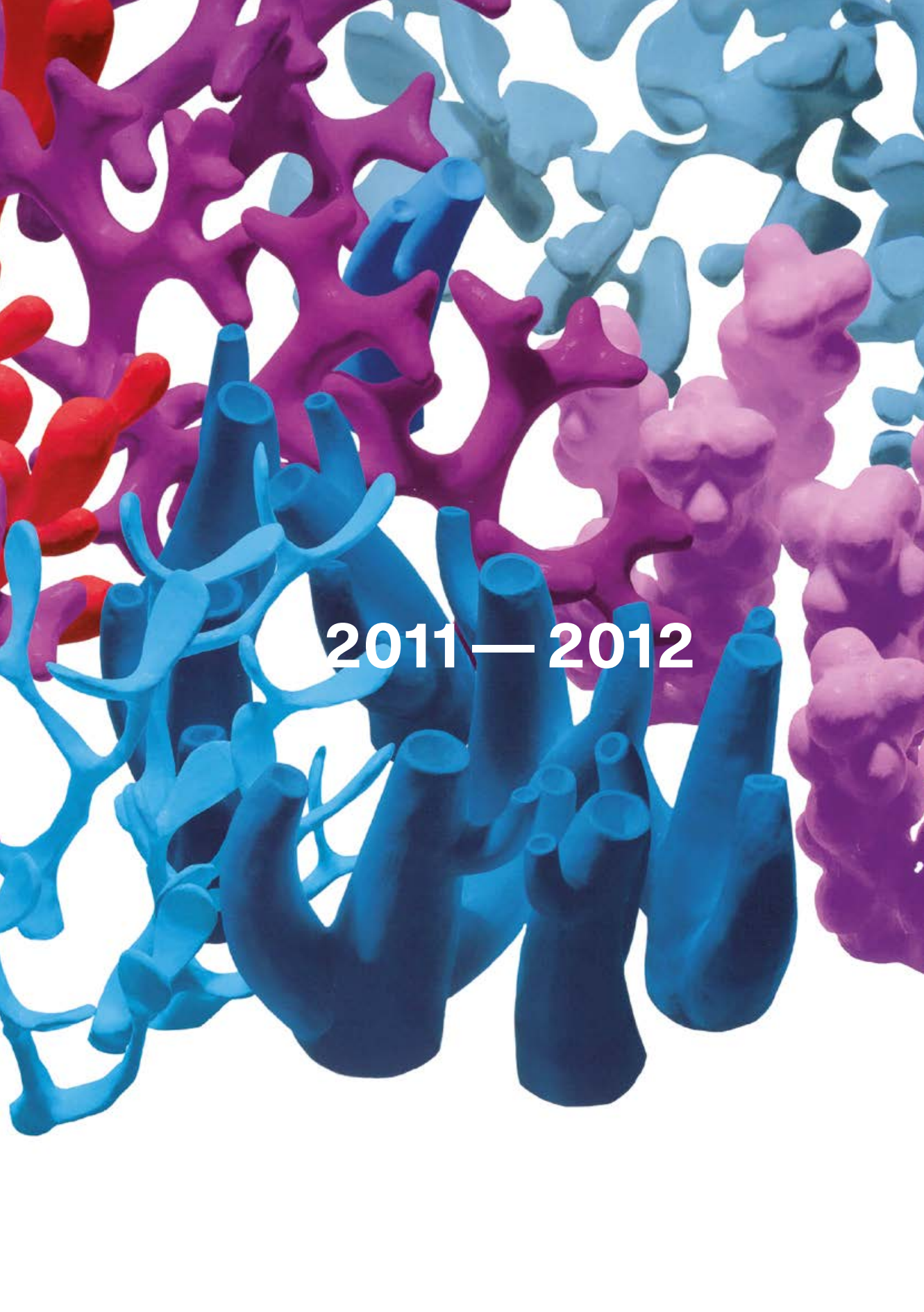
Dr. Errington has been recognized as one of the UK's leading biomedical researchers by his election to Fellowship of the Royal Society and the Academy of Medical Sciences, as well as to EMBO and both the European and American Academies of Microbiology. In 2014, Errington was awarded the Novartis Medal and Prize from the UK Biochemical Society, and in 2017 the Lwoff Medal of the Federation of European Microbiology Societies. Professor Errington has a strong track record in the commercial exploitation of basic science, founding two companies devoted to the discovery and development of novel antibiotics.

L-form Bacteria and the Origins of Life



As a career geneticist, the opportunity to visit the birthplace of genetics and deliver a lecture in honour of Mendel, was a wonderful, almost surreal experience – among the most memorable highlights of my long career.



An abstract sculpture composed of numerous interconnected, branching, and tubular forms, resembling coral or a complex network of vessels. The sculpture is rendered in three distinct colors: a vibrant blue, a deep purple, and a bright red. The forms are three-dimensional and have a smooth, slightly glossy finish. They are arranged in a dense, overlapping manner, creating a complex, organic structure. The blue forms are prominent in the foreground and middle ground, while the purple and red forms are more visible in the background and on the sides. The overall composition is dynamic and visually striking.

2011—2012

John Diffley

* 1958

*Chromosome Replication Laboratory – Clare Hall Laboratories,
Cancer Research UK London Research Institute*

📅 October 6, 2011

John Diffley is a molecular biologist who specializes in studying eukaryotic DNA replication.



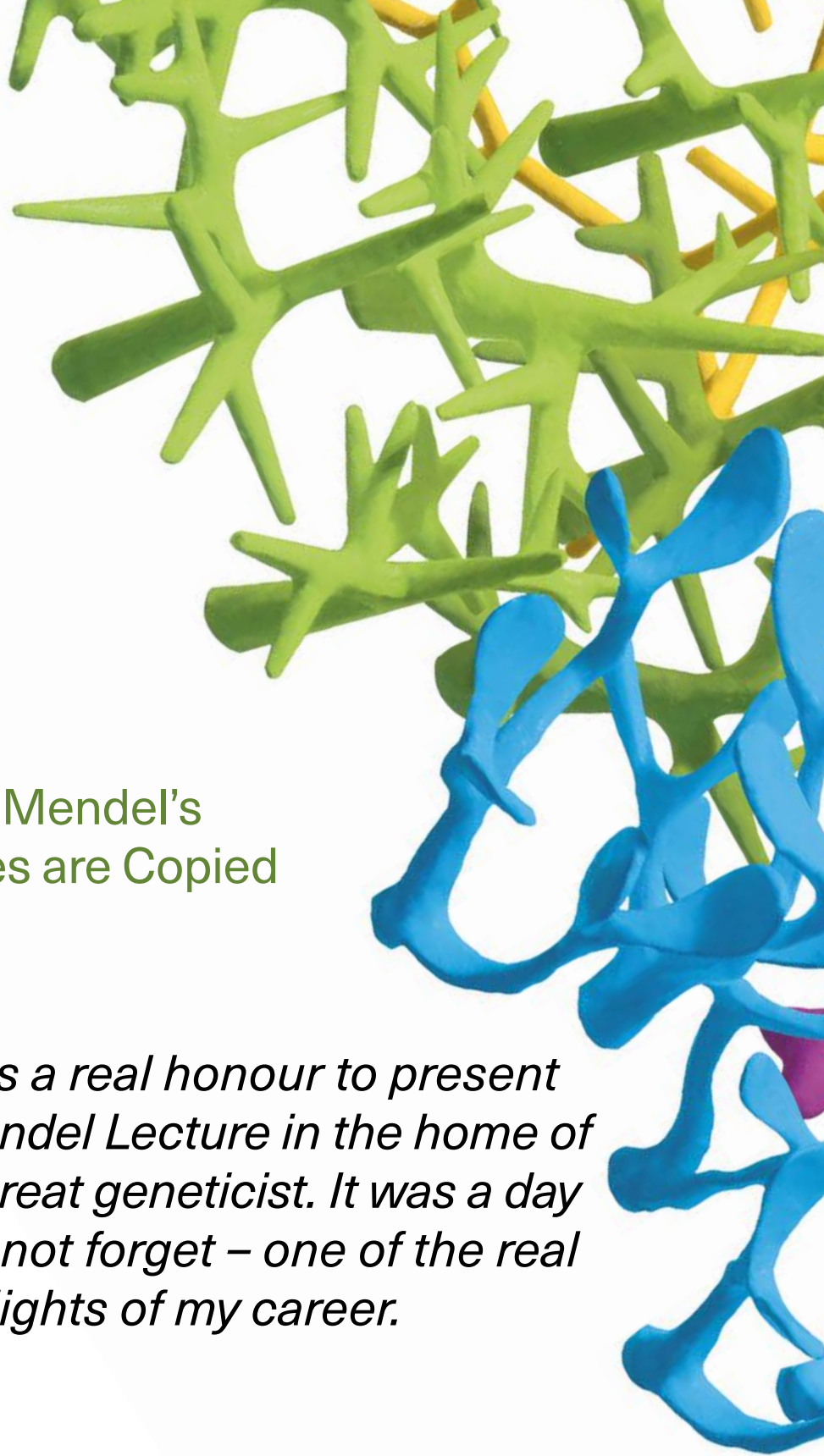
He obtained his PhD from New York University, USA, in 1985 and was a post-doctoral fellow at Cold Spring Harbor Laboratory, USA, until 1990. After that he established a lab at the Imperial Cancer Research Fund, UK (which in 2002 was renamed Cancer Research UK). Since 2006 he has been the director of Clare Hall Laboratories and the deputy director of the Cancer Research UK London Research Institute. Since 2015 he has been Associate Research Director at the Francis Crick Institute.

Diffley's work studies the molecular machinery that copies DNA and ensures that each daughter cell receives a complete set of genetic instructions, and how the process is affected when DNA is damaged. Diffley discovered and characterized how DNA replication origins are regulated to ensure once per cell cycle replication. His group recently described the reconstitution of the initiation of eukaryotic DNA replication with purified proteins. They also showed how chromatinized templates

are replicated, how nucleosomes displaced during replication are re-deposited on nascent DNA, and how chromatin influences DNA replication origin choice and lagging strand synthesis. He has also shown that DNA damage checkpoints regulate DNA replication on damaged DNA by inhibiting origin firing and that loss of this checkpoint or misregulation of normal cell cycle control can cause genome instability by interfering with normal DNA replication, with important implications in cancer biology.



Diffley was elected as a member of the European Molecular Biology Organization (EMBO) in 1998, awarded the Paul Marks Prize for Cancer Research in 2003, elected a Fellow of the Royal Society in 2005, and elected a Fellow of the American Association for the Advancement of Science (AAAS) in 2007. He was awarded the 2016 Louis-Jeantet Prize for Medicine for his contributions to understanding “how DNA replication, a process essential to life, initiates”, and the 2016 Canada Gairdner International Award for his “pioneering research on the eukaryotic DNA replication cycles including initiation, regulation and responses to DNA damage”.

An abstract 3D molecular model is positioned on the right side of the page. It features a complex network of green and yellow rod-like structures, possibly representing a protein or a DNA/RNA complex, with a blue, more globular structure at the bottom right. The background is white.

How Mendel's Genes are Copied

*It was a real honour to present
a Mendel Lecture in the home of
the great geneticist. It was a day
I will not forget – one of the real
highlights of my career.*

Timothy John Mitchison

* 1958

Department of Systems Biology, Harvard Medical School, Boston, USA

📅 October 13, 2011

Timothy John “Tim” Mitchison is a British cell biologist and systems biologist interested in the structure, dynamics, and function of the cytoskeleton.



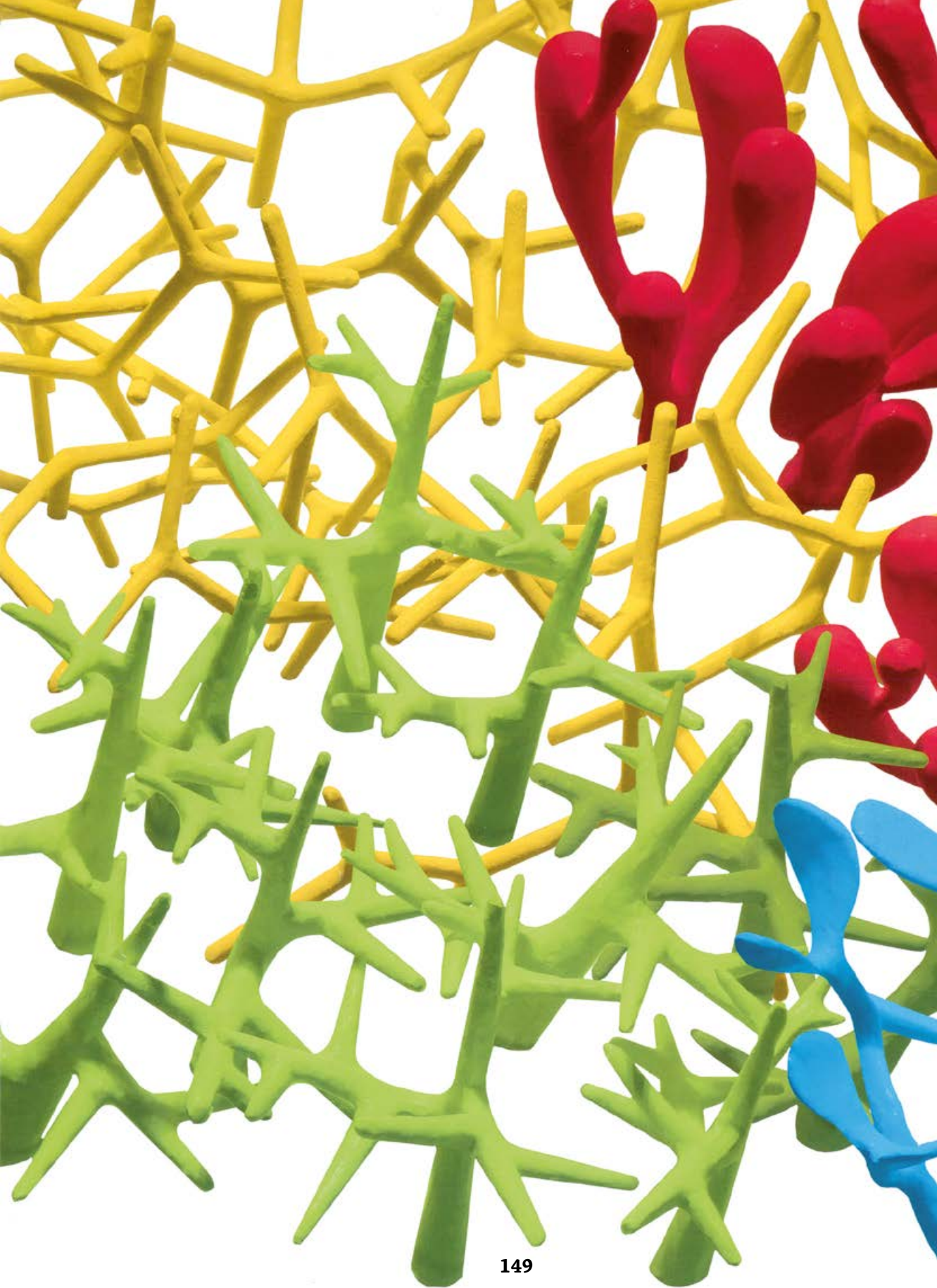
After completing his undergraduate degree at Merton College, Oxford, he moved to the University of California, San Francisco in the United States in 1979, to work on his PhD. He returned to the UK for postdoctoral research at the National Institute for Medical Research (NIMR) in London. In the late 1980s he returned to San Francisco to become an assistant professor at UCSF. In the late 1990s he became co-director of the Institute for Chemistry and Cell Biology at Harvard Medical School. In 2004 he was a founding faculty member of the new Department of Systems Biology at HMS, where he continues to work on cell division mechanisms and the pharmacology of anti-cancer drugs.

Mitchison was elected Fellow of the Royal Society in 1997 and was president of the American Society for Cell Biology. He delivered the Keith R. Porter Lecture in 2013 and was elected a member of the National Academy of Sciences of the United States in 2014.

Mitchison's lab uses imaging-based assays in living cells and *in vitro* extracts, in conjunction with molecular biology and biochemical fractionation approaches, as well as theory and modelling to study the function of the cytoskeleton. Together with Marc Kirschner, he discovered dynamic instability in microtubules and is studying the cell division mechanism. The lab is increasingly interested in cancer chemotherapy directed at the mitotic spindle to understand how current chemotherapy works, and how it can be improved. Current foci include understanding monopolar cytokinesis, and the mechanism by which actin filaments turn over rapidly in the cytoplasm.

How Does a Large Cell Find its Center?





Jürgen Knoblich

* 1963

Institute of Molecular Biotechnology of the Austrian Academy of Sciences (IMBA), Austria

 **November 10, 2011**

Jürgen Knoblich started his scientific career as a graduate student at the Max Planck Institute in Tübingen where he worked on cell cycle control in *Drosophila*. In 1994 he became a postdoctoral fellow at the University of California, San Francisco, where he discovered his interest in asymmetric cell division, a topic that has remained the main focus of his research ever since. In 1997, Jürgen Knoblich returned to Europe to become a group leader at the Institute of Molecular Pathology (IMP) in Vienna, Austria. In 2004, he moved to the newly founded Institute of Molecular Biotechnology of the Austrian Academy of Sciences (IMBA). He became a senior scientist and was appointed deputy director of the institute in 2005 and director in 2018.



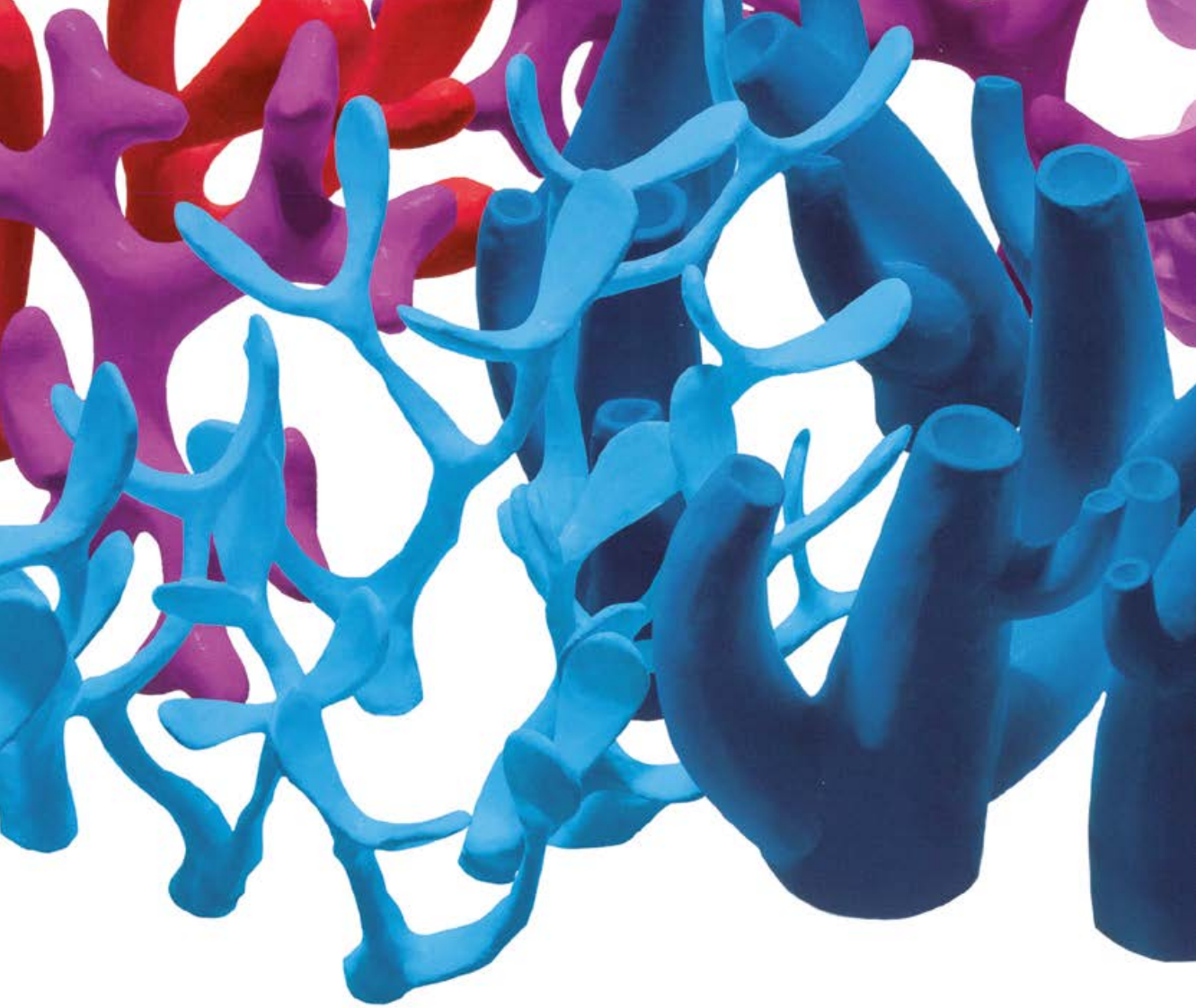
Knoblich's research focuses on brain development and cell division. Initially, he characterized a complete mechanism for the asymmetric stem cell division in *Drosophila* neural stem cells. His group was also the first to carry out a genome-wide *in vivo* RNAi screen demonstrating the ability to simultaneously analyze gene functions across the whole genome in a tissue's specific manner. Recent findings suggest that tumours can be based on

stem cells that keep their unique stem cell characteristics and thus divide uncontrollably, without ever differentiating into specific somatic cell types. In 2013, Knoblich's lab developed an *in vitro* culture system called Cerebral Organoids that recapitulates the development of a human brain at a remarkable level of detail. Their models made possible the investigation of the migration of neurons and neuronal activities. By fusing two separate organoids, it became possible to study interactions between distinct brain areas. They have also successfully modelled patient-specific disease phenotypes and used them to describe disease mechanisms.

Jürgen Knoblich holds the professorship in Synthetic Biology at the Medical University of Vienna. He received the EMBO young investigator award in 2001, the ELSO early career award in 2003, the Wittgenstein Prize in 2009, the 2012 Erwin Schrödinger-Preis, and the 2015 Sir Hans Krebs Medal of the Federation of European Biochemical Societies (FEBS). He is also a member of the Academia Europaea and of the Pontifical Academy of Sciences.

Proliferation Control and Tumorigenesis in Stem Cell Lineages of the Nervous System: Lessons from *Drosophila* and Mouse Genetics





Gregor Mendel, a great mind, far ahead of his time would be delighted to see, that still, after 200 years, the world's leading scientists assemble every year to hold a lecture in his name. I am very honoured to be part of this scientific legacy.

Angelika Amon

* 1967

Massachusetts Institute of Technology (MIT), Cambridge, USA

📅 March 8, 2012

Angelika Amon was an Austrian-American molecular and cell biologist focusing on cell growth, division and chromosome imbalance.

She received her BS from the University of Vienna and continued her doctoral work there at the Research Institute of Molecular Pathology, receiving her PhD in 1993. She completed a two-year postdoctoral fellowship at the Whitehead Institute in Cambridge, Massachusetts, and was subsequently named a Whitehead Fellow for three years. She joined the MIT Center for Cancer Research and MIT's Department of Biology in 1999 and was promoted to full professor in 2007.

In the earliest stages of her career, Amon made profound contributions to deciphering the regulatory networks governing cell division and proliferation in various model organisms and shedding light on how chromosome segregation is regulated. More recently she studied the consequences of chromosome mis-segregation on cell and organismal physiology, and how these repercussions can lead to human disease. She found that aneuploidy can interfere with a cell's normal DNA repair mechanism, allowing genetic mutations to quickly accumulate in tumour cells. Amon's work also led to understanding how aneuploidy results in some of the health problems associated specifically with Down syndrome.

Her pathbreaking research was recognized by several awards and honours, including the 1998 Presidential Early Career Award for Scientists and Engineers,

the 2003 National Science Foundation Alan T. Waterman Award, the 2007 Paul Marks Prize for Cancer Research, the 2008 National Academy of Sciences (NAS) Award in Molecular Biology, the 2013 Ernst Jung Prize for Medicine, the 2019 Breakthrough Prize in Life Sciences, the Vilcek Prize in Biomedical Science, and the 2020 Human Frontier Science Program Nakasone Award. She was also named to the Carnegie Corporation of New York's annual list of Great Immigrants, Great Americans and was elected a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

Angelika Amon, professor of biology and a member of the Koch Institute for Integrative Cancer Research, died on 29 October 2020 at age 53, following a two-and-a-half-year battle with ovarian cancer.



Causes and Consequences of Aneuploidy



Anthony A. Hyman

*1962

Cell Biology/Microtubules and Cell Division, Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany

 **March 22, 2012**

Anthony Hyman studied zoology at University College in London, was awarded a PhD in 1987 at King's College (Cambridge) and completed his postdoctoral studies at the University of California in San Francisco. He subsequently became a group leader at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany. In 1999 he became one of the four founding directors of the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG) in Dresden, where he was managing director from 2010–2013.

Located at the interface between cell biology and developmental biology, his research has focused primarily on the organization of cellular biochemistry. Hyman is known for his studies on the role of so-called microtubules in cell division. Functioning as dynamic “molecular machines”, these cytoskeletal components organize the distribution of a cell's components to its daughter cells. Hyman has developed a range of innovative physical and genomic methods for studying the microtubular cytoskeleton, including laser microsurgery techniques. Using video microscopy and high-throughput processes, he has successfully identified hundreds of genes which cause cell division defects.

More recently he has been studying the mechanisms by which cells compartmentalize their biochemistry by phase separation. Aberrant phase transitions within liquid-like compartments may underlie amyotrophic lateral sclerosis and other neurodegenerative and age-related diseases. His current work focuses on

the physical-chemical basis by which intrinsically disordered proteins phase separate. Using this knowledge, he is studying the roles of phase separation in physiology and disease.

Widely regarded as one of the world's leading cell biologists, Professor Hyman was elected a member in 2000 of the European Molecular Biology Organization (EMBO) and was awarded its Gold Medal in 2003. He was elected a fellow of the Royal Society (FRS) in 2007. In 2011, Hyman was awarded the Gottfried Wilhelm Leibniz Prize, Germany's most prestigious research award, for his work on microtubules and cells. In 2020 he was awarded the Wiley Prize in Biomedical Sciences for his work on biomolecular condensates, and was also given the NOMIS Distinguished Scientist Award by the NOMIS Foundation. In the same year Hyman was elected as an international member of the US National Academy of Sciences. In 2021 he received the Nakasone Prize from the HFSP.

Cytoplasmic Organization through Phase Transitions



Roland Kanaar

* 1961

*Department of Molecular Genetics, Oncode Institute, Erasmus University
Medical Center, Rotterdam, Netherlands*

📅 April 19, 2012

Roland Kanaar is a Dutch biochemist and molecular biologist.

Kanaar studied chemistry (BSc) and biochemistry (MSc) at Leiden University. He obtained his PhD degree in molecular biology in 1988 for research on the action of an enhancer in site-specific DNA recombination and the elucidation of how nucleoprotein complexes assembled at distant sites along a DNA chain communicate with each other to provide selectivity during recombination. His postdoctoral work at the University of California, Berkeley, aimed at understanding mechanisms of homologous recombination and how proteins and RNA interact to achieve accurate but flexible recognition of splice sites. He returned to the Netherlands in 1995 and started working in the Department of Genetics at Erasmus University in Rotterdam. In 2015 Kanaar became the Director of the Joint Erasmus MC/TU Delft, master's degree programme in nanobiology. In 2016, Kanaar was appointed Head of the Department of Molecular Genetics, and in 2020 Chair of the Theme of Biomedical Sciences at Erasmus University Medical Center.

His research focuses on the molecular mechanisms and physiological relevance of homologous DNA recombination and DNA break metabolism. Work in his team spans the experimental range from single-molecule biophysics to mouse genetics. His research has revealed that homologous recombination plays an important role in repairing radiation-induced DNA breaks in mammals, and his

team's discovery of the pathway responsible for random integration of exogenous DNA in the genome has had important implications for gene targeting efficiency in mammalian cells. His team is developing functional *ex vivo* tests on patient tumour material to guide precision therapy and design novel precision cancer treatments.



Professor Kanaar was elected a member of the European Molecular Biology Organization in 2002 and in 2013 to the Royal Netherlands Academy of Arts and Sciences (KNAW).

How DNA Recombination Maintains Genome Integrity



Óscar Fernández-Capetillo

* 1974

Genomic Instability Group, Spanish National Cancer Research Centre (CNIO), Madrid, Spain and the Karolinska Institute, Stockholm, Sweden

May 16, 2012

Óscar Fernández-Capetillo is a Spanish biochemist. He obtained his PhD in 2001 from the Universidad del País Vasco working on the role of E2F transcription factors on the immune system. He then joined the laboratory of A. Nussenzweig at the National Cancer Institute, USA, where he started to work on the cellular response to DNA damage, focusing particularly on the role of the histone variant H2AX and other chromatin-related aspects. After that he joined the CNIO to lead the Genomic Instability Group with a particular focus on developing cellular and animal tools to investigate the role of the ATR/Chk1 signalling cascade in protection against cancer and ageing. He is currently the Deputy Director at CNIO as well as Director of its Molecular Oncology Program. Since 2015 he has also been a professor of “Cancer Therapy” at the Karolinska Institute in Stockholm, Sweden.

The laboratory at CNIO combines mouse models, molecular and cellular biology, and genetic screens, while the laboratory at Karolinska has specialized in cell-based phenotypic chemical screens. While the initial focus of Fernandez-Capetillo was on ATR signalling, today his interests are spread across many independent topics which include mechanisms of DNA replication and repair, ageing, neurodegeneration, and academic drug development.

His work has been recognized through several national and international awards and honours including the Swiss Bridge Award (2005), selection as an EMBO Young Investigator (2008) and

Member (2016), the Eppendorf Award for Young Investigators (2009), the International Early Career Scientist, from the Howard Hughes Medical Institute of the USA (2011), and being named by CELL in their “40-under-40” list of the 40 most influential scientists under 40 years of age (2014).

Exploring the Role of Replicative Stress in Cancer and Ageing





Doug Koshland

* 1953

Department of Molecular and Cell Biology, University of California, Berkeley, USA

May 24, 2012

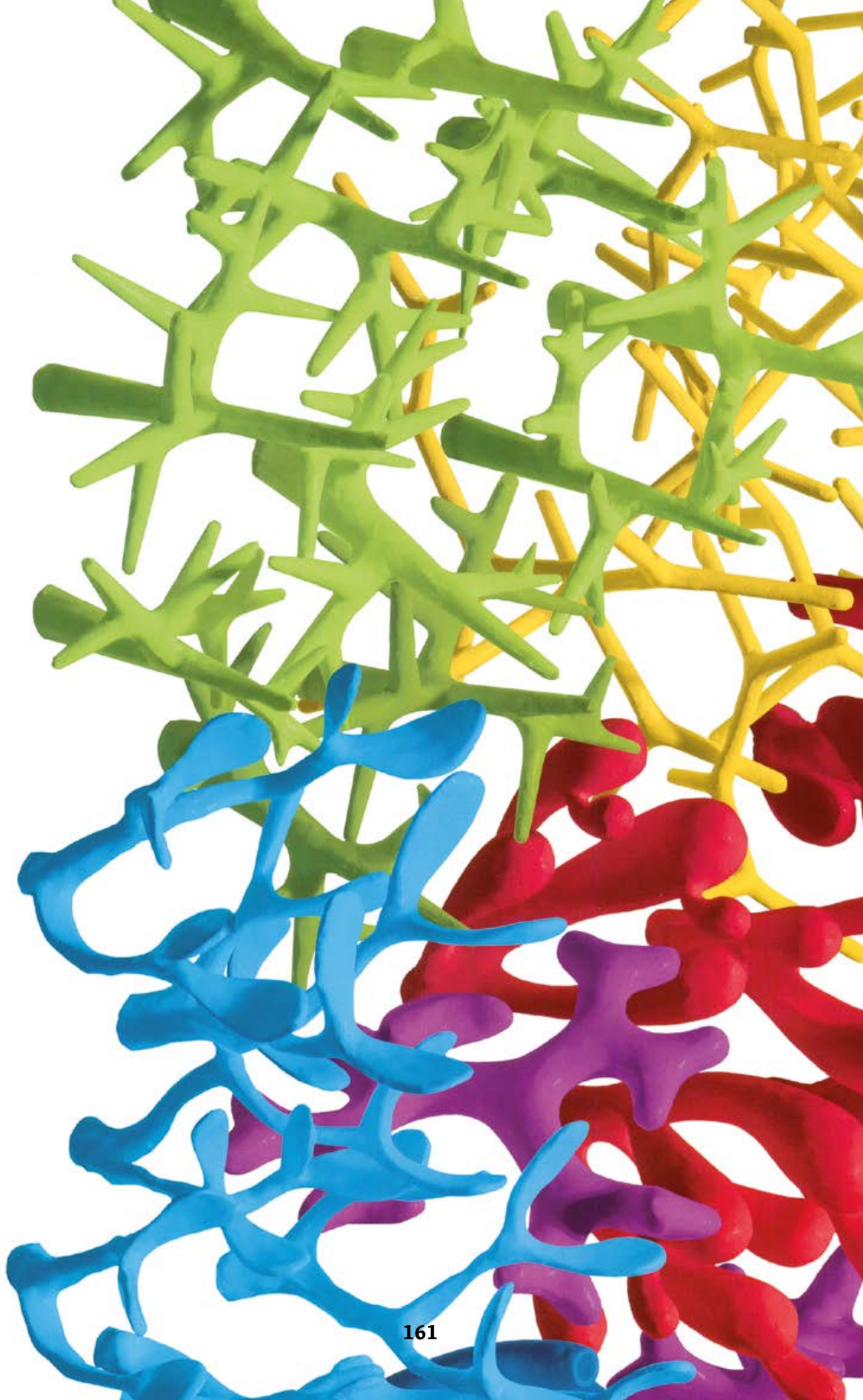
Douglas E. Koshland earned his BA degree in chemistry from Haverford College and his PhD degree in microbiology at the Massachusetts Institute of Technology, where he studied the secretion of beta-lactamase in *Salmonella typhimurium*. His postdoctoral work at the University of Washington, Seattle, studied yeast chromosome segregation, and at the University of California, San Francisco, focused on vertebrate kinetochore function. Douglas Koshland was a staff scientist and then senior staff scientist at the Carnegie Institution for Science's Department of Embryology from 1987 to 2010. During that time, he was also an adjunct professor in the Department of Biology at the Johns Hopkins University, and a Howard Hughes Medical Institute Investigator from 1997 to 2012. In 2010, Koshland was named Professor of Molecular and Cell Biology at the University of California, Berkeley. Recently he was appointed Richard and Rhoda Goldman Distinguished Chair in the Biological Sciences at the University of California, Berkeley.

Dr. Koshland's laboratory uses genetic, cell biological and biochemical approaches in budding yeast to understand cell division, higher-order chromosome structure, genome integrity and evolution, and stress biology. He was the first to identify cohesins, made a major contribution to the understanding of cohesins and condensins, and employed minichromosomes to illuminate universal chromosome transitions and the specific protein involved.

Doug Koshland was inducted into the National Academy of Science in 2010, and was also elected to the American Academy of Arts and Sciences.



Preventing Chromosomes from Going Rogue





10th anniversary

A halftone portrait of a man with glasses and a beard, partially obscured by a large green circle. The man is looking slightly to the left. The background is a light, textured grey.

2012

Gary Ruvkun

* 1952

Harvard University, Massachusetts General Hospital, Department of Genetics, USA

📅 October 8, 2012

Ruvkun attended the University of California at Berkeley, where he studied physics and biology, and graduated in 1973 with a degree in biophysics. In 1976 he enrolled in a PhD programme in biophysics at Harvard University. His PhD thesis, which explored bacterial nitrogen fixation genes, unlocked many of the genetic regulations of this process and showed that these genes have been conserved over 3 billion years of microbial evolution. After receiving his PhD in 1982, Ruvkun did postdoctoral research with Walter Gilbert at Harvard and Robert Horvitz at MIT, where he explored the genetic pathways controlling the developmental timing of *C. elegans*. Ruvkun became a professor at Harvard in 1985.



In collaboration with Victor Ambros at Harvard, Ruvkun established that the gene *lin-4* inhibits the activity of the gene *lin-14*. In 1991, Ruvkun showed that activating mutations of *lin-14* that escape repression by *lin-4* are RNA regulatory elements in the *lin-14* messenger RNA that follows the protein coding region. Ambros and his team discovered that *lin-4* encodes a tiny RNA of 22 nucleotides. Ambros and Ruvkun discovered that

the 22-nt *lin-4* RNA is complementary to sections in the *lin-14* mRNA, and that activating mutations in *lin-14* delete these complementary regions. This complementarity to the *lin-4* miRNA was imperfect – the duplexes contained multiple bulges and loops both in the *lin-4* RNA strand and in the *lin-14* mRNA strand, like the secondary structures of the well-studied ribosomal RNAs. Ambros and Ruvkun's back-to-back studies in *Cell* (1993) announced the discovery of the first microRNA and of its mechanism of regulating target mRNA translation by imperfect base pairing.

The universality of miRNAs emerged in 2000 when Ruvkun's laboratory discovered the second miRNA, *let-7*, which was conserved in over 500 million years of animal phylogeny – including in humans. The *let-7* miRNA also repressed the activity of its target gene through its 3' UTR with imperfect complementary sequences in the target mRNA. The Ruvkun lab is now using genetic strategies to systematically discover the components of the microRNA pathways in *C. elegans*. These discoveries triggered an explosion of tiny RNA exploration across the tree of life, and led to the identification of the biochemical machinery by which tiny RNAs of different classes are generated and regulate their target genes in many genetic pathways. This work has revealed that miRNAs are key players in embryogenesis and totipotent cell decisions, as well as diseases ranging from coronary disease to cancer.

Ruvkun also has made key discoveries in aging research. His lab discovered the molecular mechanisms of the first two aging genes discovered by Tom Johnson at the University of Colorado and Cynthia Kenyon at the University of California at San Francisco, which enabled the study of aging to become molecular. He discovered essentially every element of an insulin-signalling pathway that is the most potent regulator of lifespan in *C. elegans*. Many of the genes identified by Ruvkun's comprehensive insulin-signalling genetics have been shown to mediate metabolic control and lifespan in humans as well.

March of Dimes Prize in Developmental Biology in 2016. He became a member of the National Academy of Sciences in 2008, the American Academy of Arts and Sciences in 2009, and the American Philosophical Society in 2019. Since 1997 and in collaboration with Chris Carr, Mike Finney and Maria Zuber, Ruvkun has been developing with NASA support a DNA sequencer to send to Mars or other planets to search for life on those planets that uses DNA, RNA, and ribosomes, like life on Earth. This is to test the hypothesis that life has spread between planets and perhaps across the galaxy.



Gary Ruvkun has received many awards (most of them with Ambros): the Rosenstiel Award in 2005, the Albert Lasker Award for Basic Medical Research in 2008, the Gairdner International Prize in 2008, the Warren Triennial Prize in 2008, the Massry Prize in 2008, and the Dan David Prize in 2011 (with Cynthia Kenyon for his discoveries in aging), the Paul Janssen Award in 2012, the Wolf Prize for Medicine in 2014, the Gruber Prize in 2014, the Breakthrough Prize in Life Sciences in 2014, and the

An Animal
Surveillance
Pathway for
Microbial
Inhibition of
Conserved
Cellular
Components
and Induction
of Defence
Responses

Josef Jiříčný

* 1951

Institute of Molecular Cancer Research, University of Zurich, Switzerland

📅 October 8, 2012

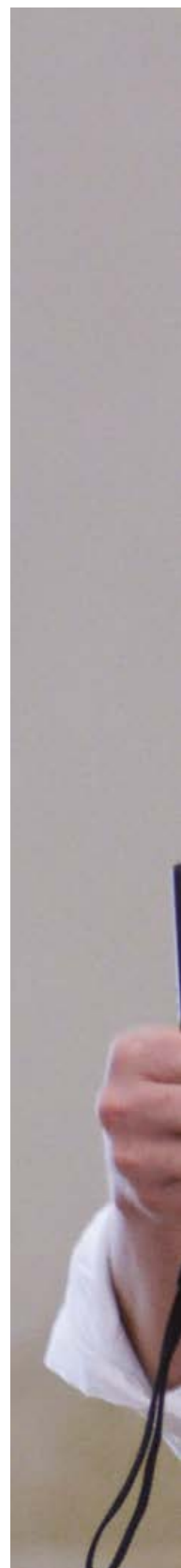
Josef Jiříčný was born in Prague in 1951. Following the occupation of Czechoslovakia in 1968, he emigrated to England. He studied chemistry at the University of Aston in Birmingham and then at the University of London, where he obtained his PhD in 1977. After three years of postdoctoral research at King's College London, he moved to the Imperial Cancer Research Fund laboratories in London, where he began to explore repair mechanisms of damaged or carcinogen-modified DNA. In 1983 he transferred his research to the Friedrich Miescher Institute in Basel, where he became a senior group leader in 1989. One year later he accepted the position of senior director of biochemistry at the newly-founded Istituto di Richerche di Biologia Molecolare (IRBM) near Rome, where he continued to study DNA repair mechanisms, as well as coordinating research programmes aimed at the discovery of novel antiviral substances. In 1996 he moved to Zurich as director of the Institute of Molecular Cancer Research of the medical faculty of the University of Zurich (UZH). In 2003 he was elected joint UZH/ETH professor and joined the Department of Biology at the ETH in Zurich.

Jiříčný's group has been primarily interested in studying the biochemistry and biology of the postreplicative mismatch repair (MMR) system in human cells. They identified and characterized several key components of this system. They have also been studying the link between MMR and colon cancer, as mutations in MMR genes are associated with one of the most common inherited cancer predisposition

syndromes, hereditary non-polyposis colon cancer (HNPCC). Having discovered that MMR-associated proteins participate in other pathways of DNA metabolism as well, Jiříčný's lab shifted its focus to the characterization of these processes, particularly the repair of interstrand cross-links such as those induced by the cancer chemotherapeutic cisplatin.

Josef Jiříčný has been a member of EMBO since 1996 and of Academia Europaea since 2000. In 2003 he was awarded the Gregor Mendel Medal of the Czech Academy of Sciences for his contribution to the elucidation of the genetics of inherited cancer. In the same year, he was nominated the Bonizzi-Theler Professor of functional genomics and received the Swiss Bridge Award. In May 2006, he received the San Salvatore Prize for cancer research and the International Award of the Slovak Academy of Sciences. In 2010 he was awarded the Ernst-Theophile Jucker Prize for Cancer Research.

FAN 1, a Novel Enzyme Involved in the Processing of Cisplatin Adducts in DNA





I feel highly honoured to be among the speakers who have had the great privilege to participate in the Mendel Lecture series during the past two decades.

Jan Hoeijmakers

* 1951

Department of Genetics, Erasmus MC, Rotterdam, Netherlands

 **October 8, 2012**

Jan Hoeijmakers graduated in 1975 in molecular biology from the Radboud University Nijmegen, Netherlands, and finished his PhD at the University of Amsterdam (under supervisor Piet Borst) in 1979. He was given a position in the Department of Cell Biology and Genetics of Erasmus University in Rotterdam where he became professor of Molecular Genetics in 1993 and head of the Department in 2001.

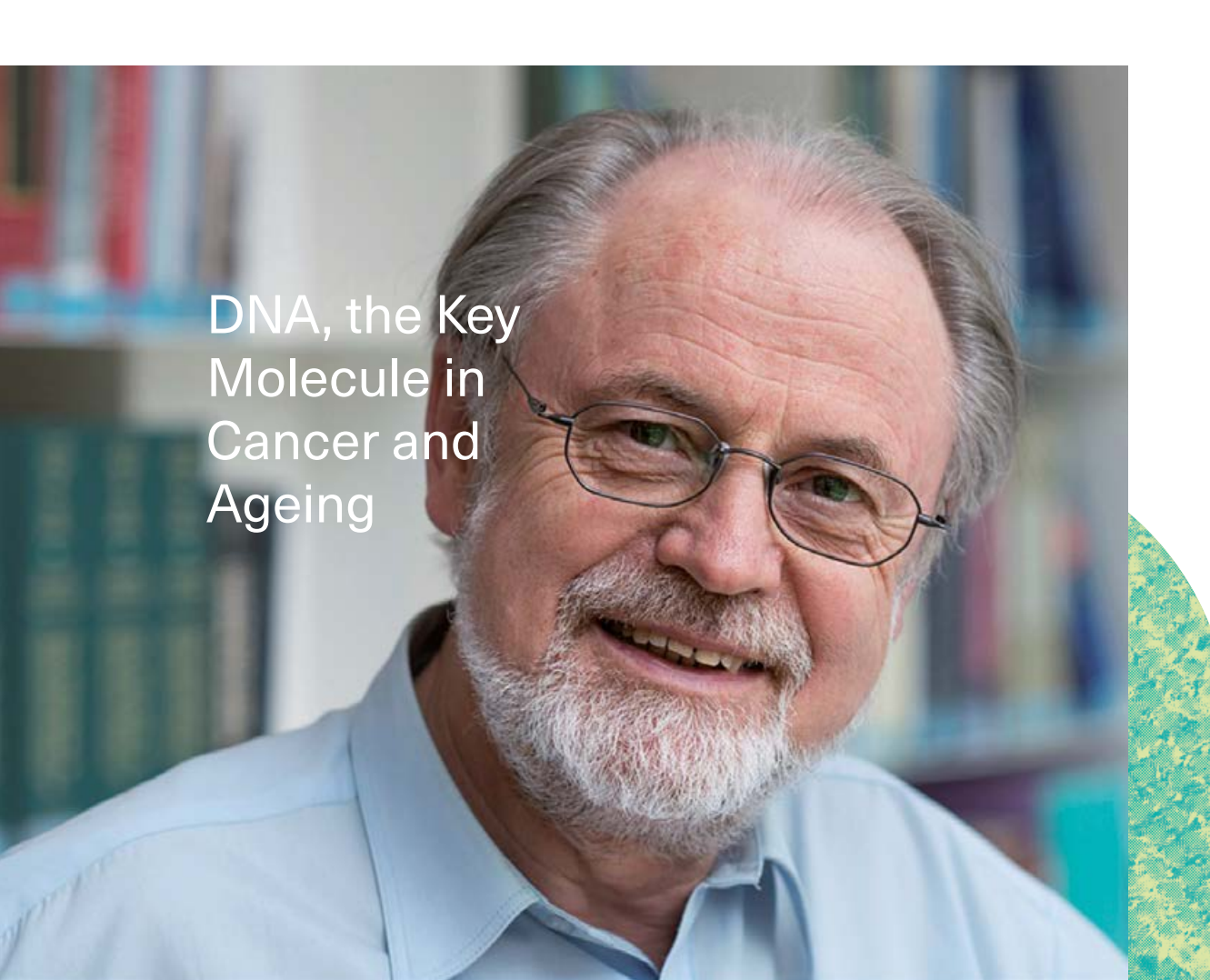
His PhD work provided insight into the curious fishnet-structure and function of the unusual mitochondrial DNA of trypanosomes, called kinetoplast DNA. In addition, by cloning four genes for surface antigens he discovered – at that time unexpected – DNA rearrangements enabling these parasites to constantly change their surface coat and thereby escape the host immune system, causing sleeping sickness. For this work he received the Harold-Quintus-Bosz Prize in 1983.

After completing his PhD, Hoeijmakers studied the molecular biology of DNA repair by cloning many human DNA repair genes, allowing elucidation of the molecular-genetic basis of multiple rare and very severe human repair syndromes, and understanding repair mechanisms *in vitro*, in live cells and intact mice by developing GFP-tagging and dynamic innovative photobleaching techniques. His team generated the largest collection of mouse models for DNA repair deficiencies, enabling insight into the biological and clinical importance of DNA damage for cancer and aging. He pioneered the link between DNA damage, repair and aging and succeeded in influencing aging

in mice. Recently, his group also identified DNA damage-driven transcriptional stress as a major cause of systemic aging, explaining the basis of proteinopathies, and discovered a surprising effect of nutritional interventions, with implications for repair syndromes, dementias, chemotherapy and ischemia reperfusion injury in surgery and organ transplantation. This work has led to a complete reversal of nutritional guidelines for DNA repair syndrome patients suffering from dramatic premature aging.

Jan Hoeijmakers has been honoured with many prizes. In 1986 he received the De Snoo-van 't Hoogerhuijs Prize; in 1995 the Louis-Jeantet Prize together with Bootsma for cloning the first human DNA repair gene; and in 1998 the Spinoza Prize, the highest award in Dutch science. In 2000 he was awarded the Descartes Prize and the Van Gogh Prize, and in 2001 the Josephine Nefkens Prize for cancer research. In 2011 he and Bert Vogelstein received a prize from the Charles Rodolphe Brupbacher Foundation for their research into genome stability and its role in aging and cancer. In that year he also received the Queen Wilhelmina Research Prize from the Dutch Cancer Society. Hoeijmakers became Academy Professor at the Royal Netherlands Academy of Sciences in 2011. He was knighted in 2013 in the Order of the Dutch Lion, received the NVHG Galjaard Prize of the Netherlands Society of Human Genetics in 2016, the International Olav Thon Foundation personal Award in 2017, the “EMGS Award” in 2019, and jointly with other lab members the Ammodo Award in 2020.



A portrait of a middle-aged man with grey hair, a full grey beard, and glasses. He is wearing a light blue button-down shirt and is smiling slightly. The background is a blurred bookshelf filled with books of various colors.

DNA, the Key Molecule in Cancer and Ageing

The amazing discovery of the basic genetic principles by Mendel has provided the basis of genetics today and the enormous impact it has on our society, most importantly health and well-being of mankind. This major discovery deserves lasting commemoration by the Mendel Lectures.

Jiří Lukáš

* 1961

*Novo Nordisk Foundation Center for Protein Research,
University of Copenhagen, Denmark*

📅 October 8, 2012

Jiří Lukáš was born in the Czech Republic and studied at the Veterinary University in Brno, Czech Republic and obtained a PhD in zoology from the Czech Academy of Science. He worked as a visiting scientist with Nobel laureate Paul Nurse at the Department of Biochemistry, Oxford, UK and as a postdoc with Giulio Draetta at EMBL, Heidelberg, Germany. In 1993 he became a senior scientist in the Danish Cancer Society, Copenhagen, Denmark, where he later served as Director of the Center for Genotoxic Stress Research. For much of his career he created a remarkable partnership with Jiří Bártek, placing replication stress among the hallmarks of cancer. In 2012, Jiří Lukáš moved to the University of Copenhagen where he was appointed Professor at the Faculty of Health and Medical Sciences and Executive Director of the Novo Nordisk Foundation Center for Protein Research.

Prof. Lukáš studies chromosomal dynamics in the mammalian cell cycle and after DNA damage. He has made revolutionary discoveries enhancing our knowledge of essential mechanisms required for genome maintenance, and has provided key evidence of how the failure of post-translational protein modifications contribute to the development of cancer. His laboratory is also renowned for pioneering advanced imaging techniques combined with genetic silencing and computation-based phenotypic readouts, which elucidate fundamental principles of protein function in their physiological environment and generate powerful resources of previously unknown genome caretakers including rate-limiting

guardians of DNA repair as potentially druggable targets of cancer.

Prof. Lukáš has received numerous prestigious awards for his research including the Young Danish Cancer Researcher Prize (1995), the Alfred Benzon's Foundation Prize (2002), the Novo Nordisk Foundation Prize (2003), the GJ Mendel Honorary Medal (2003), the Danish Cancer Society Senior Research Prize (2008), the Danish Society for Cancer Research Award (2010), the Leopold Griffuel Award (2014), and the Fernström Foundation Grand Nordic Prize (2016). Lukáš is an elected member of EMBO, Academia Europaea, the European Academy of Cancer Sciences, and the Royal Danish Academy of Sciences and Letters. He is also Honorary Member of the Learned Society of the Czech Republic.

Most recently, Prof. Lukáš received the Anders Jahre Medical Prize in 2020 for his many years of outstanding research and work on cell cycle regulation and genome integrity in cancer.

Spatial and Temporal Organization of Genome Maintenance





Günter Blobel

* 1936

Howard Hughes Medical Institute & The Rockefeller University, New York, USA

 **October 9, 2012**

Günter Blobel was born in 1936 in Waltersdorf, Germany (now part of Poland). In January 1945 he fled with his family from their native Silesia to Dresden to escape from the advancing Red Army.

He received his MD from the University of Tübingen in 1960 and his PhD in 1967 from the University of Wisconsin, Madison, where he worked with Van R. Potter in the McArdle Laboratory for Cancer Research. He did postdoctoral work at Rockefeller University in the laboratory of George E. Palade, and remained at the university from that time. He was named the John D. Rockefeller, Jr. Professor in 1992, and became an Investigator at the Howard Hughes Medical Institute in 1986.

In a series of ground-breaking experiments conducted over the course of 30 years, Günter Blobel discovered how the cell's protein distribution system operates. It was for this work that he won the Nobel Prize in Physiology or Medicine in 1999. Blobel found that proteins carry built-in signals that act like postal codes to direct proteins to their proper locations within each cell. His studies also demonstrated that special receptors on the surfaces of membranes read those signals and allow the appropriate proteins either to pass through or to lodge within the membrane.

Günter Blobel received the King Faisal International Prize in 1996, the Albert Lasker Award for Basic Medical Research in 1993, the Louisa Gross Horwitz Prize in 1989, and the Gairdner Foundation International Award in 1982. He was a member

of the National Academy of Sciences, the American Philosophical Society, the Pontifical Academy of Sciences, and received the German Order of Merit.

Blobel became well known for his direct and active support of the rebuilding of Dresden in Germany, becoming in 1994 the founder and president of the non-profit "Friends of Dresden, Inc.". He donated all of his Nobel award money for the rebuilding of the Frauenkirche (completed in 2005) and the building of a new synagogue.

Günter Blobel died on February 18, 2018, at the age of 81.

Molecular Design of Nature's Largest and Most Versatile Channel Anchored in the Center of the Nuclear Pore



Julius Lukeš

* 1962

Institute of Parasitology, Biology Centre, CAS, České Budějovice, Czech Republic

📅 October 9, 2012

Julius Lukeš studied at Charles University in Prague, Czech Republic, graduating in 1986. After completing a PhD in 1991 in parasitology in the Czech Republic, Lukeš went for several postdoc stays in the Netherlands and USA, and since 1999 has established his independent laboratory at the Institute of Parasitology, Czech Academy of Sciences, of which he became director in 2012.



His lab is generally interested in protists belonging to the eukaryotic supergroup *Excavata*. While his team was until relatively recently primarily focused on parasitic kinetoplastid flagellates, the lab also became interested in ecologically relevant euglenids and a group of marine protists called diplomonads that are extremely diverse and abundant in the oceans, yet markedly understudied. The aim is a holistic understanding of this enigmatic group of marine protists, from studying their morphology and life cycles, to mapping their diversity and abundance, to turning them into model organisms, which would allow dissecting mechanistic details underlying their

biology. The inquiries into these three groups are unified by consideration of their evolution and the structure and function of their single reticulated mitochondrion.

Lukeš has also retained interest in field research, each year collecting protists to culture and analyze, for example, from the *Tara* Polar Circle expedition and from Papua New Guinea, Ecuador, Madagascar, Ghana, Vietnam, Cuba, the Philippines, China etc.

Julius Lukeš has been recognized by the scientific community by a number of honours. In 2002, he received the Otto Wichterle Prize from the Czech Academy of Sciences, in 2004 he became a Member of the Learned Society of the Czech Republic, and in 2009 he became a Laureate *Praemium Academiae*.

Between 2012 and 2017 he was a Senior Fellow of the Canadian Institute for Advanced Research. He has been a Fellow of the American Academy for Microbiology since 2014, a Fellow of the European Academy of Microbiology since 2015, and a Fellow of the American Association for the Advancement of Science since 2018.

RNA Editing in Trypanosomatid Protists



Jiří Friml

* 1973

VIB Ghent, Belgium

📅 October 9, 2012

Jiří Friml was born in the Czech Republic and studied biochemistry at Masaryk University in Brno, Czech Republic. Immediately after receiving his master's degree in 1997 he obtained a fellowship at the Max Planck Institute in Cologne, Germany. He finished with a PhD degree in biology at the University of Cologne in 2000. In 2001 he moved to the Centre for Plant Molecular Biology at the University of Tübingen. There he headed a research group before gaining a further doctorate in biochemistry at Masaryk University. From 2007 to 2012 he was a professor of plant systems biology at the University of Ghent, Belgium, where he led a research group.



The research of Jiří Friml has always focused on the cellular and molecular mechanisms behind adaptive development in plants. He proposed a general

model that explains how plants capture multiple internal and external signals and translate them into the extraordinary plasticity and adaptability that characterizes their development. At the centre of Friml's research work is the growth hormone auxin. Its distribution regulates what is up and what is down in a plant, how much it grows in a particular direction and where individual organs are located. These findings are seen as a milestone in gaining a greater understanding of numerous physiological processes in plants. They are also of pre-eminent importance to agronomic and medical research.

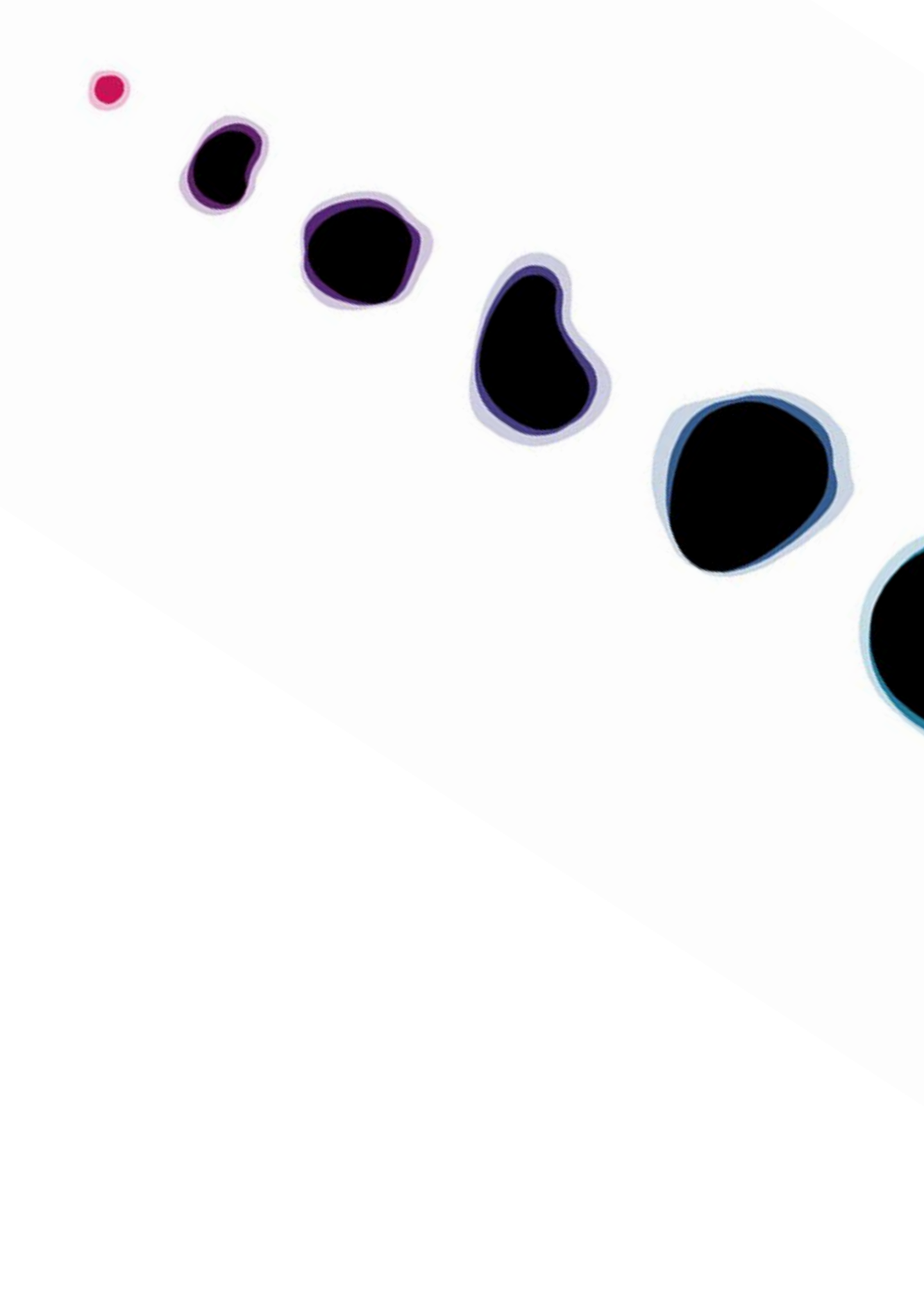
For his work, Jiří Friml has been recognized with many prestigious awards including the EMBO Young Investigator Award (2004), the Heinz Maier-Leibnitz Prize (2005), and the prestigious European Science Prize awarded by the Körber Foundation (2010). In 2015 he was selected for the list of the World's Most Influential Scientific Minds.

How Cells Make a Plant: Role for Directional Auxin Transport



A man with short brown hair, wearing a white short-sleeved button-down shirt, is speaking at a podium. A small black lavalier microphone is clipped to his shirt. He is holding a black pen in his hands. The background is a light-colored wall with a faint, stylized graphic of a person's head. The image is framed by a teal and green patterned border on the right and bottom.

It is a great honour to follow in the footsteps of Gregor Johann Mendel with my molecular genetic research. It is great to see that Mendel's tradition in Brno is revived and continued.



2012 — 2013

Nancy Kleckner

* 1947

Harvard University, Cambridge, USA

 **October 25, 2012**

Nancy Kleckner graduated from Harvard, where she studied the reciprocity of recombination genetically in bacteriophage lambda with Matthew Meselson. She earned a PhD at the Massachusetts Institute of Technology in 1974 and remained for a postdoctoral fellowship with geneticist David Botstein, with whom she described the first transposable drug resistance element, Tn10.

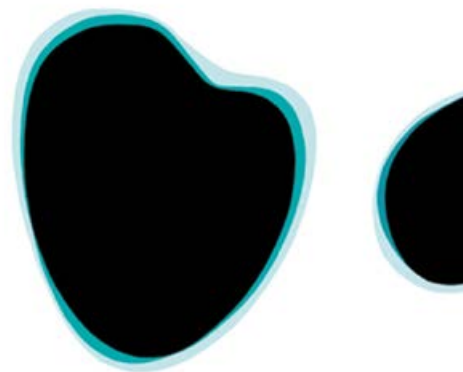
In 1977, Harvard hired Kleckner as an assistant professor. Her continued studies on transposons led to identification of the first anti-sense RNA to control gene expression and genetic proof that Tn10 moves by a cut-and-paste mechanism. She also became a leading expert in the biochemistry of transposons. In 1985 she was the nineteenth woman awarded tenure at Harvard. She then added two new lines of research: *E. coli* replication and cell cycle, and meiosis.

Her lab is particularly interested in higher order processes involving the integration of spatial, temporal and functional elements and in viewing chromosomes as physical objects for which mechanical forces (stresses) play important roles. They study meiotic chromosomes in budding yeast and other organisms, thereby elucidating the several steps of homolog recognition and juxtaposition, the functional interplay between chromatin and structural axes along and between chromosomes, and the programmed spatial patterning of interhomolog crossovers. They also study the global chromosome dynamics of both *E. coli* and mammalian chromosomes, including investigating

a general “stress hypothesis”. They have also developed new tools for chromosome imaging and for monitoring forces within chromosomes *in vivo*.

Dr. Kleckner was awarded the GSA Medal of the Genetics Society of America in 1990 and the GSA Thomas Hunt Morgan Medal for Lifetime Achievement in 2016. She was elected to the American Academy of Arts and Sciences in 1991, to the US National Academy of Sciences in 1993, and as a Foreign Associate member of the European Molecular Biology Organization in 2004. At Harvard, she founded the PhD track in Engineering and Physical Biology. She is also a Fellow of the American Association for the Advancement of Science and the American Academy of Microbiology.

Meiotic Recombination: The Exception to, and the Executor of, Mendel's Laws





Visiting the site of Mendel's experiments and being immersed in his life and surroundings was memorable and meaningful and it was an honour to have the opportunity to give a Mendel Lecture.



Brenda Schulman

* 1967

St. Jude Children's Research Hospital, Memphis, USA

📅 March 14, 2013

Brenda Schulman received her bachelor's degree in biology from Johns Hopkins University in 1989 and her PhD in biology from the Massachusetts Institute of Technology in 1996. She then worked as a postdoctoral fellow at the Massachusetts General Hospital Cancer Center (1996–1998) and later at the Memorial Sloan Kettering Cancer Center (1998–2001). Schulman joined the faculty at the St. Jude Children's Research Hospital in 2001. She became a Howard Hughes Medical Institute Investigator in 2005.



She is broadly interested in how ubiquitin and ubiquitin-like proteins are matched with specific substrates, and how they alter the functions of their targets to regulate the cell cycle, autophagy, metabolic signalling, differentiation and other biological processes. Her lab structurally visualizes transient ubiquitylation complexes trapped as if in action, biochemically reconstitutes signalling pathways, develops chemical tools to probe ubiquitin signalling, and employs

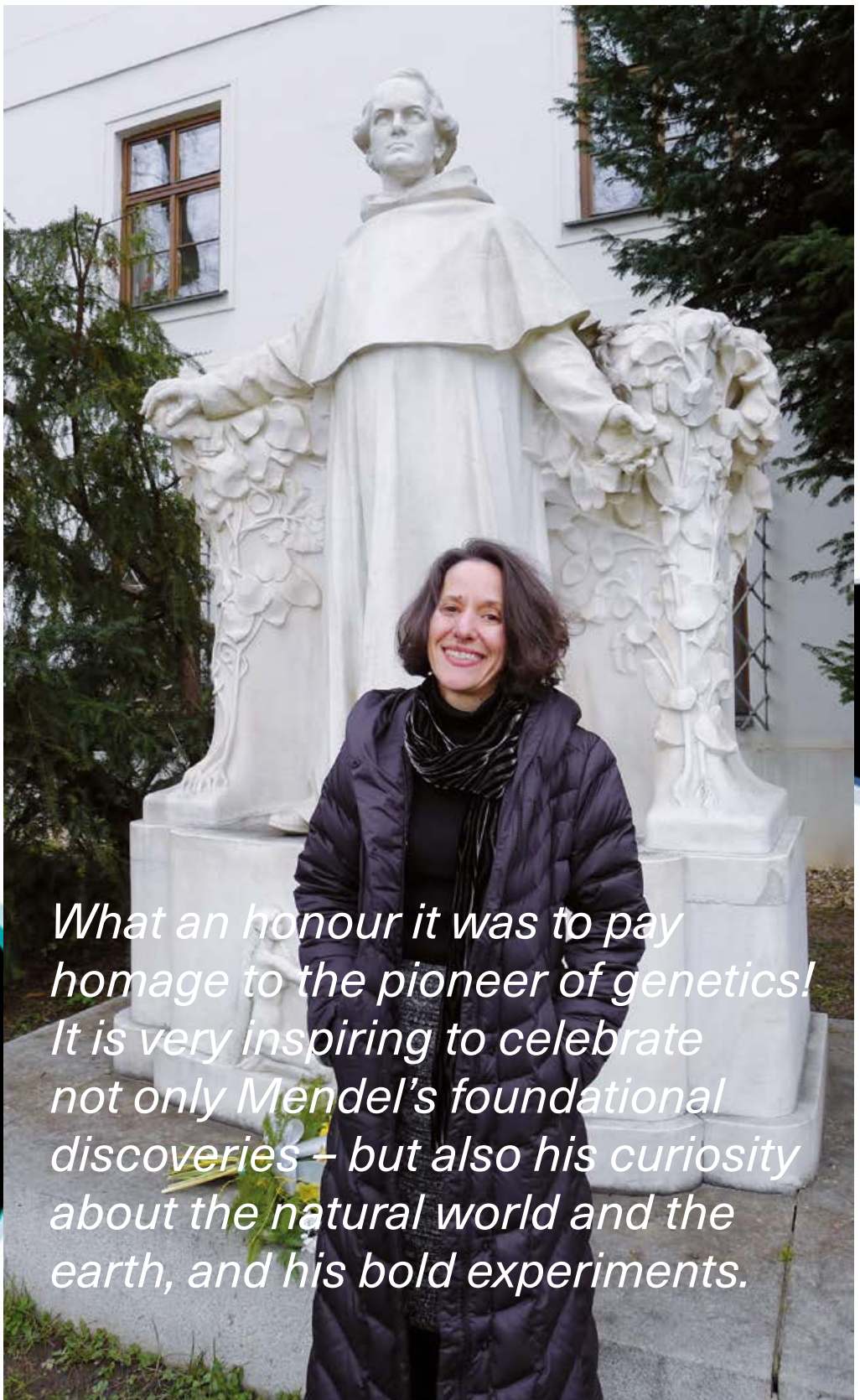
cell biology to investigate how ubiquitylation mediates regulation. Knowledge of this regulation has contributed to our understanding of how defects caused by mutations contribute to diseases including cancers and neurodegeneration, and how viruses hijack ubiquitin pathways during infections.

Brenda Schulman received the 2004 Presidential Early Career Award for Scientists and Engineers, the 2011 Dorothy Crowfoot Hodgkin Award from the Protein Society, and was elected to the American Academy of Arts and Sciences in 2012. Dr. Schulman was elected to the National Academy of Sciences in 2014 and received a MERIT Award from the National Institute of General Medical Sciences the same year.

After sixteen years at St. Jude's, Schulman moved to the Max Planck Institute of Biochemistry in Germany in 2017, becoming a Director and Scientific Member. In 2019, she was awarded the Ernst Jung Prize for Medicine, the Gottfried Wilhelm Leibniz Prize and was elected to the Leopoldina.

She continues working on ubiquitin and protein degradation.

Twists and Turns in Ubiquitin Conjugation Cascades



*What an honour it was to pay
homage to the pioneer of genetics!
It is very inspiring to celebrate
not only Mendel's foundational
discoveries – but also his curiosity
about the natural world and the
earth, and his bold experiments.*

Tom Rapoport

* 1947

Harvard Medical School, Boston, USA

📅 April 11, 2013

Tom Abraham Rapoport is a German-American cell biologist who studies protein transport in cells. He received his PhD in 1972 from the Humboldt University in East Berlin (then in the German Democratic Republic) for work in enzymology. He then focused on mathematical modelling of metabolism, for which he received his second degree (*habilitation*) from the same institution. In 1979 he moved to the Zentralinstitut



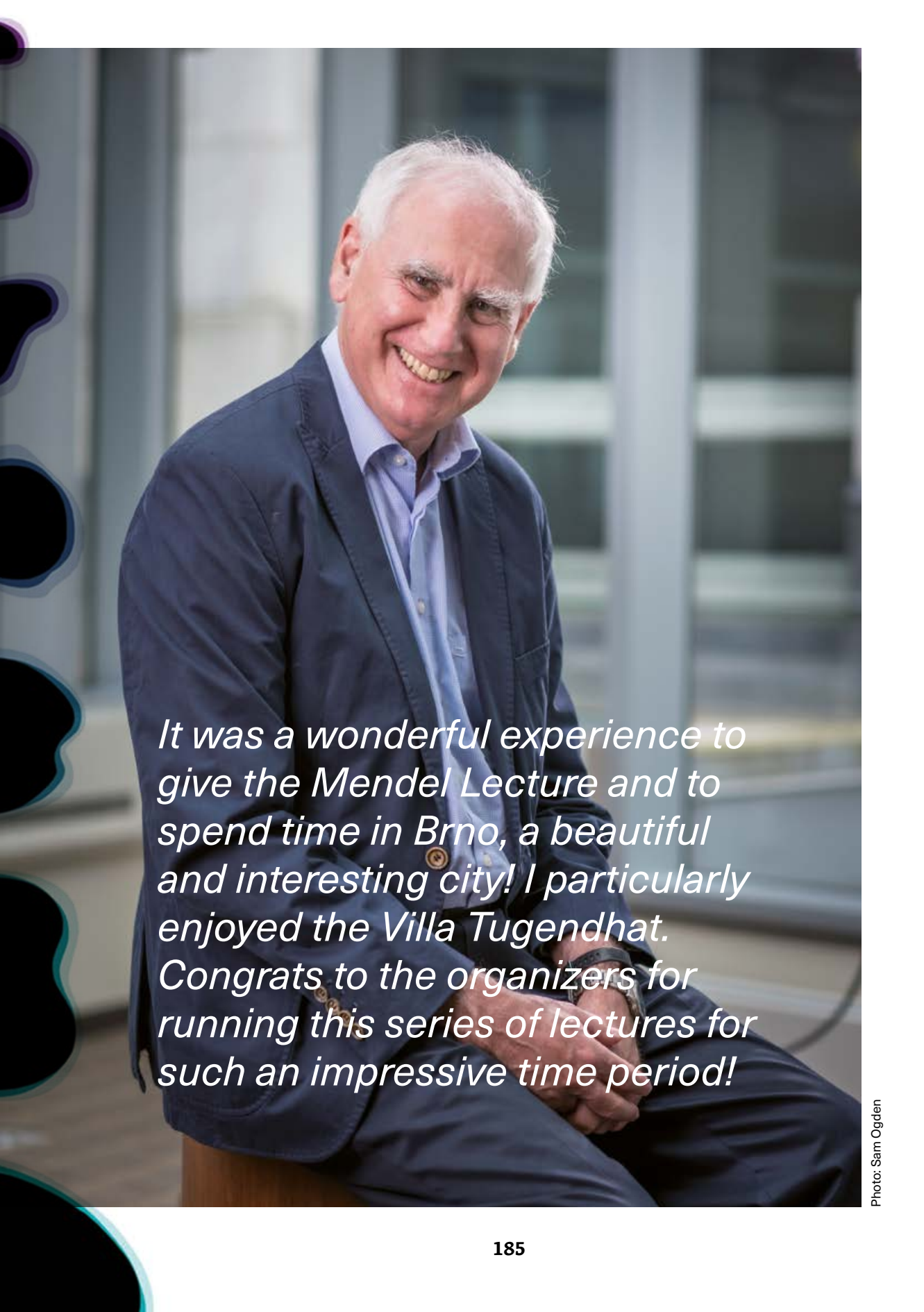
für Molekularbiologie der Akademie der Wissenschaften der DDR, later called the Max Delbrück Center for Molecular Medicine, where he became a professor in 1985. After the reunification of Germany, he moved to the United States in 1995. He has been a professor at the Harvard Medical School since 1995, and an HHMI investigator since 1997.

The Rapoport lab is interested in the mechanisms by which proteins are transported across membranes, how misfolded proteins are degraded, and how organelles form and maintain their characteristic shapes. Most of the projects centre around the endoplasmic reticulum (ER).

He was a member of the Akademie der Wissenschaften der DDR from 1988 until 1992, when it was dissolved. He has been a member of the German Academy of Sciences Leopoldina since 2003, a member of the US National Academy of Sciences since 2005, and he is a fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science. His pioneering research has been recognized with many awards including the Max-Delbrück Medal in 2005, the Sir Hans Krebs Medal in 2007, and the Schleiden Medal in 2011, among many others.

Tom Rapoport is still working at the Harvard Medical School. Recently, the Rapoport lab has started to study how proteins are imported into peroxisomes, and how lung surfactant proteins generate lamellar bodies.

How the ER Gets into Shape



It was a wonderful experience to give the Mendel Lecture and to spend time in Brno, a beautiful and interesting city! I particularly enjoyed the Villa Tugendhat. Congrats to the organizers for running this series of lectures for such an impressive time period!

Photo: Sam Ogden

Torben Heick Jensen

*1965

Department of Molecular Biology and Genetics, Aarhus University, Denmark

 **April 18, 2013**

Torben Heick Jensen (THJ) studied at Aarhus University, Denmark, receiving his MSc in Molecular Biology in 1993 and his PhD in 1997. He then spent three years as a postdoctoral scholar at the Howard Hughes Medical Institute, Brandeis University (USA) under the mentorship of Nobel laureate Michael Rosbash. Upon returning to Denmark in 2001, THJ was appointed assistant professor, and subsequently associate professor at Aarhus University. In 2010, he was appointed full professor at what was then the Department of Molecular Biology.



THJ's research covers the biogenesis and turnover of RNA in eukaryotic cells and its contribution to gene expression regulation at the post-transcriptional level. For the past decade, his research group has contributed to identifying the

molecular mechanisms that help to sort newly transcribed RNA between a productive pathway, involving RNA packaging with proteins and cellular transport, and a destructive pathway, involving RNA degradation complexes identified by the THJ group.

In 2004, THJ was awarded the prestigious five-year Hallas Møller Fellowship from the Novo Nordisk Foundation. In 2005, the Danish National Research Foundation awarded him a five-year grant to establish a Centre of Excellence – the Centre for mRNP Biogenesis and Metabolism, which was extended for another five years to 2015. In 2012, he was elected as a member of the European Molecular Biology Organization (EMBO), and he was the recipient of an Advanced ERC Grant in 2014–2019.

The focus of THJ's laboratory continues to be to understand the molecular principles dictating the sorting of newly transcribed RNA.

Making and Breaking RNA in Human Nuclei



Simon Boulton

* 1972

The Francis Crick Institute, London, UK

 **May 2, 2013**

Simon Boulton received his MSc from the University of Edinburgh in 1994 and completed his PhD at the University of Cambridge in 1998 under the supervision of Steve Jackson of the Gurdon Institute. From 1998–2002 he worked as an HFSP and EMBO Postdoctoral Research Fellow at Harvard Medical School in Boston, USA, in the labs of Nicholas Dyson and Marc Vidal. Following his return to the UK in 2002 he established his own lab at Clare Hall Laboratories, London Research Institute, and was subsequently promoted to senior scientist in 2007. In 2015, his lab moved to become part of the Francis Crick Institute in London.

Boulton's career has focused on the discovery of DNA repair genes and providing molecular insights into genome instability disorders and cancer. His team exploits the experimental strengths of *C. elegans* and mouse genetics, human cell culture, biochemistry and biophysical approaches. Most notably, Boulton's work has played an instrumental role in shaping our understanding of the regulation and execution of homologous recombination (HR), a key DSB repair pathway frequently inactivated in cancer. Boulton was the first to establish the existence of error-prone micro-homology mediate end joining, which operates as a backup DNA repair pathway to NHEJ. He also identified RTEL1 as the first negative regulator of HR in metazoan, which controls meiotic recombination, ensures accurate genome duplication and maintains telomere integrity. He has also provided insights into the mechanisms that protect chromosome ends in pluripotent and somatic cells, and how cancer cells use

Alternative Lengthening of Telomeres to achieve replicative immortality.

Boulton's academic achievements have been acknowledged with several prestigious accolades. In 2006 he was awarded the Colworth Medal, and in 2007 he received the European Molecular Biology Organization (EMBO) Young Investigators Programme Prize. In 2008, he was awarded the European Association for Cancer Research (EACR) Young Researcher Award and the Eppendorf/Nature Award for Young European Investigators. In 2009, he became an EMBO member. In 2010, he was awarded a Royal Society Wolfson Research Merit Award, and in 2011 he received the prestigious EMBO Gold Medal award and gave the Royal Society Francis Crick Prize Lecture. In 2012, he was elected as a Fellow of the Academy of Medical Sciences. In 2013, Boulton received the Paul Marks Prize for Cancer Research, which recognizes a new generation of leaders in cancer research.

Since 2015 Boulton has been a senior group leader and Ambassador for Translation at the Francis Crick Institute, London. He is also co-founder and Vice President of Science Strategy of Artios Pharma Ltd. (2016), a biotech company that is developing small molecule DNA repair inhibitors to selectively kill cancer cells either as monotherapies or in combination with existing treatments. Most recently, Boulton was appointed the director of RadNet City of London, a Cancer Research UK initiative to accelerate our understanding of radiobiology to improve radiation treatments for cancer patients.

A man with short brown hair, wearing a brown blazer over a white shirt, stands in a hallway. The hallway has white walls and a dark door in the background. The text "Genome Stability and the Control of Recombination" is overlaid in teal on the left side of the image.

Genome Stability and the Control of Recombination

As a trained geneticist, it was a huge honour to give the Mendel Lecture and to visit the location where the great man conducted his transformative work.

Peter Walter

* 1954

*Howard Hughes Medical Institute, Department of Biochemistry and Biophysics,
University of California, San Francisco, USA*

📅 May 9, 2013

After obtaining his BS in chemistry at the Freie Universität Berlin in 1973, Peter Walter completed his MS degree in organic chemistry at Vanderbilt University. In 1976, he enrolled in a PhD programme at Rockefeller University, where he worked with Günter Blobel. During his dissertation work, he purified proteinaceous members of a complex essential for protein translocation and showed that it selectively recognizes secretory proteins in the cytoplasm and targets them to the endoplasmatic reticulum (ER). He remained in Blobel's group for two additional years, first as a postdoctoral fellow and then as an assistant professor, during which time he identified a 7S RNA component of the signal recognition particle. Since 1983 Walter has worked in the Department of Biochemistry and Biophysics at the University of California, San Francisco (UCSF), where he became a professor in 1991 and served as department chair from 2001 until 2008.

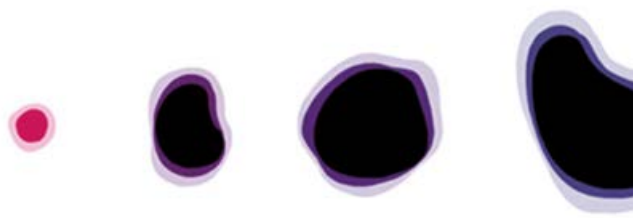
Walter's laboratory explores the signalling pathway by which cells alter their quantities of ER. Working with yeast as a model, he has pioneered studies to gain a mechanistic understanding of protein sorting/targeting to the ER. The same principles also apply in higher organisms, including humans. This communication process is so crucial to cells that imbalances can lead to a number of diseases including cancer, diabetes, cystic fibrosis, and vascular and neurodegenerative diseases.

Walter is an elected member of several scientific societies such as the German Academy of Natural Scientists Leopoldina,

the National Academy of Sciences, the National Academy of Medicine, the American Association for Arts and Science, and the European Molecular Biology Organization. He is a co-author of the textbooks *Molecular Biology of the Cell* and *Essential Cell Biology*, two of the world's most widely used standards in the field of molecular cell biology. Among the many awards he has received are the Eli Lilly Award, the Wiley Prize, the Stein and Moore Award from the Protein Society, the Gairdner Award, the E. B. Wilson Medal, and the Jung Prize.

Walter received the 2012 Paul Ehrlich and Ludwig Darmstaedter Prize, the 2014 Shaw Prize and Lasker Award, the 2015 Vilcek Prize, and the 2018 Breakthrough Prize. In 2016 Walter was the president of the American Society of Cell Biology.

The Unfolded Protein Response in Health and Disease





Stanislas Leibler

* 1957

The Rockefeller University, New York, USA

 **May 16, 2013**

Stanislas Leibler completed his undergraduate studies in physics at the University of Warsaw. He received an MS in theoretical physics in 1979, a PhD in theoretical physics in 1981 and a second PhD in physics in 1984, all from the University of Paris. He spent a year at the École Normale Supérieure and then from 1984 to 1992 he was a research fellow at the Saclay Nuclear Research Centre. Leibler spent two years at Cornell University (1985–1987) and another two years at the École Supérieure de Physique et Chimie Industrielles (1989–1991). In 1992, he moved to Princeton University as a professor in the Department of Physics, becoming a professor in the Department of Molecular Biology in 1993. From 1997 to 1998 he was a visiting scientist at the European Molecular Biological Laboratories in Heidelberg, Germany, and moved to the Rockefeller University in 2001. Leibler was a tri-institutional professor at Weill Cornell Medical College and the Sloan-Kettering Institute from 2003 to 2010. Since April 2009 he has been sharing his time between Rockefeller and the Institute for Advanced Study at Princeton.

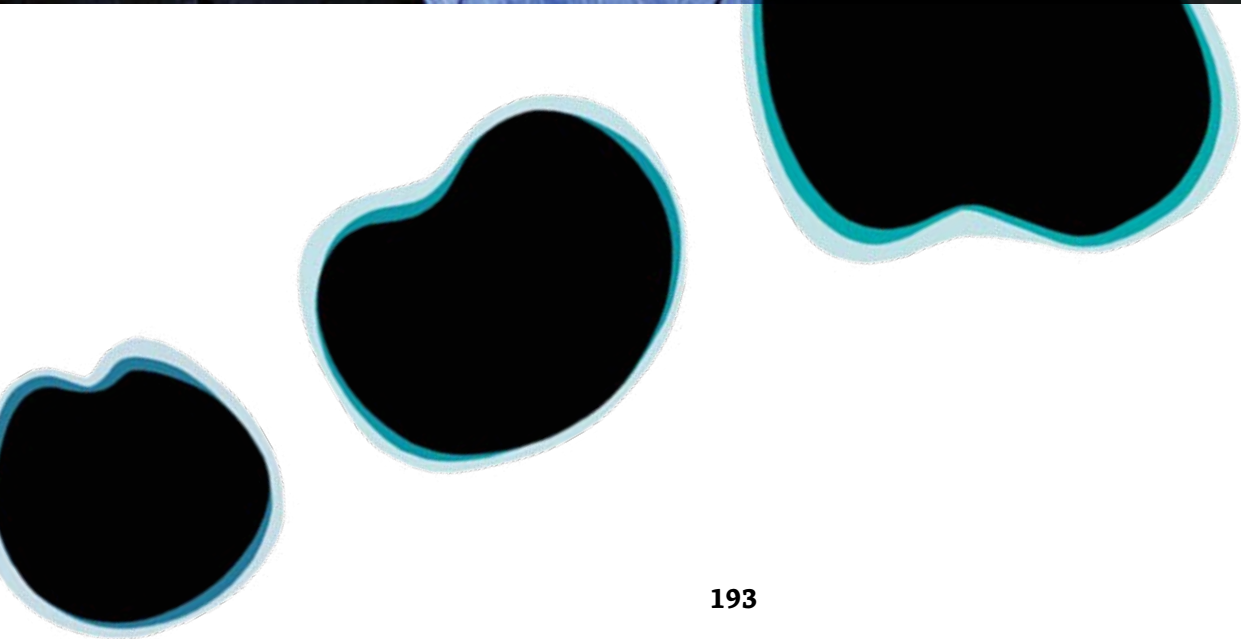
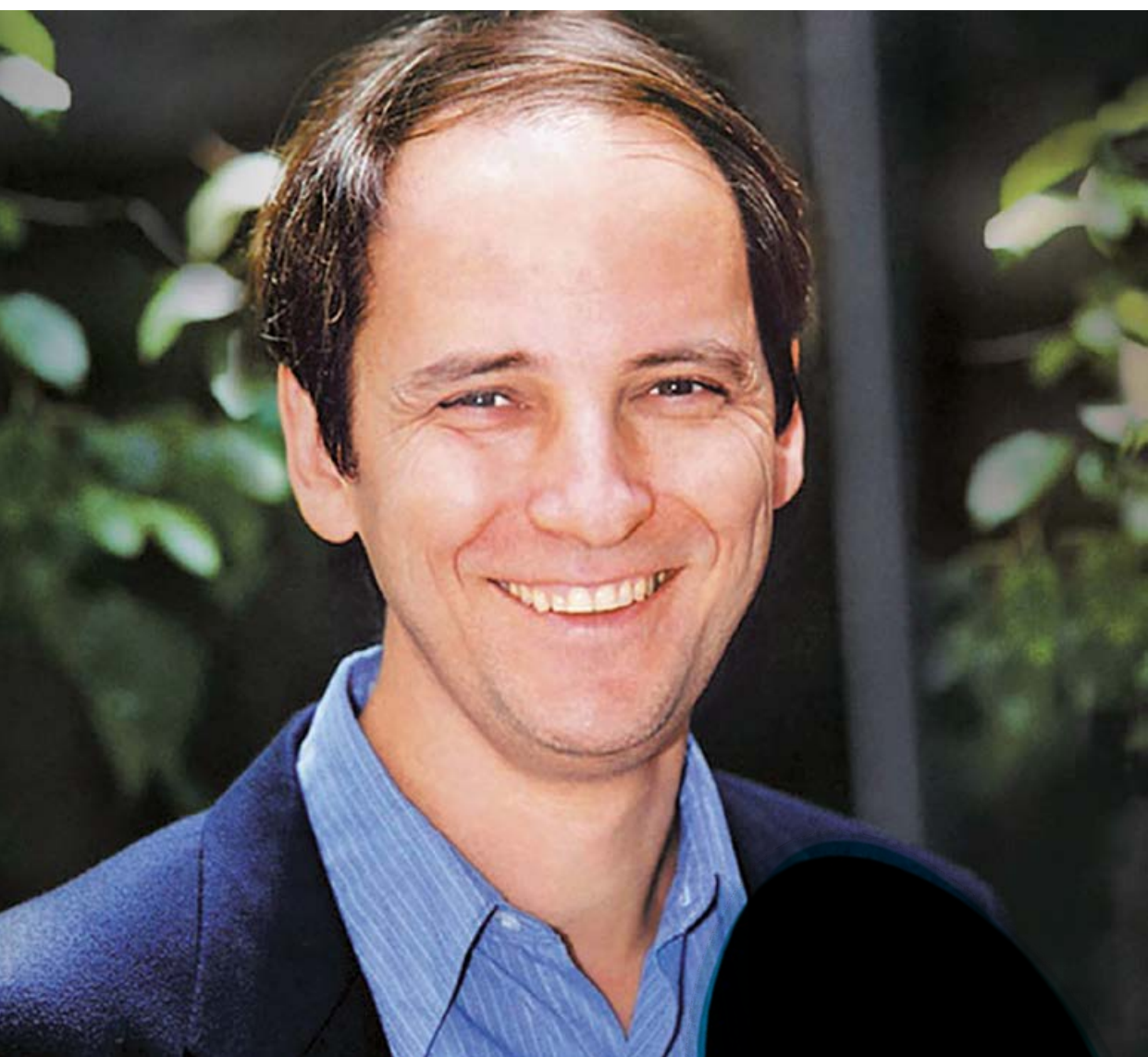
Leibler's laboratory is developing both the theoretical and experimental methods necessary for conducting studies on the collective behaviour of biomolecules, cells and organisms. By selecting a number of basic questions on how simple genetic and biochemical networks function in bacteria, his lab is beginning to understand how individual components can give rise to complex, collective phenomena. They have developed simple

genetic networks in bacteria that act like clocks or logic circuits. Together with Michael Elowitz, Leibler's group built a synthetic network to implement a negative feedback system of gene regulation in *E. coli*, representing one of the key results of synthetic biology. Currently his laboratory is focusing on how microbial populations survive in varying environments.

Leibler is a fellow of the American Physical Society. He was a 1997–1998 Humboldt Research Award winner at the European Molecular Biology Laboratory (EMBL) in Heidelberg.

In 2015 Leibler won the Max Delbrück Prize awarded by the American Physical Society and in 2016 he was elected to the National Academy of Sciences.

Following in
Mendel's Footsteps:
Statistical Analysis
of Microbial
Behavioural
Phenotypes





The background is a light gray surface. Scattered across it are several white, torn-edge paper shapes, some of which are circular and have small holes. These shapes are decorated with various colored dots and shapes. In the top left, a white shape has two green dots and one black dot. Below it, another white shape has two red dots. To the right of these, there are two red dots. In the bottom left, a white shape has several blue dots. To its right, another white shape has two purple dots. Further right, there are two purple dots. The text "2013 — 2014" is centered in the middle of the image.

2013 — 2014

Peter Baumann

* 1969

Stowers Institute for Medical Research, Kansas City, USA

📅 October 17, 2013

Peter Baumann obtained his BA in zoology at Cambridge University, UK, in 1993. The following year, he joined Steve Jackson's group at the Wellcome/Cancer Research Centre Institute (now Wellcome Trust/Cancer Research UK Gurdon Institute) to study the transcriptional apparatus in *Archaea*, and obtained his MSc in 1994. The same year he joined Stephen West at the Clare Hall Laboratories (now the Francis Crick Institute) and earned a PhD in biochemistry from the University of London in 1998. He then started postdoctoral research with Tom Cech at the University of Colorado in Boulder. During his time in Boulder, Baumann's research interests expanded into the area of telomeres and the fundamental question of how chromosome ends are distinguished from DNA breaks. In 2000, he discovered telomere end binding proteins in fission yeast and human cells. Deletion of the gene in yeast led to rapid loss of telomeres, chromosome fusions and death of most cells. Based on these phenotypes he named the protein Pot1 for Protection of Telomeres.

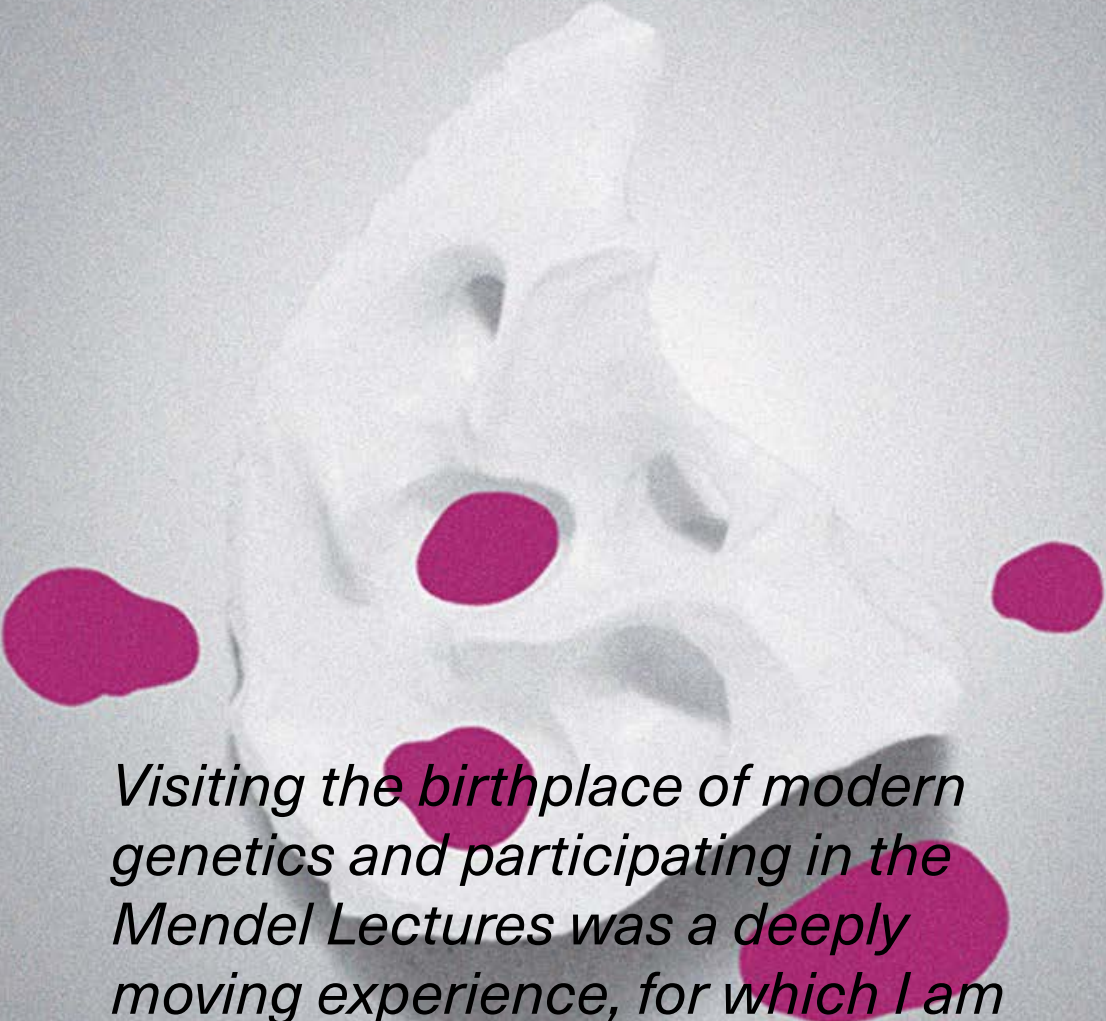
In 2002 he joined the Stowers Institute as an independent investigator where he continued his research into telomere maintenance and chromosome stability using both fission yeast and mammalian cells. He also began investigating the molecular mechanisms of chromosome inheritance in parthenogenetic lizards. This work earned him a Pew Scholar Award (2003), an appointment as a Howard Hughes Early Career Scientist (2009) and as a Howard Hughes Medical Institute Investigator (2013). Also in 2013,

he was named the inaugural recipient of the Priscilla Wood Neaves Endowed Chair in the Biomedical Sciences.



After receiving a prestigious Alexander von Humboldt Professorship, Baumann moved his research group to Johannes Gutenberg-Universität Mainz in Germany in 2017. He continues his research on the architecture and dynamics of chromosome ends and the inheritance of genetics. In 2019 he was elected an EMBO member.

Biogenesis and Regulation of Telomerase



Visiting the birthplace of modern genetics and participating in the Mendel Lectures was a deeply moving experience, for which I am eternally grateful to the organizers.

Carlos Bustamante

* 1951

University of California, Berkeley, USA

📅 October 24, 2013

Carlos José Bustamante is a Peruvian scientist, an HHMI investigator and professor of molecular and cell biology, physics, and chemistry at the University of California, Berkeley.

Bustamante studied medicine at the National University of San Marcos before discovering his true interest in biochemistry. He received his BSc and MSc in biochemistry from Cayetano Heredia University in Lima, and his PhD in 1981 in biophysics from UC Berkeley. In 1981–1982 he worked as a postdoctoral fellow at the Lawrence Berkeley National Laboratory. After eight years (1982–1990) at the University of New Mexico, he spent seven years as a professor of chemistry at the University of Oregon, and in 1998 he accepted a position as professor in molecular and cell biology at UC Berkeley. Since 2012 he has held the Raymond and Beverly Sackler Chair of Biophysics at UC Berkeley.

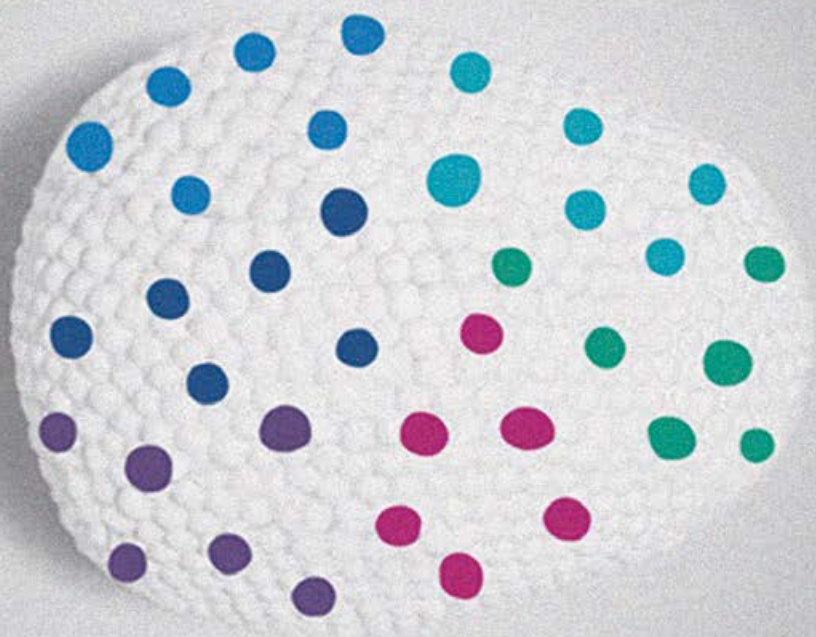


Professor Bustamante uses novel methods of single-molecule visualization, such as scanning force microscopy, optical and magnetic tweezers, single molecule fluorescence, fluorescence correlation spectroscopy and super-resolution

photo-activated light microscopy to study how cells convert chemical energy into mechanical work through highly specialized molecular machines. Bustamante's research played a pivotal role in the characterization of viral DNA packing, transcription, translation and protein folding and degradation.

Professor Bustamante is a member of several scientific organizations, including the American Physical Society (1995) and the National Academy of Science (2002); he is an Honorary Member of the Royal Spanish Biochemistry Society (2009); and a member of the Academy of Science of Chile (2013), the American Association for the Advancement of Science (2014), the American Academy of Arts and Sciences (2015), and the Peruvian Society of Biochemistry and Molecular Biology (2017). He is also the recipient of many awards – the 2004 Alexander Hollaender Award, the 2004 Hans Neurath Prize, the 2002 Biological Physics Prize, the 2004 National Science Prize of Peru, the 2012 Fellows of the Biophysical Society Award, the 2012 Vilcek Prize, and the 2012 Raymond and Beverly Sackler International Prize.

Grabbing the Cat by the Tail: How a Viral Molecular Motor Packages DNA



Kay Hofmann

* 1961

University of Cologne, Cologne, Germany

📅 November 21, 2013

Kay Hofmann obtained his MSc in chemistry from the University of Dortmund, Germany, in 1986 and his PhD in biochemistry from the University of Cologne, Germany, in 1992. Following his postdoctoral work in bioinformatics at the same university during the years 1992–1994, he stayed as a postdoctoral fellow for four years at the Swiss Institute for Experimental Cancer Research in Lausanne. After his return to Germany, he served as Head of Bioinformatics at Memorec Biotec GmbH (1998–2005), and later as Head of Bioinformatics at Miltenyi Biotec GmbH (2005–2012). In 2012, he was appointed Professor of Genetics and Computational Biology at the University of Cologne, Germany.



His group is applying bioinformatical and experimental methods to study the natural history of ancient cell signalling pathways. One research focus is programmed cell death, which is important

for development and anti-pathogen defence in animals, plants and fungi. While different organism classes appear to employ very different mechanisms to achieve a similar goal, recent findings suggest a common evolutionary origin of programmed cell death. A second research focus is the role of protein ubiquitination in the anti-pathogen defence. While host cells use this system to target pathogens and associated components for removal, many pathogens have evolved evasive mechanisms, often by co-opting host-derived genes for their own purpose. The study of such pathways offers not only interesting insights into the evolution of signalling pathways, but also has important medical applications.

A Common Evolutionary Basis for Cell Death Pathways in Animals, Plants and Fungi



Joan Massagué

*1953

Memorial Sloan-Kettering Cancer Center, New York, USA

 **May 22, 2014**

Joan Massagué earned his PhD in Pharmacy and Biochemistry from the University of Barcelona in 1978. In 1982, he completed a postdoctoral fellowship at Brown University, where he worked on the insulin receptor. Later that year, he became assistant professor of Biochemistry at the University of Massachusetts Medical School and initiated work on transforming growth factor- β (TGF β). In 1989 he joined the Memorial Sloan Kettering Cancer Center in New York and was appointed a Howard Hughes Medical Institute Investigator. He served as Chairman of the Sloan Kettering Institute Cell Biology Program from 1989 to 2003 and as the Founding Chairman of the Cancer Biology and Genetics Program from 2003 to 2013. He holds the Marie-Josée and Henry R. Kravis Foundation Chair, and is also a professor at Weill-Cornell Graduate School of Medical Sciences. In 2014, Massagué was appointed Director of the Sloan Kettering Institute and Provost of the Gerstner Sloan Kettering Graduate School of Biomedical Sciences.

Massagué is interested in the mechanisms that support tissue homeostasis and cancer metastasis. Focusing on TGF β as one of the most prevalent signalling pathways in metazoan biology, he elucidated this signalling pathway and is establishing how TGF β signals control pluripotency and differentiation in stem cells and homeostasis in mature cells. He has also identified a set of genes associated with metastasis in various organs. His group described metastasis as a dynamic process by which stem-like

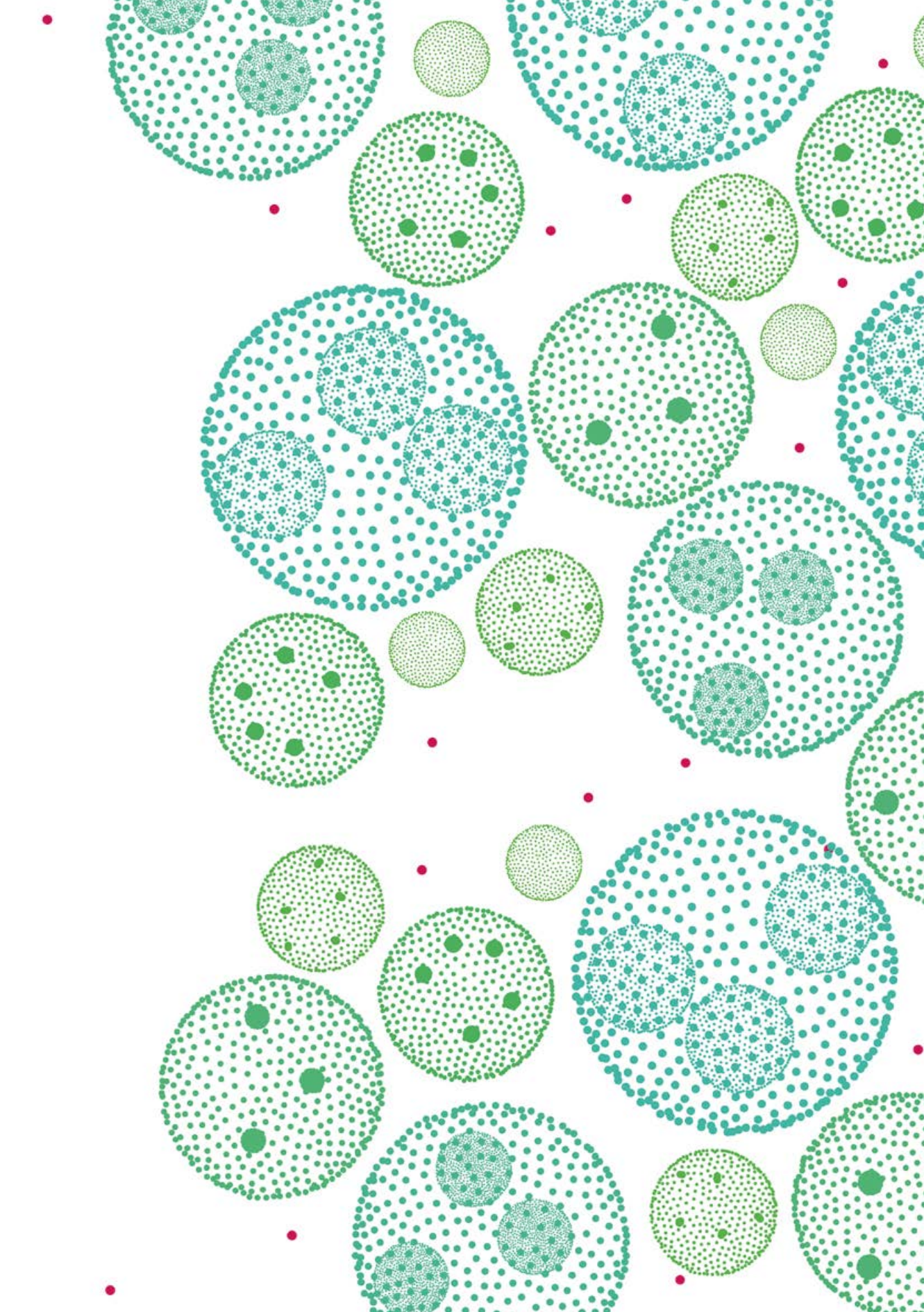
cancer cells with high phenotypic plasticity re-infiltrate tissues in response to tumour microenvironment changes mimicking tissue regeneration processes. He described a cell adhesion mechanism that metastasis-initiating cells use for outgrowth. In addition, his group defined the basis for metastatic latency in breast and lung cancers and the role of the immune system in enforcing dormancy. His work illuminated the regenerative origin of metastases, which were previously believed to result from specialized genetic mutations.

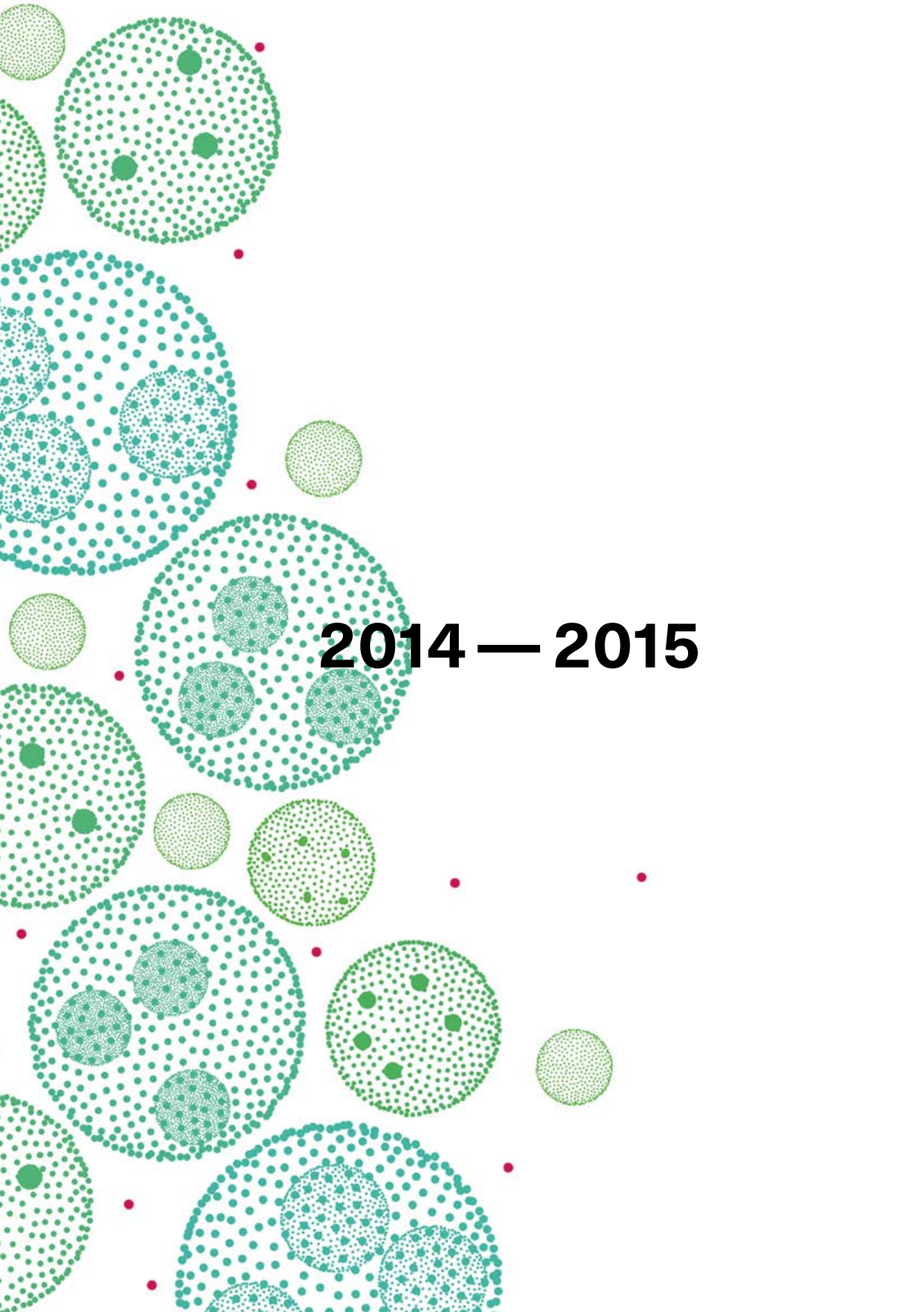
Massagué is a member of the American Academy of Arts and Sciences (1990), the US National Academy of Sciences (2000), the National Academy of Medicine (2004), the Spanish Royal Academies of Medicine and of Pharmacy, the European Molecular Biology Organization, and the American Association for Cancer Research (AACR) Academy (2016). He is the recipient of many prestigious awards including the 2004 Prince of Asturias Prize, the 2006 Vilcek Prize, the 2007 Passano Prize, the 2008 BBVA Frontiers of Science Prize, the 2011 Pasa-row Foundation Medical Research Award, the 2016 Pezcoller Foundation-AACR International Award, and other honours.

Origins of Metastatic Traits



The Mendel Lectures are a splendid initiative for international scientific exchange and the training of future generations of biomedical scholars and entrepreneurs in Czechia. Delivering one amid the incomparable history and beauty of Brno is an indelible experience.





2014 — 2015

Lorraine S. Symington

*1958

Columbia University Medical Center, New York, USA

October 30, 2014

Lorraine Symington received her BSc degree in biology from the University of Sussex, and a PhD in genetics from the University of Glasgow in 1979, studying horizontal gene transfer in bacteria with Dr. David J. Sherratt. After postdoctoral training in DNA biochemistry at Harvard Medical School and in yeast genetics at the University of Chicago, she joined the faculty at Columbia University in 1988. Since 2020 she has been the Harold S. Ginsberg Professor and Director of Graduate Studies of Microbiology and Immunology at Columbia University.



Symington has made major contributions in defining the key steps in the mechanism of homology-directed double strand breaks (DSB) using yeast as an experimental system. The failure to repair, or inaccurate repair of, DSBs can result in loss of genetic information or chromosomal rearrangements that can be an underlying cause of a number of hereditary syndromes. She focuses on three aspects of homologous recombination: (1) mechanisms and regulation of DNA-end processing, (2) mechanisms of break-induced replication, and in doing so (3) discovered and characterized many of the key enzymes that act in these processes. Her

work led to the commonly accepted model that end processing occurs by a two-step mechanism, the first catalyzed by the conserved Mre11 complex, followed by the action of two functionally redundant nucleases (Exo1 and DNA2). She also defined the mutagenic recombination processes that lead to the formation of chromosomal translocations.

For her scientific contributions Lorraine Symington received the Irma T. Hirschl Career Scientist Award in 1989, the 1994 Harold and Golden Lampert Basic Research Award, and was appointed a Fellow of the American Association for the Advancement of Science in 2009. Symington became a Member of the American Academy of Arts Sciences in 2018 and a Member of the National Academy of Sciences in 2020.



A woman with short grey hair and glasses is speaking, looking slightly upwards. Behind her is a large, faded portrait of a man with glasses. The image is decorated with several green circles of varying sizes, each filled with a pattern of small dots. Some circles are solid green, while others are white with green dots. A few small red dots are also scattered around the green circles.

Mechanisms of Homologous Recombination

Herbert Waldmann

* 1957

Max Planck Institute of Molecular Physiology, Dortmund, Germany

📅 March 5, 2015

Herbert Waldmann studied chemistry and completed his PhD in organic chemistry in 1985. During the next two years he worked as a postdoctoral fellow at Harvard University in Cambridge, USA. In 1991 he qualified as professor at the University of Mainz. Shortly thereafter he was appointed professor of organic chemistry at the University of Bonn, and in 1993 he became professor of organic chemistry at the University of Karlsruhe. Since 1999 he has headed the Department of Chemical Biology at the Max Planck Institute of Molecular Physiology and, concurrently, has also held the position of professor of biochemistry at the Technische Universität Dortmund.

His current research interests include chemical biology and synthesis of natural product-inspired bioactive small molecule synthesis as well as stereoselective synthesis. A major focus of his research activities is the combination of organic chemistry, biophysics and biology for the synthesis and biological evaluation of peptide and protein conjugates that are involved in biological signal transduction processes. More recently syntheses of natural-product-derived compound libraries have been investigated by the Waldmann group.

Waldmann has been awarded numerous academic distinctions, including the Otto Bayer Prize, the Emil-Fischer Medal of the German Chemical Society (GDCh), one of the highest distinctions in Organic Chemistry in Germany, the Hans Herloff Inhoffen Medal, and the Max Bergmann Medal. In 2017 Waldmann delivered the

Paul Karrer Lecture and in 2020 received the Liebig commemorative coin from the Society of German Chemists. He is a Member of the German Academy of Sciences Leopoldina (2004) and a Fellow of the Royal Society of Chemistry (2005). For more than 20 years Waldmann has been a scientific consultant and advisor to major pharmaceutical, agrochemical and chemical companies and biotechnology companies.





Biology Oriented Synthesis

Kurt Wüthrich

* 1938

Institute of Molecular Biology and Biophysics ETH Zürich, Switzerland

 **March 19, 2015**

Kurt Wüthrich is a Swiss chemist/biophysicist and Nobel chemistry laureate, known for developing nuclear magnetic resonance (NMR) methods for studying biological macromolecules.



Wüthrich studied chemistry, physics and mathematics at the University of Bern and obtained a PhD in chemistry at the University of Basel in 1964. Following his PhD, Wüthrich continued postdoctoral research in Basel for a short time before leaving in 1965 to work at the University of California, Berkeley, for two years. After working at the Bell Telephone Laboratories in Murray Hill, New Jersey, Wüthrich returned in 1969 to Switzerland where he began his career at the ETH Zürich. In 1980 he became a Professor of Biophysics and since 2001 he has divided his time between the ETH Zürich and the Scripps Research Institute in California.

Wüthrich's research interests lie in molecular structural biology, and in structural genomics. His specialty is nuclear magnetic resonance (NMR) spectroscopy with biological macromolecules, a field in which he contributed the NMR method of three-dimensional structure determination of proteins and

nucleic acids in solution. The Wüthrich groups have determined more than 200 NMR structures of proteins and nucleic acids, including the immunosuppression system cyclophilin A–cyclosporin A, the homeodomain–operator DNA transcriptional regulatory system, and prion proteins from a variety of species.

His achievements have been recognized by the Louisa Gross Horwitz Prize in 1991, the Louis-Jeantet Prize for Medicine in 1993, the Kyoto Prize in Advanced Technology in 1998, the Otto Warburg Medal in 1999, the Nobel Prize in Chemistry for “his development of nuclear magnetic resonance spectroscopy for determining the three-dimensional structure of biological macromolecules in solution” in 2002, the President's Gold Medal from the Government of India in 2010, the Theodor Bücher Medal in 2013, and a number of other awards and honorary degrees.

The Colourful Postgenomic World of Proteins



Lecturing at the Augustinian Abbey in the environment where Gregor Mendel pursued his enlightening work was a unique, moving experience; I keep fond memories of the visit in Brno.

Xiaoliang Sunney Xie

*1962

Harvard University, Cambridge, USA

📅 April 2, 2015

Xiaoliang Sunney Xie received a BS degree from Peking University in China in 1984, and his PhD from the University of California at San Diego in 1990, followed by a short postdoctoral experience at the University of Chicago. In 1992, Xie joined the Pacific Northwest National Laboratory, where he later became a chief scientist. In 1999, he was appointed professor of chemistry at Harvard University. He is now the Mallinckrodt Professor of Chemistry and Chemical Biology at Harvard, and the Cheung Kong Visiting Professor at Peking University, Biodynamics Optical Imaging Center (BIOPIC). Since 2019 he has served as Dean of the Faculty of Sciences at Peking University.

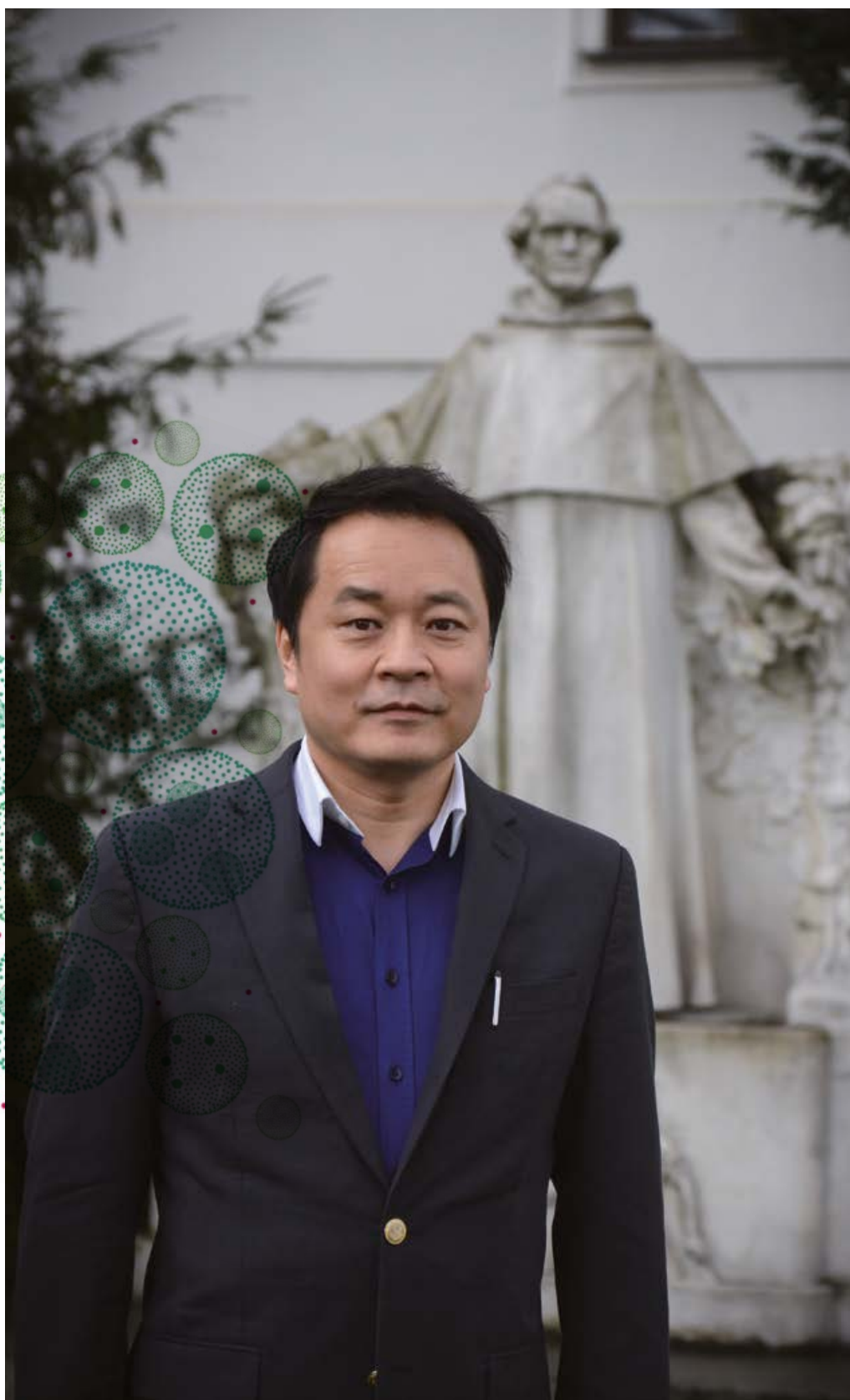
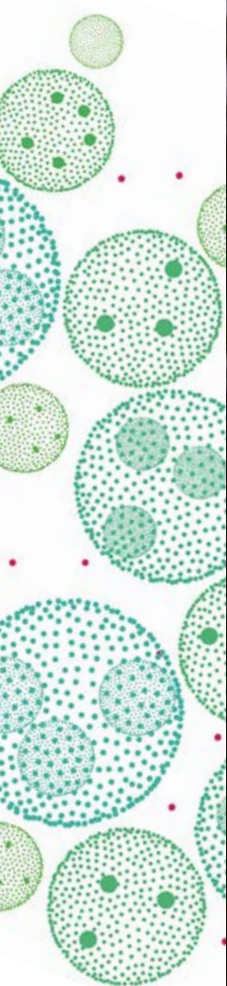
Xie has made major contributions to the emergence of the field of single-molecule biophysical chemistry and single-molecule enzymology. His team also pioneered the development of coherent Raman scattering microscopy and single cell whole genome sequencing. He has made significant contributions also to the medical applications of label-free optical imaging and single-cell genomics for pre-implantation genetic testing to avoid the transmission of monogenic diseases with *in vitro* fertilization.



Xie's honours include the Sackler Prize for Physical Sciences in 2003, the NIH Director's Pioneer Award in 2004, the Leibinger Innovation Prize in 2008, the E. O. Lawrence Award in Chemistry in 2009, the Harrison Howe Award and Biophysical Society Founders Award in 2012, the 2015 Albany Medical Center Prize, and the 2018 World Outstanding Chinese Award in Hong Kong. Xie is a fellow of the American Association for the Advancement of Science, the Biophysical Society, and the American Academy of Arts and Sciences, a member of the National Academy of Sciences and the National Academy of Medicine, and a foreign member of the Chinese Academy of Sciences.

Life at the Single
Molecule Level:
Single Cell
Genomics





Michael Rosbash

* 1944

Brandeis University, Waltham, USA

📅 April 2, 2015

Michael Rosbash is an American geneticist and chronobiologist.

Rosbash graduated from the California Institute of Technology in 1965 with a degree in chemistry, spent a year at the Institut de Biologie Physico-Chimique in Paris, and obtained a doctoral degree in biophysics in 1970 from the Massachusetts Institute of Technology. After three years of postdoctoral fellowship in genetics at the University of Edinburgh, Rosbash joined the Brandeis University faculty in 1974. He became a director of the Brandeis National Center for Behavioral Genomics.

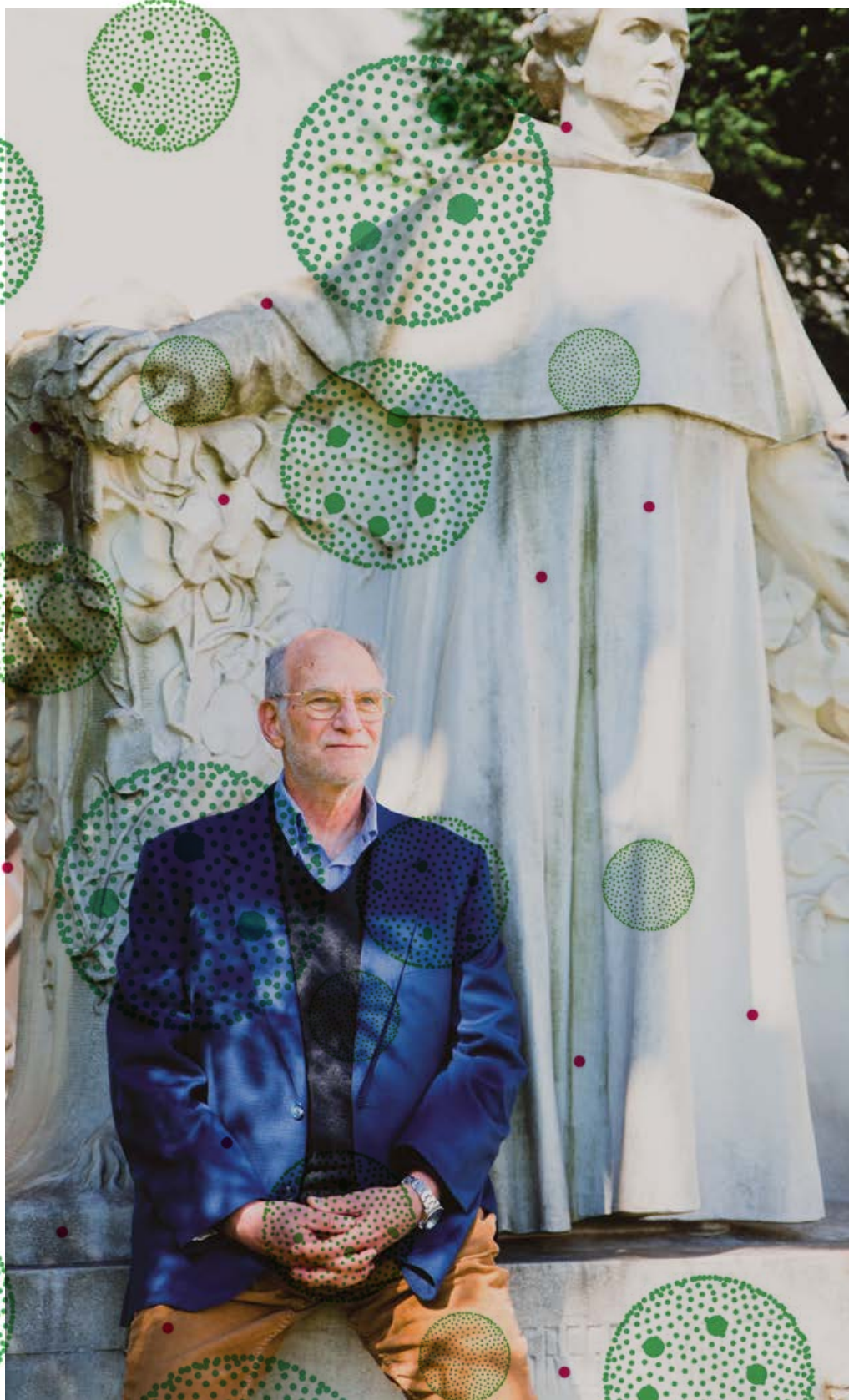


His laboratory is interested in the metabolism and processing of RNA as well as the genes and mechanisms that underlie circadian rhythms. Rosbash's research group cloned the *Drosophila* period gene (*PER*) in 1984 and in 1990 discovered that levels of *per* mRNA and its associated protein (*PER*) fluctuate during the circadian cycle, and proposed a transcription translational negative feedback loop model as the basis of the circadian clock. He also discovered the novel clock gene *cycle* and demonstrated its functional conservation in mammals,

together with identification of a new *Drosophila* circadian photoreceptor involved in this process. Recently his lab has focused on understanding the neural circuits relevant to circadian timekeeping and the enigmatic process of temperature compensation within the fruit fly brain and the function of individual circadian neurons.

Rosbash was elected to the American Academy of Arts and Sciences in 1997, the National Academy of Sciences in 2003, and became a Fellow of the American Association for the Advancement of Science in 2007. In 2009 he was awarded the Gruber Prize in Neuroscience, in 2011 the Louisa Gross Horwitz Prize, in 2012 the Canada Gairdner International Award, and in 2013 the Wiley Prize. Michael Rosbash, along with Michael W. Young and Jeffrey C. Hall, was awarded the 2017 Nobel Prize in Physiology or Medicine "for their discoveries of molecular mechanisms controlling the circadian rhythm".

**RNA Editing
and RNA Binding
within Small
Numbers of
Discrete Neurons**



Jules A. Hoffmann

* 1941

University of Strasbourg, France

May 21, 2015

Jules A. Hoffmann is a Luxembourg-born French biologist known for his contribution to the field of activation of innate immunity.

Hoffmann received undergraduate degrees in biology and chemistry at the University of Strasbourg, France. In 1969, he completed his PhD in biology at the University of Strasbourg in the Institute of Zoology. During 1973–1974 he was a postdoctoral fellow at the Institut für Physiologische Chemie at Philipps-Universität in Marburg an der Lahn, Germany. Since 1974 he has been a Research Director of the National Center of Scientific Research (CNRS) in Strasbourg. He was elected to the positions of Vice President (2005–2006) and President (2007–2008) of the French Academy of Sciences.



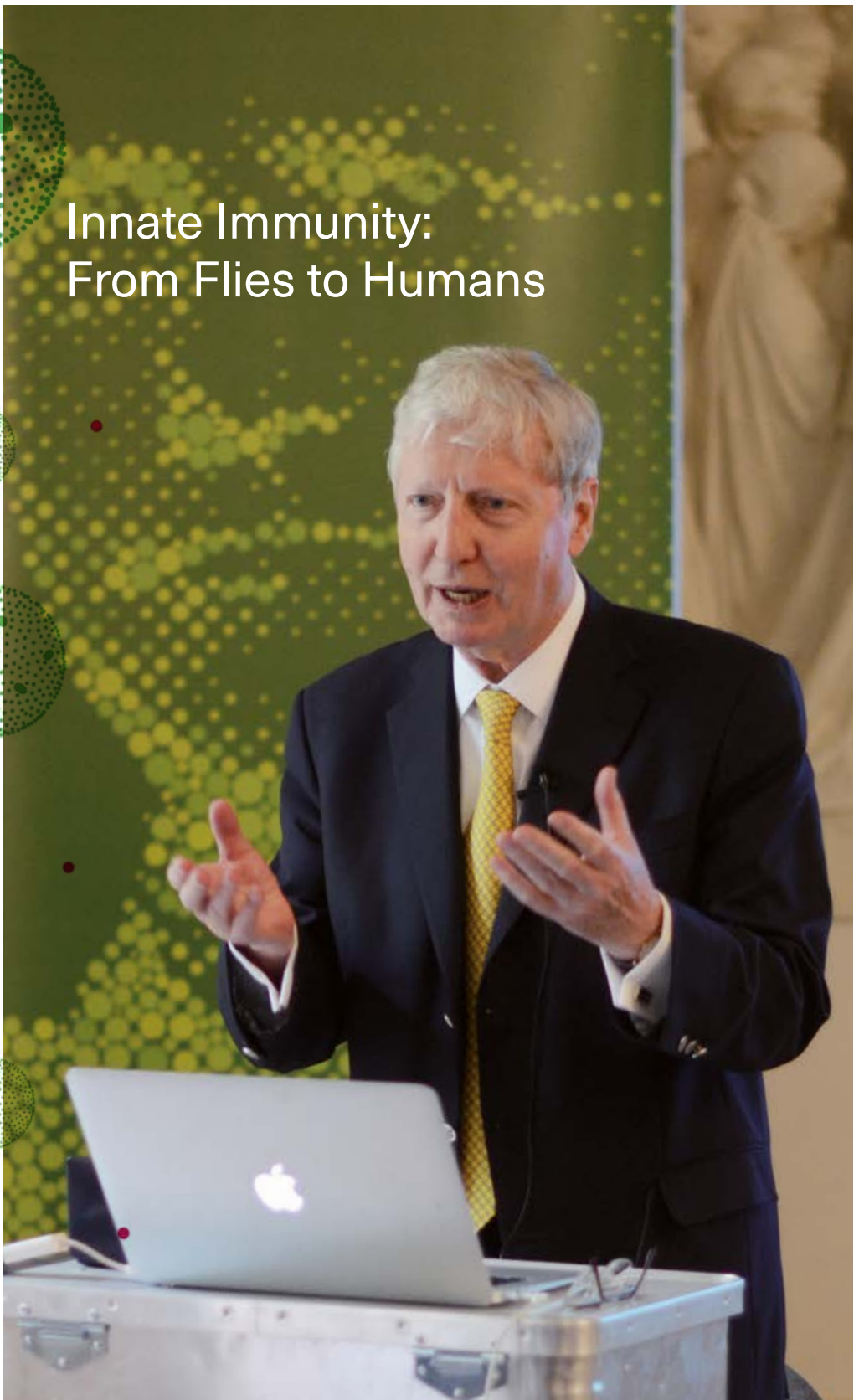
In 2011, Hoffmann, Bruce Beutler and Ralph M. Steinman were jointly awarded the Nobel Prize in Physiology or Medicine for their discoveries concerning the activation of innate immunity. He discovered an intracellular signalling pathway (Toll) responsible for regulation of antifungal peptide. Activation of this signalling pathway in the presence of an infectious

micro-organism results in stimulation of production of antimicrobial peptides capable of destroying the infectious agents. Hoffmann's work has prompted others to search for Toll-like receptors with antimicrobial activity in other organisms and to improve our understanding of innate immunity and development of new antimicrobial agents.

Jules Hoffmann is a member of the German Academy of Sciences Leopoldina, the French Academy of Sciences, the Academia Europaea, the European Molecular Biology Organization (EMBO), the United States National Academy of Sciences, the American Academy of Arts and Sciences, the Fondation Écologie d'Avenir, and the Russian Academy of Sciences. He was awarded numerous scientific prizes, including the 2004 Robert Koch Prize, the 2007 Balzan Prize, the 2010 Lewis S. Rosenstiel Award, the 2011 Nobel Prize, the Gairdner Foundation International Award, the Shaw Prize, and the CNRS Gold Medal. In 2012 Hoffmann became a Commander of the Legion of Honour.

In 2015, Hoffmann signed the Mainau Declaration 2015 on Climate Change on the final day of the 65th Lindau Nobel Laureate Meeting. The declaration was signed by a total of 76 Nobel laureates and handed to then-President of the French Republic, François Hollande, as part of the successful COP21 climate summit in Paris.

Innate Immunity: From Flies to Humans



Maria Jasin

* 1956

Memorial Sloan-Kettering Cancer Center, New York, USA

 **May 28, 2015**

Maria Jasin pursued her graduate studies at the Massachusetts Institute of Technology and received her PhD in 1984. She was a postdoctoral researcher at the University of Zürich and Stanford University prior to joining the faculty at Memorial Sloan Kettering Cancer Center in 1990, where she is a full professor and holds the William E. Snee chair. She also has an appointment at the Cornell University Graduate School of Medical Sciences.

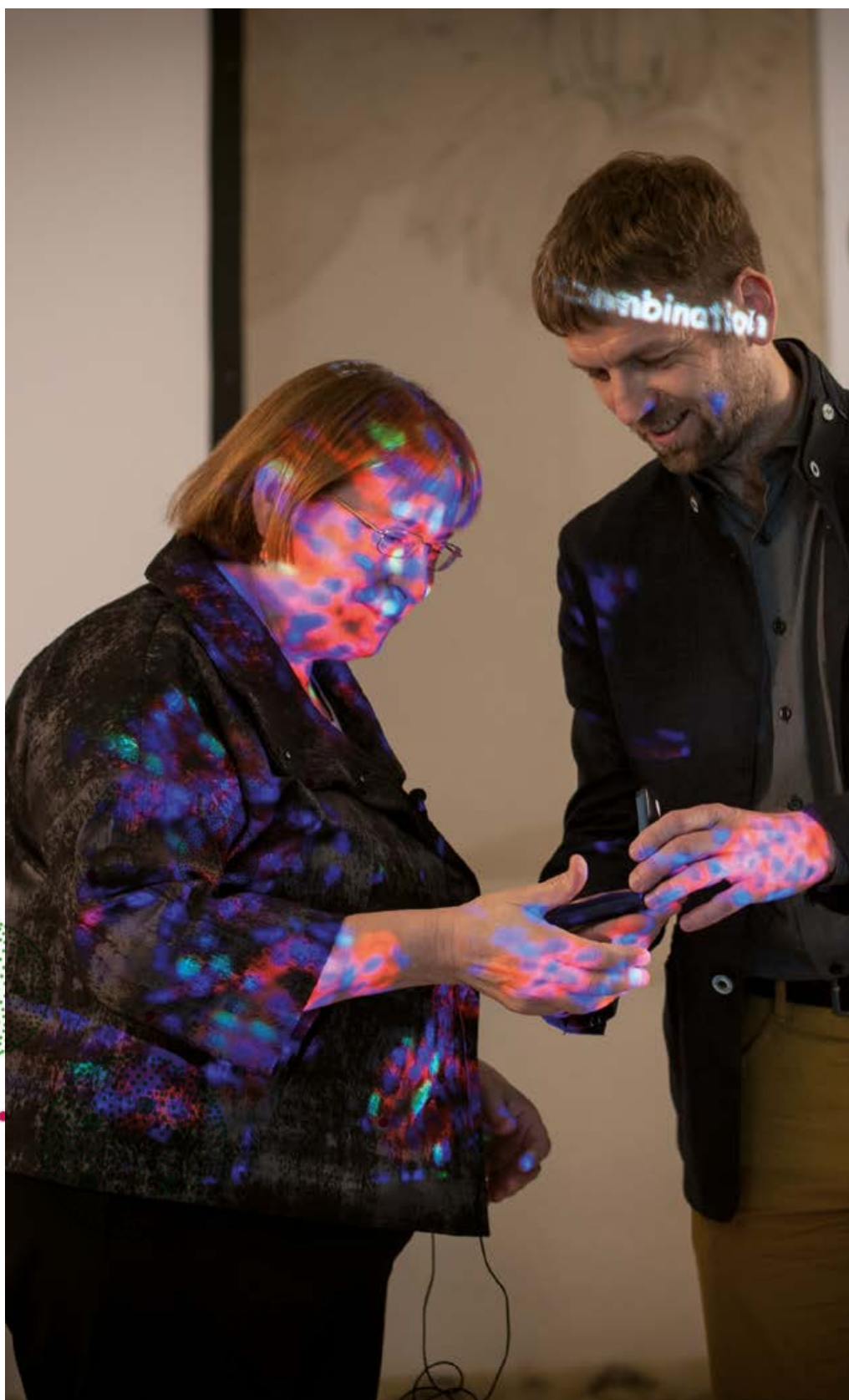


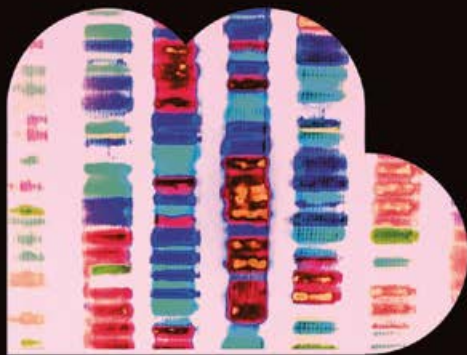
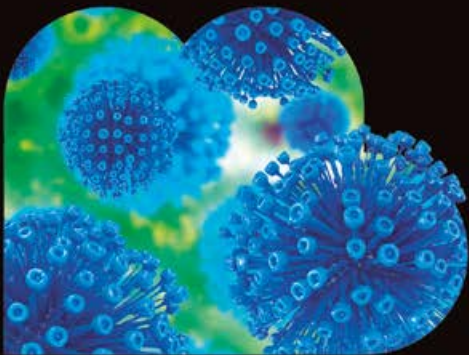
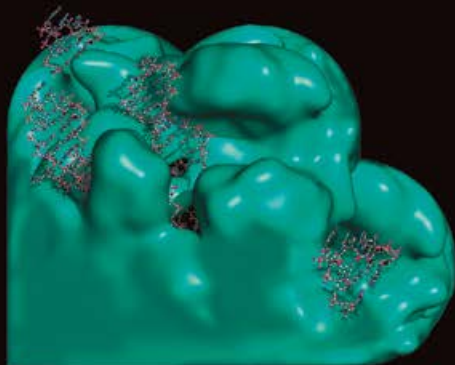
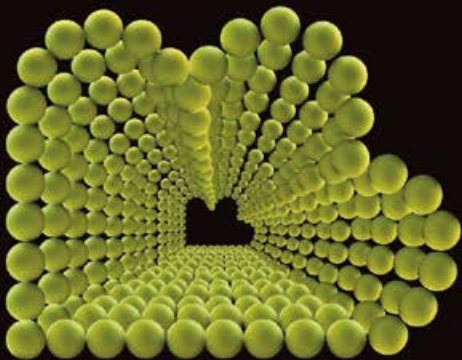
Jasin's pioneering work demonstrated the usefulness of homologous recombination for the repair of DNA breaks. Her research further demonstrated that the repair of DNA breaks in chromosomes by homologous recombination is a highly effective approach of gene targeting, with important implications for gene therapy and gene editing technology.

Her work on DNA repair mechanisms demonstrated the cellular roles of the breast cancer suppressors BRCA1 and BRCA2, revealing a major mechanism for the suppression of breast cancer. Her studies fundamentally contributed to our understanding of how cells preserve their genome integrity.

Her research accomplishments have led to her election to the National Academies of Sciences in 2015, and to the American Academy of Arts and Sciences in 2017. Jasin was awarded the Basser Global Prize in 2018 and the Shaw Prize in Life Sciences in 2019.

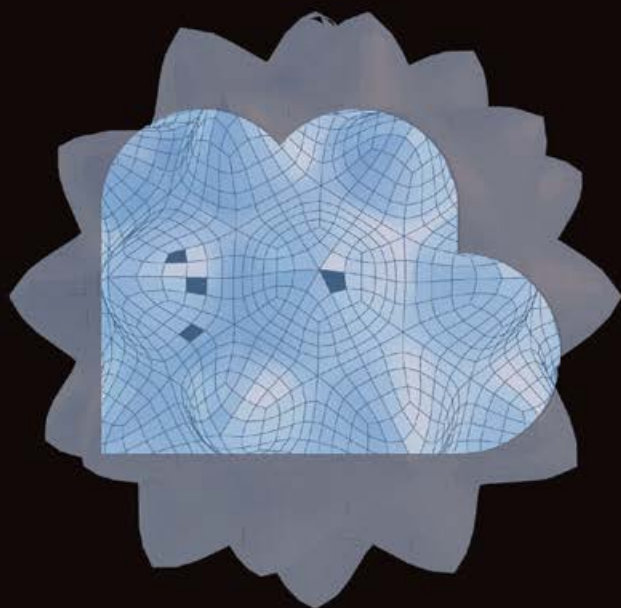
**Protecting
the Genome
by Homologous
Recombination**







2015 — 2016



Masaru Okabe

* 1948

Research Institute for Microbial Diseases, Osaka University, Japan

📅 October 1, 2015

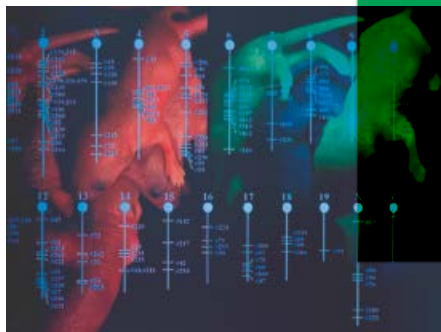
Dr. Masaru Okabe received his PhD from Osaka University and has spent the entirety of his career at this institution, with the exception of one and a half years at the National Institute of Environmental Health Sciences in Research Triangle Park, North Carolina, USA.



He served as a professor in the Genome Information Research Center of the Research Institute for Microbial Diseases and became Director of the Animal Resource Center for Infectious Diseases at the Research Institute for Microbial Diseases, Osaka University, in 2002.

His general research area is reproduction, with a specific research interest in the mechanism of sperm-egg interaction. He published the first fusion factor on mouse sperm (IZUMO1) and was involved in the finding of fusion-related factor CD9 on eggs. He believes in the power of gene-manipulated animals and utilizes many transgenic and knockout mouse lines in his research. He is also known as the scientist who demonstrated that GFP is usable in mice by producing the first “green mice” in the world.

The First “Green Mice” and the Mechanism of Mammalian Fertilization Revised by Gene-manipulated Animals





It was a memorable honour for me to be invited to participate in the Mendel Lectures and savour the rare opportunity to speak in the historical building Mendel himself once used.

Aaron Ciechanover

* 1947

*The Rappaport Faculty of Medicine and Research Institute,
Technion-Israel Institute of Technology, Haifa, Israel*

📅 October 22, 2015

Aaron Ciechanover is an Israeli biochemist well known for characterizing the cellular pathway to degrade and recycle protein via ubiquitin.

He received his MSc (1971) and MD (1973) from the Hebrew University in Jerusalem. He then completed his national service (1973–1976) as a military physician, and continued his studies to obtain a doctorate in biological sciences in the Faculty of Medicine in the Technion (DSc, 1982). There, as a graduate student with Dr. Avram Hershko and in collaboration with Dr. Irwin A. Rose from the Fox Chase Cancer Center in Philadelphia, USA, they discovered that covalent attachment of ubiquitin to a target protein signals it for degradation. They deciphered the mechanism of conjugation, described the general proteolytic functions of the system, and proposed a model according to which this modification serves as a recognition signal for a specific downstream protease. As a postdoctoral fellow with Dr. Harvey Lodish at MIT, he continued his studies on the ubiquitin system and made additional important discoveries. Over the years it has become clear that ubiquitin-mediated proteolysis plays major roles in numerous cellular processes, and aberrations in the system underlie the pathogenetic mechanisms of many diseases, among them certain malignancies and neurodegenerative disorders. Consequently, the system has become an important platform for drug development.

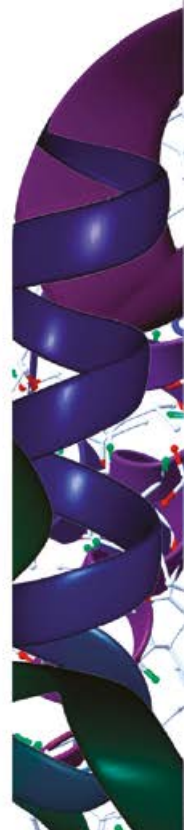
Among the numerous prizes Ciechanover received are the 2000 Albert Lasker Award, the 2002 EMET Prize, the 2003

Israel Prize, and the 2004 Nobel Prize (Chemistry, shared with Drs. Hershko and Rose).

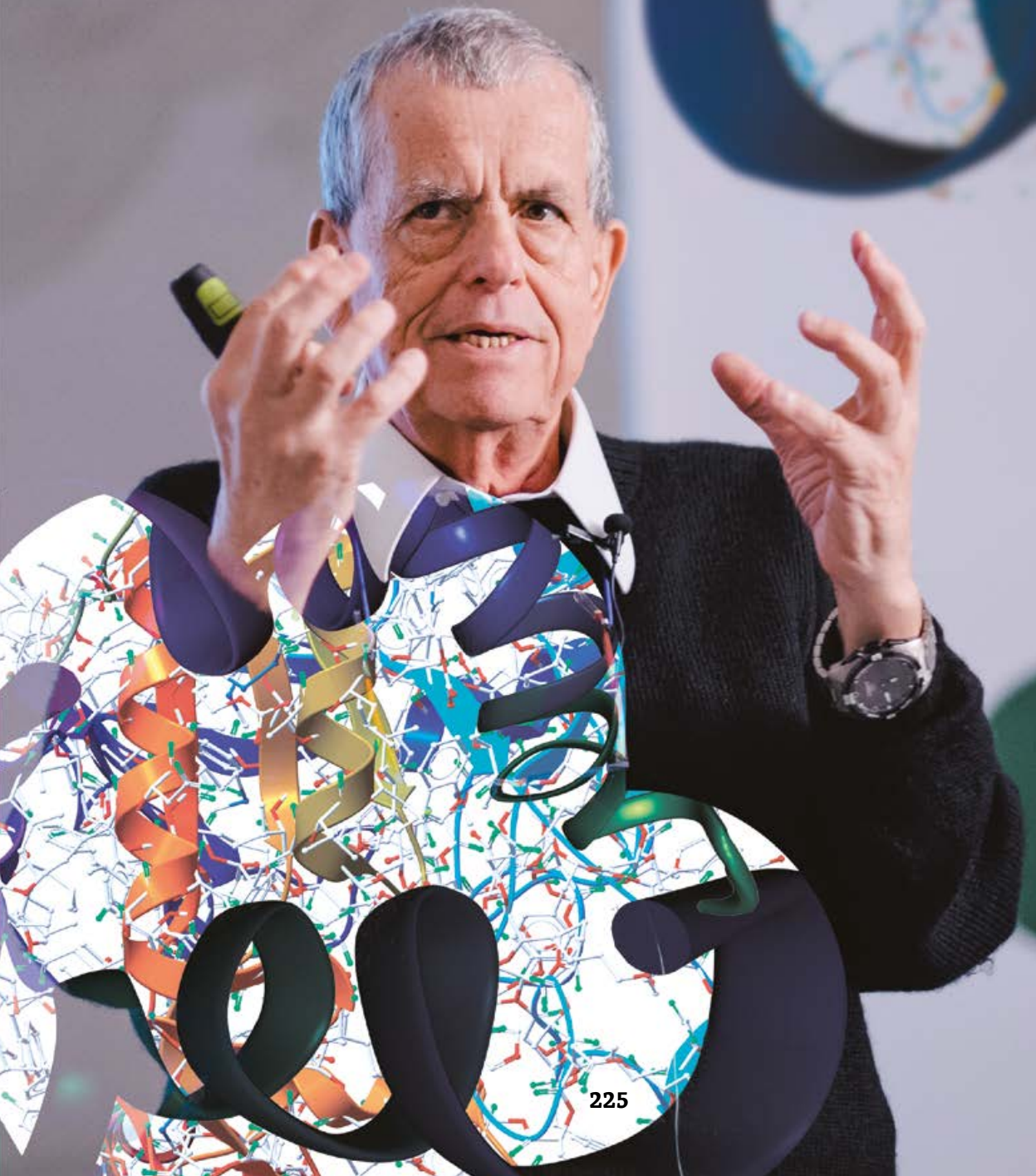


Ciechanover's membership in many academies includes the Israeli National Academy of Sciences and Humanities, the European Molecular Biology Organization (EMBO), the American Academy of Arts and Sciences (Foreign Fellow), the American Philosophical Society, the National Academies of Sciences (NAS) and Medicine (NAM) of the USA (Foreign Associate), the Pontifical Academy of Sciences at the Vatican, the Chinese Academy of Sciences (Foreign Member), the Russian Academy of Sciences (Foreign Member), and the German Academy of Sciences (Leopoldina).

He is currently a Distinguished Research Professor in the Faculty of Medicine at the Technion-Israel Institute of Technology in Haifa.



The Ubiquitin Proteolytic System – From Basic Mechanisms thru Human Diseases and on to Drug Targeting



Michael G. Rosenfeld

* 1944

School of Medicine, University of California, San Diego, USA /

HHMI, University of Rochester, USA

📅 November 12, 2015

Michael Geoffrey Rosenfeld earned a bachelor's degree from Johns Hopkins University and an MD from the University of Rochester. He worked as an assistant doctor at Washington University in St. Louis and as a research assistant at the National Institutes of Health (NIH). He was briefly a doctor at Barnes Hospital before working as a postdoctoral fellow at the University of California San Diego (UCSD). Rosenfeld holds a professorship at UCSD and is adjunct professor at Scripps Research Institute and at the Salk Institute. Since 1985 Rosenfeld has also been affiliated with the Howard Hughes Medical Institute.



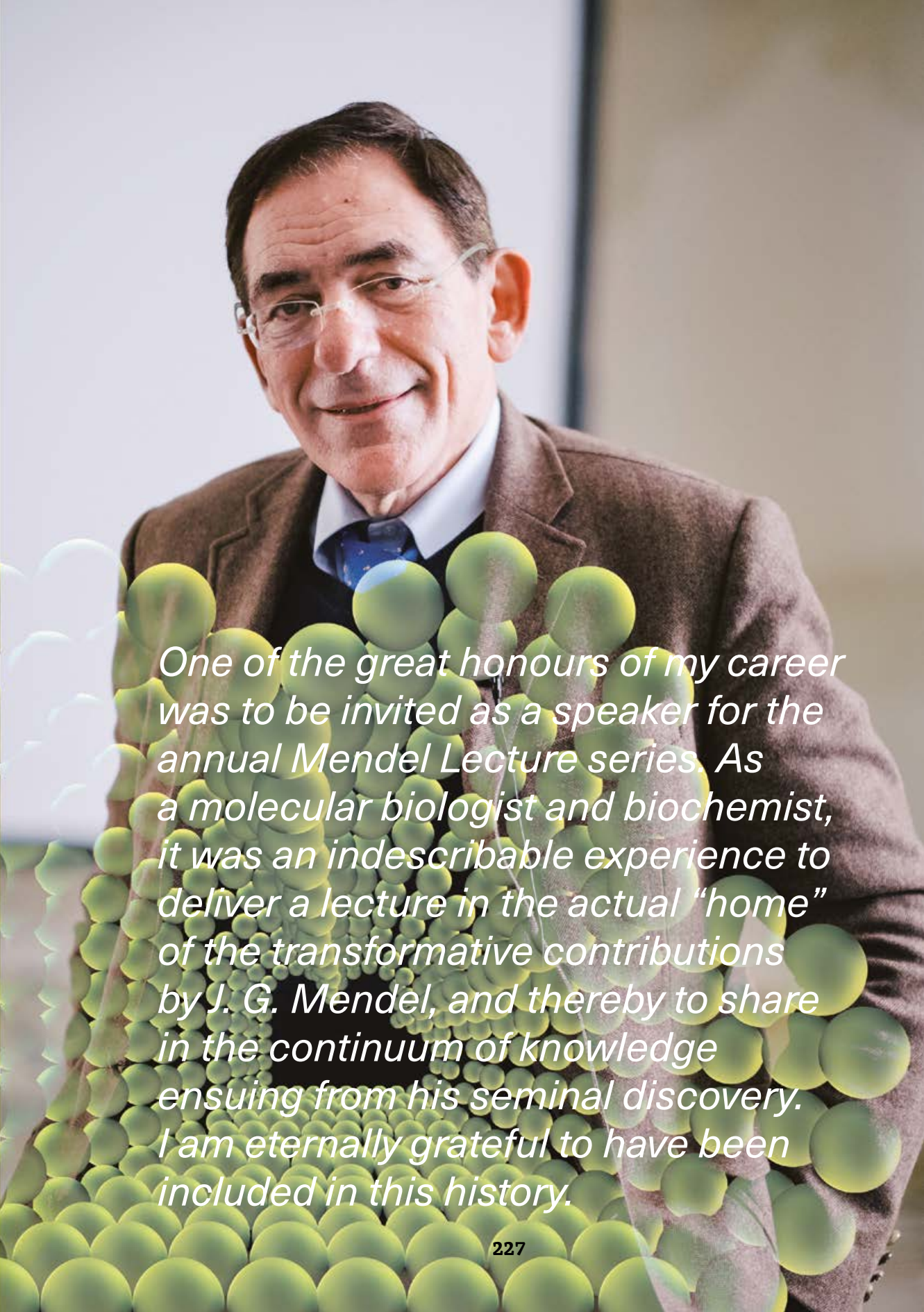
Using genetic, biochemical, and biological approaches, Michael G. Rosenfeld's work focuses on deciphering on a genome-wide scale how cells control gene expression through the integration of the output to these diverse signals, which is crucial to the body's development and cell differentiation. His studies have revealed surprising new gene-specific strategies that precisely link regulated gene responses to other cellular response programmes including DNA damage and repair. These studies have elucidated novel families of tissue-specific transcription factors, allosteric control of transcription factor

function roles of polarity in positive and negative gene transcription control, the role of nuclear receptors, and linkage of transcription to growth. This knowledge provides the basis for developing new treatments for diseases that occur when gene expression goes awry, such as diabetes, atherosclerosis, cancer, and growth defects in children.

Michael G. Rosenfeld became a Member of the American Academy of Arts and Sciences in 1991 and a Member of the National Academy of Sciences in 1994. In 1999 he received (together with Ronald M. Evans) the Fred Conrad Koch Award, and in 2012 (together with David M. Livingston and Joan Massagué) the Pasarow Award for cancer research.

Mendel's Messengers: Enhancers and Transcriptional Programmes



A portrait of a middle-aged man with dark hair and glasses, wearing a brown jacket over a blue shirt and tie. He is smiling and looking towards the camera. The background is a light, out-of-focus indoor setting. Overlaid on the bottom half of the image is a large, dense cluster of green, translucent spheres of varying sizes, resembling a molecular model or a cluster of cells.

One of the great honours of my career was to be invited as a speaker for the annual Mendel Lecture series. As a molecular biologist and biochemist, it was an indescribable experience to deliver a lecture in the actual “home” of the transformative contributions by J. G. Mendel, and thereby to share in the continuum of knowledge ensuing from his seminal discovery. I am eternally grateful to have been included in this history.

Michael G. Rossmann

*1930

Purdue University, West Lafayette, USA

📅 March 3, 2016

Michael G. Rossmann was a German-American physicist and microbiologist who helped to establish and define the very basis of structural biology as it is known today.

Michael Rossmann studied physics and mathematics at the University of London, where he received BSc and MSc degrees. He moved to the University of Glasgow in 1953 where he taught physics in the technical college and received his PhD in chemical crystallography. Rossmann then spent two years at the University of Minnesota as a postdoctoral fellow. Returning to the UK, to the University of Cambridge in 1958, he worked with Max Perutz as a research associate at the MRC Laboratory of Molecular Biology. There he led the computational effort for the structure determination of haemoglobin, a result that was recognized with the Nobel Prize in Chemistry awarded to Max Perutz and John Kendrew in 1962. In 1964 Rossmann joined the Department of Biological Sciences at Purdue University. He became full professor in 1967 and from 1978 he was Hanley Distinguished Professor of Biological Sciences at the university.

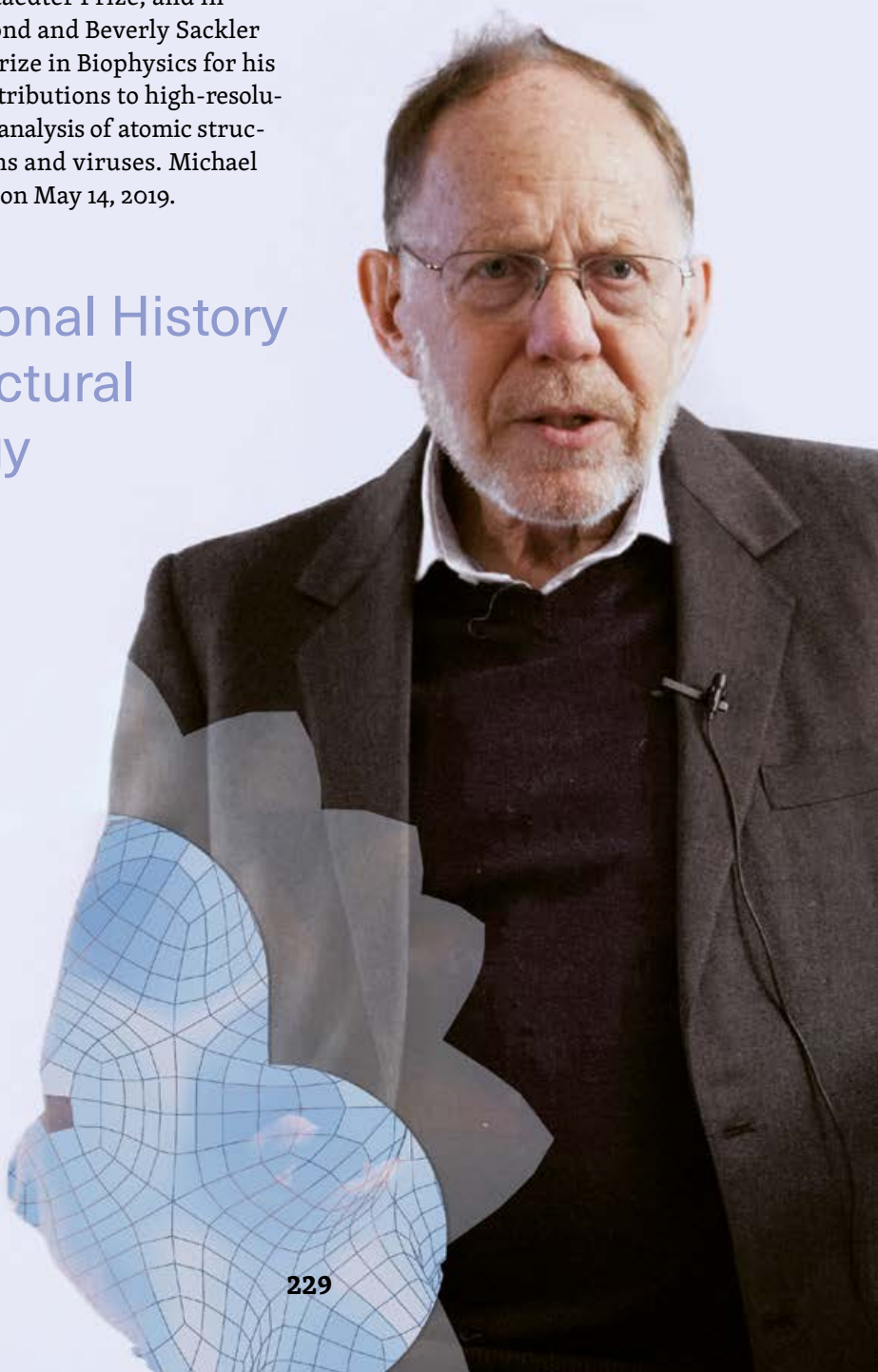


Rossmann and his team determined the structures of lactate dehydrogenase and glyceraldehyde 3-phosphate dehydrogenase. Rossmann recognized that the two enzymes share a common structural motif that enables them to bind nucleotides. Further studies identified this structural motif in numerous other protein enzymes and it became known as the Rossmann fold. Rossmann made major contributions to the methodology of macromolecular crystallography, namely to the development of molecular replacement, multi-wavelength anomalous dispersion phasing of diffraction data, phase improvement by utilizing non-crystallography symmetry averaging, phase extension, and to the processing and indexing of protein diffraction images. In 1985, Rossmann published the structure of a human common cold virus, determined using x-ray crystallography. This work laid the foundation for a molecular understanding of cell entry of enteroviruses and for the development of capsid-binding inhibitors against a broad range of enteroviruses. In 2016, using cryo-electron microscopy, his lab reported the first structure of the Zika virus, responsible for a severe epidemic at the time.

Among other honours, Rossmann was elected Fellow of the American Academy of Arts and Sciences in 1978, Member of the National Academy of Sciences in 1984, Foreign Member of the Royal Society of London in 1996, and Fellow of the American Association for the Advancement of Science in 1999. He was awarded the 1990 Louisa Gross Horwitz Prize, the Gregori

Aminoff Prize in 1994, the 1995 Purdue University Medal of Honor, the 1996 Ewald Prize, the 2001 Paul Ehrlich and Ludwig Darmstaedter Prize, and in 2016 the Raymond and Beverly Sackler International Prize in Biophysics for his pioneering contributions to high-resolution diffraction analysis of atomic structures of proteins and viruses. Michael Rossmann died on May 14, 2019.

A Personal History of Structural Virology



Steve Jackson

* 1962

Gurdon Institute, University of Cambridge, UK

April 7, 2016

Stephen Philip Jackson received a BSc degree in biochemistry in 1983 from the University of Leeds. He then carried out his PhD research at the Imperial College London and Edinburgh University, earning his PhD in 1987. Jackson then spent four years as a postdoctoral fellow at the University of California, Berkeley, where he developed an interest in the regulation of transcription. He returned to the UK in 1991 as a junior group leader at the Wellcome-CRC Institute in Cambridge, now the Gurdon Institute, where he became head of the Cancer Research UK Laboratories.



Here, he continued his research on transcription by eukaryotic RNA polymerases and expanded this work to include the transcriptional apparatus of *Archaea*. In the process of identifying and characterizing the functions of the human DNA-dependent protein kinase (DNA-PK) protein, he was led into the field of DNA repair and DNA-damage signalling, which is now the major focus of his academic group. Jackson's work provided key insights into the cellular processes that respond to DNA damage. The discovery of DNA-PK and its activation by DNA double-strand breaks (DSBs) led him

to identify and characterize various components of the non-homologous end joining pathway for DSB repair. His work helped to establish how DNA-damage signalling coordinates DNA repair, how this repair is controlled during the cell cycle at telomeres and within chromatin. In 1997, Jackson founded the company KuDOS Pharmaceuticals with the aim of translating knowledge of DNA damage response pathways into new treatments for cancer. KuDOS evolved into a fully integrated drug-discovery and drug-development company that developed the blockbuster drug Olaparib (Lynparza), which is now used to treat ovarian, breast and other cancers worldwide (marketed by AstraZeneca, which acquired KuDOS in 2005/2006, and Merck). In 2011, Jackson founded MISSION Therapeutics, a firm to develop drugs to improve the management of life-threatening diseases, particularly cancer. In 2017, he founded Adrestia Therapeutics Ltd and currently serves part-time as its chief executive and chief scientific officer.

Jackson has received various prizes, including the Inaugural Eppendorf-Nature European Young Investigator Award (1995), the Biochemical Society GlaxoSmithKline Award (2008), the BBSRC Innovator of the Year Award (2009), the Royal Society Buchanan Medal (2011) in recognition of his "outstanding contributions to understanding DNA repair and DNA damage response signalling pathways", the King Faisal International Prize for Science (2016), the Royal Netherlands Academy of Arts and Sciences



Harnessing
Genetic
Principles
to Better
Understand
and Treat
Human
Disease

Dr. A. H. Heineken Prize for Medicine (2016) for “fundamental contributions to our understanding of the repair of DNA in human cells and for turning this knowledge into the development of new cancer drugs”, the Genome Stability Network medal (2017), the Fondation ARC’s Leopold Griffuel Prize in Translational and Clinical Research (2019), and the Royal Society Mullard Award (2020). He was elected a member of the European Molecular Biology Organization (EMBO) in 1997, a fellow of the Academy of Medical Sciences in 2001, and a fellow of the Royal Society in 2008.

It was a great honour and privilege to deliver a lecture in the Mendel Lecture series, to meet the various leading Czech scientists and to sightsee the wonderful city of Brno.

Joan Steitz

* 1941

Howard Hughes Medical Institute / Yale University, New Haven, USA

May 5, 2016

Joan Elaine Argetsinger Steitz is known for her discoveries involving RNA, including ground-breaking insights into how ribosomes interact with messenger RNA by complementary base pairing, and that introns are spliced by small nuclear ribonucleic proteins (snRNPs).



Steitz received her BSc degree in chemistry from Antioch College in 1963. After completing her undergraduate degree, Steitz applied to Harvard's new programme in biochemistry and molecular biology. There, she was the first female graduate student to join the laboratory of Nobel Laureate James Watson, with whom she first worked on bacteriophage RNA. Steitz completed postdoctoral research at the Medical Research Council (MRC) Laboratory of Molecular Biology (LMB) at the University of Cambridge, UK, where she was guided by Francis Crick, Sydney Brenner, and Mark Bretscher. In 1970, Steitz joined the faculty at Yale. She is now Sterling Professor of Molecular Biophysics and Biochemistry at Yale University and continues her work with the HHMI and advocates for gender equity in the sciences.

Dr. Steitz is one of the pioneers of the field of RNA biology and is world-renowned for her many seminal contributions.

She showed how ribosomal RNA uses base-pairing to initiate translation at the start sites of bacterial mRNA. She discovered snRNPs, the cellular particles that assemble to form spliceosomes, which carry out the splicing of pre-messenger RNA into the final mature mRNA, and elucidated many of their roles. She discovered that introns, which were thought to be inert, code for RNA that target the modification of other cellular RNAs during their maturation. More recently she has found new roles for microRNAs in gene regulation.

In addition to being one of the first two women scientists to receive the Albany Medical Center Prize (2008), America's largest prize in medicine, Dr. Joan Steitz has been honoured by many awards including the Eli Lilly Award (1976), the US Steel Foundation Award (1982), membership in the National Academy of Sciences (1983), the National Medal of Science (1986), the Novartis-Drew Award (1999), the FASEB Excellence in Science Award (2003), the RNA Society Lifetime Achievement Award (2004), the ASCB's highest scientific honour – the EB Wilson Medal (2005), the Rosalind E. Franklin Award for Women in Science (2006), and the Gairdner International Prize (2006). In 2011, Dr. Steitz was awarded the Robert J. and Claire Pasarow Foundation 23rd Annual Medical Research Award for Extraordinary Achievement in Cancer Research, and in 2012 the Pearl Meister Greengard Prize and the Vanderbilt Prize in Biomedical Science. In 2015, she received the Herbert Tabor Award. In 2018 Dr. Steitz won the Lasker-Koshland Award for Special Achievement in Medical Science.

Viral and Cellular Noncoding RNAs: Insight into Evolution



Stephen J. Benkovic

* 1938

Department of Chemistry, The Pennsylvania State University, USA

May 19, 2016

Stephen James Benkovic is an American chemist studying mechanistic enzymology and the discovery of enzyme inhibitors.

Benkovic received his BS degree in chemistry and AB degree in English literature from Lehigh University, and his PhD in organic chemistry from Cornell University. After a stay as a postdoctoral research associate at the University of California, Santa Barbara, he joined the Chemistry Department at Penn State University in 1965 and was appointed a full Professor of Chemistry in 1970, became the Evan Pugh Professor of Chemistry, and in 1988 the holder of the Eberly Chair in Chemistry.



He is known for his major contributions that have initiated or shaped our understanding of biological processes. He was the first to hypothesize that conformational changes outside the enzyme's active site were necessary for achieving maximal catalysis. This is illustrated by his studies on dihydrofolate reductase (DHFR). In addition, he showed how multi-enzyme complexes are assembled to achieve specificity and function, and, where several activities are present, how they are mediated. This was demonstrated in

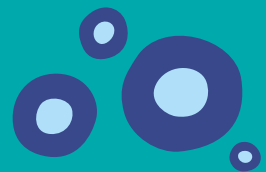
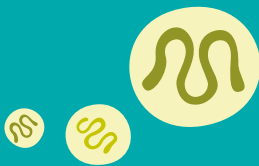
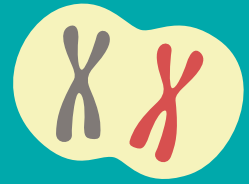
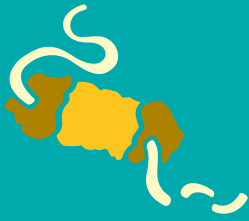
studies on DNA replication that featured the assembly, disassembly and function of the T4 replisome that coordinated DNA replication. Benkovic discovered the first example of a reversible metabolon, the purinosome, which only assembles in response to cellular demands, and has demonstrated that it acts temporarily and spatially to form and deliver needed metabolites to cellular constituents.

Benkovic's work has been recognized by numerous awards and fellowships, including the Pfizer Enzyme Award (1977), the Gowland Hopkins Award (1986), the Alfred Bader Award of the American Chemical Society (1994), the Chemical Pioneer Award (1998), the Christian B. Anfinsen Award (2000), the Nakanishi Prize (2005), the Benjamin Franklin Medal in Life Science (2009), and the President's National Medal of Science (2010). He was elected a member of the American Academy of Arts and Sciences (1984), the National Academy of Sciences (1985), the National Academy of Medicine (1995), the American Philosophical Society (2002), and to the Royal Society (2021).

Benkovic holds 28 US and seven foreign patents and co-founded Anacor Pharmaceuticals (acquired by Pfizer in 2016) and Boragen.

On *De Novo* Purine Biosynthesis: The Purinosome







2016 — 2017



Wolfgang Baumeister

* 1946

Department of Molecular Structural Biology, Max Planck Institute of Biochemistry, Martinsried, Germany

📅 September 22, 2016

Wolfgang Baumeister studied biology, chemistry and physics at the Universities of Münster and Bonn, Germany, and obtained his PhD from the University of Düsseldorf in 1973. From 1973–1980 he was a research associate in the Department of Biophysics at the University of Düsseldorf. From 1980 to 1981 he spent time as a postdoc at the Cavendish Laboratory in Cambridge, England. In 1982 he became a Group Leader at the Max Planck Institute of Biochemistry in Martinsried, Germany, and in 1988 Director and head of its Department of Structural Biology. In 2000 he was named Moore Distinguished Scholar at the California Institute of Technology in Pasadena, USA.

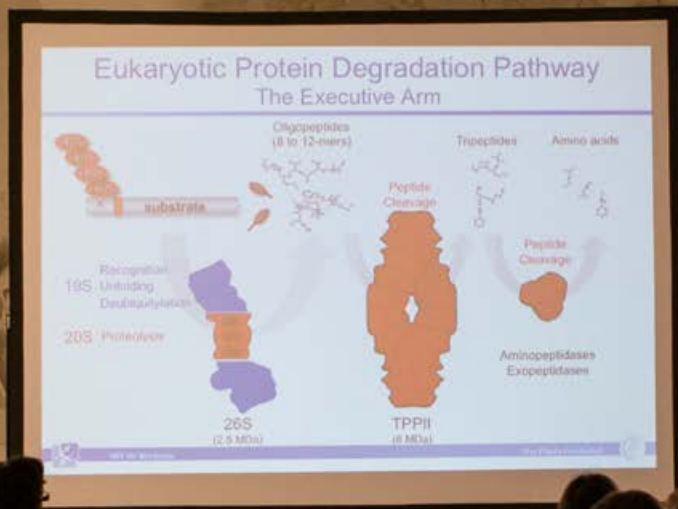
Wolfgang Baumeister made seminal contributions to our understanding of the structure and function of the cellular machinery of protein degradation, in particular the proteasome, ribosomal supercomplexes such as polysomes, the cytoskeleton, and synaptic structures. Moreover, Baumeister's department has developed cryo-electron tomography, a method enabling the visualization of the macromolecular structures in a functional context and true-to-life state in shock-frozen cells. Images from different projection angles are recorded in the microscope and mathematically combined into 3D image cubes (tomograms). The method is widely used now to study cellular architectures of prokaryotes and eukaryotes at subnanometer resolutions.

Baumeister's contributions to science were recognized by numerous awards including the 1998 Otto Warburg Medal,

the 2003 Louis-Jeantet Prize for Medicine, the 2004 Stein and Moore Award, the 2005 Schleiden Medal and the Harvey Prize in Science and Technology, the 2006 Ernst Schering Prize, the 2018 Ernst Jung Medal for Medicine in Gold, the 2019 Science Award by the Stifterverband für die Deutsche Wissenschaft, and the Van Deenen Medal. He has been a member of the Bavarian Academy of Sciences since 2000, the Academy of German Natural Scientists Leopoldina since 2001, the American Academy of Arts and Sciences since 2003, and the National Academy of Sciences since 2010.



The Molecular Machinery of Intracellular Protein Degradation: Structural Studies *ex situ* and *in situ*



Austin Smith

* 1960

Department of Biochemistry, University of Cambridge / Wellcome Trust/

MRC Cambridge Stem Cell Institute, UK

📅 November 10, 2016

Austin Gerard Smith is a British biologist, notable for his pioneering work on the biology of embryonic stem cells.

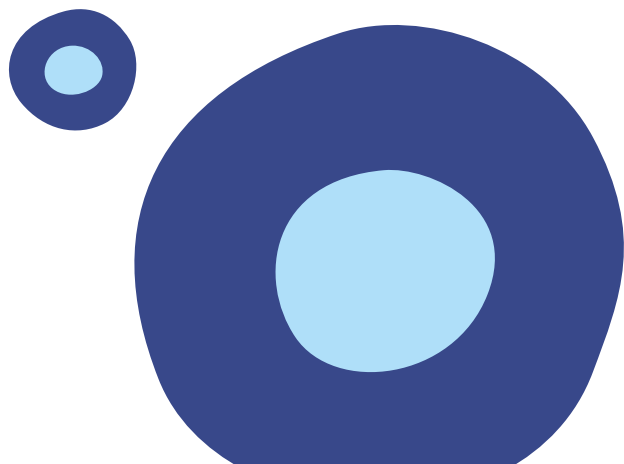


Smith studied biochemistry at the University of Oxford where he became captivated by pluripotency. He pursued this interest in his doctoral studies at the University of Edinburgh (PhD in 1986) and in postdoctoral research at the University of Oxford, before joining the Centre for Genome Research at the University of Edinburgh as a group leader in 1990. He returned to Edinburgh as a Group Leader in 1990. In 1996, he was appointed director of the Centre, which became the Institute for Stem Cell Research under his leadership. In 2006 he moved to Cambridge where he was the founding Director of the Wellcome Trust Centre for Stem Cell Research and in 2012 became the director of the new Wellcome Trust-MRC Cambridge Stem Cell Institute at the University of Cambridge. In 2019 he took up the post of Director of the Living Systems Institute at the University of Exeter.

Smith's group studies pluripotent stem cells. These are cell lines derived from early embryos that retain the potential

to generate all somatic cell types. Having identified the intrinsic and extrinsic factors that support pluripotency, he developed a culture medium for mouse stem cells that allows them to renew themselves indefinitely. This allows him to understand how they maintain this broad potency and how they transition into lineage specification and commitment. The group compares pluripotent cells from different mammals to elucidate common principles and species-specific adaptations.

In 2000, Dr. Smith was awarded the Pfizer Academic Award, in 2002 the Ellison-Cliffe Medal, and in 2003 the MRC Research Professorship and was elected to the Royal Society of Edinburgh. In 2004, Smith was elected a Member of the European Molecular Biology Organization, and in 2006 a Fellow of the Royal Society. In 2010, he was co-recipient of the Louis-Jeantet Prize for Medicine along with French cardiologist Michel Haissaguerre. In 2016, he received the ISSCR McEwen Award for Innovation.



Design Principles of Pluripotency



Ada Yonath

* 1939

Department of Structural Biology, Weizmann Institute of Science, Rehovot, Israel

 **March 2, 2017**

Ada E. Yonath is an Israeli crystallographer best known for her pioneering work on the structure and function of the ribosome.

Yonath graduated from the Hebrew University of Jerusalem with a bachelor's degree in chemistry in 1962, and a master's degree in biochemistry in 1964. In 1968, she obtained her PhD from the Weizmann Institute of Science for x-ray crystallographic studies on the structure of collagen. After her postdoctoral studies at Carnegie Mellon University (1969) and MIT (1970), she returned to Israel and established the protein crystallography laboratory. From 1979 to 1984 she was a group leader with Heinz-Günter Wittmann at the Max Planck Institute for Molecular Genetics in Berlin. In the years 1986–2004 she headed a Max Planck Institute Research Unit at DESY in Hamburg, Germany, in parallel to her research activities at the Weizmann Institute.

Yonath focuses on the mechanisms underlying protein biosynthesis by crystallography, using a research line she pioneered from 1980 despite considerable scepticism in the international scientific community. In 1986 she discovered the tunnel through which nascent proteins exit the ribosome, and in 2000 and 2001, she determined the complete high-resolution structures of both ribosomal subunits and discovered within the otherwise asymmetric ribosome, the universal symmetrical region that provides the framework and navigates the process of polypeptide polymerization. Consequently, she showed that the ribosome is a ribozyme that

places its substrates in stereochemistry suitable for peptide bond formation and for substrate-mediated catalysis. She also re-visualized the path taken by nascent proteins and revealed the dynamic elements enabling its involvement in various steps of protein synthesis. Her work has also led to the elucidation of the modes of action of many different antibiotics targeting the ribosome, illuminated the mechanism of drug resistance and synergism, and demonstrated the structural basis for antibiotic selectivity, paving the way for structure-based next generation antibiotics.

Among others, Yonath is a member of the United States National Academy of Sciences; the American Academy of Arts and Sciences; the Israel Academy of Sciences and Humanities; the European Academy of Sciences and Art; the European Molecular Biology Organization; the Pontifical Academy of Sciences at the Vatican; and is a Foreign Member of the Royal Society.

Her awards and honours include the Israel Prize (2002), the Harvey Prize (2002), the Paul Karrer Gold Medal (2004), the Louisa Gross Horwitz Prize (2005), the Wolf Prize in Chemistry and the EMET Prize for Art, Science and Culture in Life Sciences (2006), and the Albert Einstein World Award of Science (2008). In 2009, she received the Nobel Prize in Chemistry along with Venkatraman Ramakrishnan and Thomas A. Steitz for revealing the structure and function of the ribosome, becoming the first Israeli woman to win the Nobel Prize and the first woman in 45 years to win the Nobel Prize for Chemistry.

The Genetic Apparatus, from Mendel to Critical Issues in Contemporary Medicine



*It is my great honour to be invited
to deliver the Mendel Lecture.
I am most grateful for this, since
it gave me an opportunity to be
impressed by Mendel's actual
environment alongside discussing
his points of view.*

Sir Peter Donnelly

* 1959

Nuffield Dept. of Medicine, Dept. of Statistics, University of Oxford /

Wellcome Centre for Human Genetics, UK

 **March 16, 2017**

Sir Peter James Donnelly is an Australian who trained in mathematics and statistics but has gone on to make substantial contributions in population, statistical, and human genetics, and in meiosis.

Donnelly graduated from the University of Queensland and studied for a doctorate at Oxford. When elected to a chair at Queen Mary College, London, in 1988, Donnelly was only 29, and possibly the youngest Professor in Great Britain. He held a chair at the University of Chicago (1994–96) and was head of the Department of Statistics at the University of Oxford from 1996 to 2001. From 2007 to 2017 he was Director of the Wellcome Centre for Human Genetics (WCHG) in Oxford.

Donnelly was one of the global leaders in what has been called the “genetic revolution”, the explosion in knowledge of genetic variation associated with common human diseases. He had a leading role in the International HapMap project and chaired the Wellcome Trust Case Control Consortium (WTCCC), which was named by *Scientific American* as the top scientific achievement of 2007, and its successor WTCCC2 looking at the genetics of more than 20 common diseases across 60,000 individuals.

Donnelly has also made major contributions to coalescent theory, and through large-scale genetic analyses, to our understanding of the history of human populations, especially in Europe. His group has been responsible for a number of breakthroughs in our understanding

of meiosis and meiotic recombination, including the identification of the protein which localizes recombination hotspots, its additional roles downstream of double strand breaks, and the mechanism which underpins its role as the first speciation gene identified in vertebrates.

With colleagues, Donnelly founded Genomics PLC in 2014, and became its CEO in 2017. The company uses large-scale genetic data to identify novel drug targets and understand individual risk for common human diseases in order to drive a prevention-first approach to healthcare.

Donnelly was elected a Fellow of the Royal Society in 2006 and a Fellow of the Academy of Medical Sciences in 2008. Other significant awards have included the 2004 Guy Medal in Silver from the Royal Statistical Society, the 2009 Weldon Memorial Prize, the Genetics Society Medal 2020, and the Royal Society’s 2021 Gabor Medal. He was knighted by Her Majesty the Queen in 2019 for services to the understanding of human genetics in disease.

Meiosis, Recombination and the Origin of a Species



It was a huge honour to be asked to deliver one of the Mendel Lectures, and a great personal and scientific thrill to be able to visit the home of Mendel, and his profoundly important work, in Brno. I will cherish the memories for a long time.

Friedhelm Hildebrandt

* 1957

Harvard Medical School / Boston Children's Hospital /

Howard Hughes Medical Institute, USA

📅 March 23, 2017

Dr. Hildebrandt received his MD degree from Heidelberg University, Germany, in 1982, obtained his paediatrics and nephrology subspecialty training at Marburg University Children's Hospital, and was a postdoctoral research fellow in nephrology at the Yale School of Medicine in 1988–1989. After his return to Germany he worked at the University of Freiburg where he obtained tenure in 1995. In 2001, he became the Frederick G.L. Huetwell Professor of Pediatrics and Human Genetics at the University of Michigan. Since 2008 he has been an Investigator at the Howard Hughes Medical Institute and the chief of nephrology at the Boston Children's Hospital. In 2013 he became the William E. Harmon Professor of Pediatrics at the Harvard Medical School.

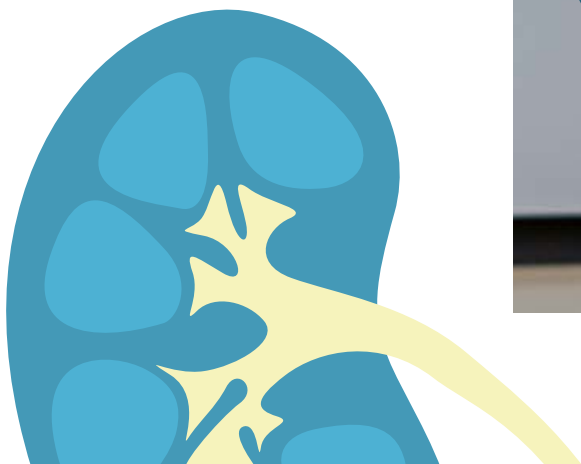
syndrome and congenital malformations of the kidney and urinary tract. His lab studies the function of newly identified disease genes in disease models of mice and zebrafish.

He has received multiple awards for his research, including the E. Mead Johnson Award for Pediatric Research in 2004 from the Society for Pediatric Research, the highest research award given in paediatrics. He is a recipient of the 2014 Homer Smith Award and the 2017 Alfred R. Newton Award of the International Society of Nephrology. Hildebrandt was elected as member of the Association of American Physicians in 2005, the Leopoldina in 2007, and the American National Academy of Medicine in 2015.



Hildebrandt's clinical interests include hereditary renal disease. His laboratory focuses on the identification and functional characterization of recessive single-gene causes of kidney diseases in children. His group has identified over 80 novel causative genes among the 240 genes that are currently known to cause chronic kidney disease, if mutated. Gene identification extends to nephrotic

Chronic Kidney Disease: The Mendelian Surprise



A man with glasses, wearing a grey suit jacket, a white shirt, and a red tie with a colorful pattern of people, is speaking into a microphone. He is holding the microphone with both hands. In the background, there is a large, faint, light-colored graphic of a pea plant. On the left side of the image, there is a blue circular graphic with a stylized yellow pea plant. The text is overlaid on the lower left portion of the image.

Mendel's work has exemplified the universality of the laws of nature. When visiting Brno to give the Mendel Lecture, I was reminded how the mission of science is a universal, international one.

David Tollervey

* 1955

Wellcome Trust Centre for Cell Biology, University of Edinburgh, UK

 April 20, 2017

David Tollervey studied for his BSc in microbiology in Edinburgh and then for a PhD in genetics at Cambridge. As a postdoctoral fellow, he moved to the University of California and in 1983 he relocated to a permanent position at the Institut Pasteur in Paris, France. In 1988 he became a group leader at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany. He returned to Edinburgh in 1997 as a Professor of RNA Biology and Wellcome Trust Principle Research Fellow. Since 2011 he has served as Director of the Wellcome Centre for Cell Biology.

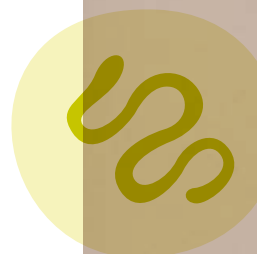
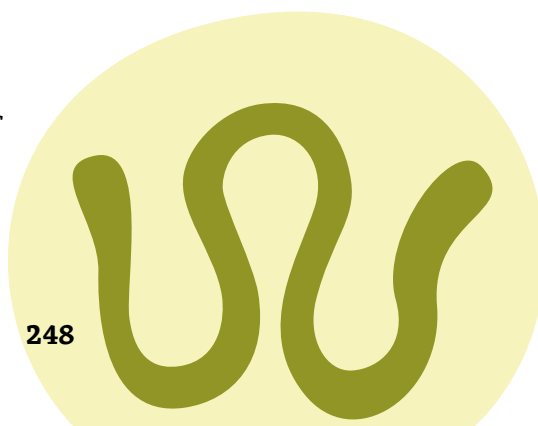


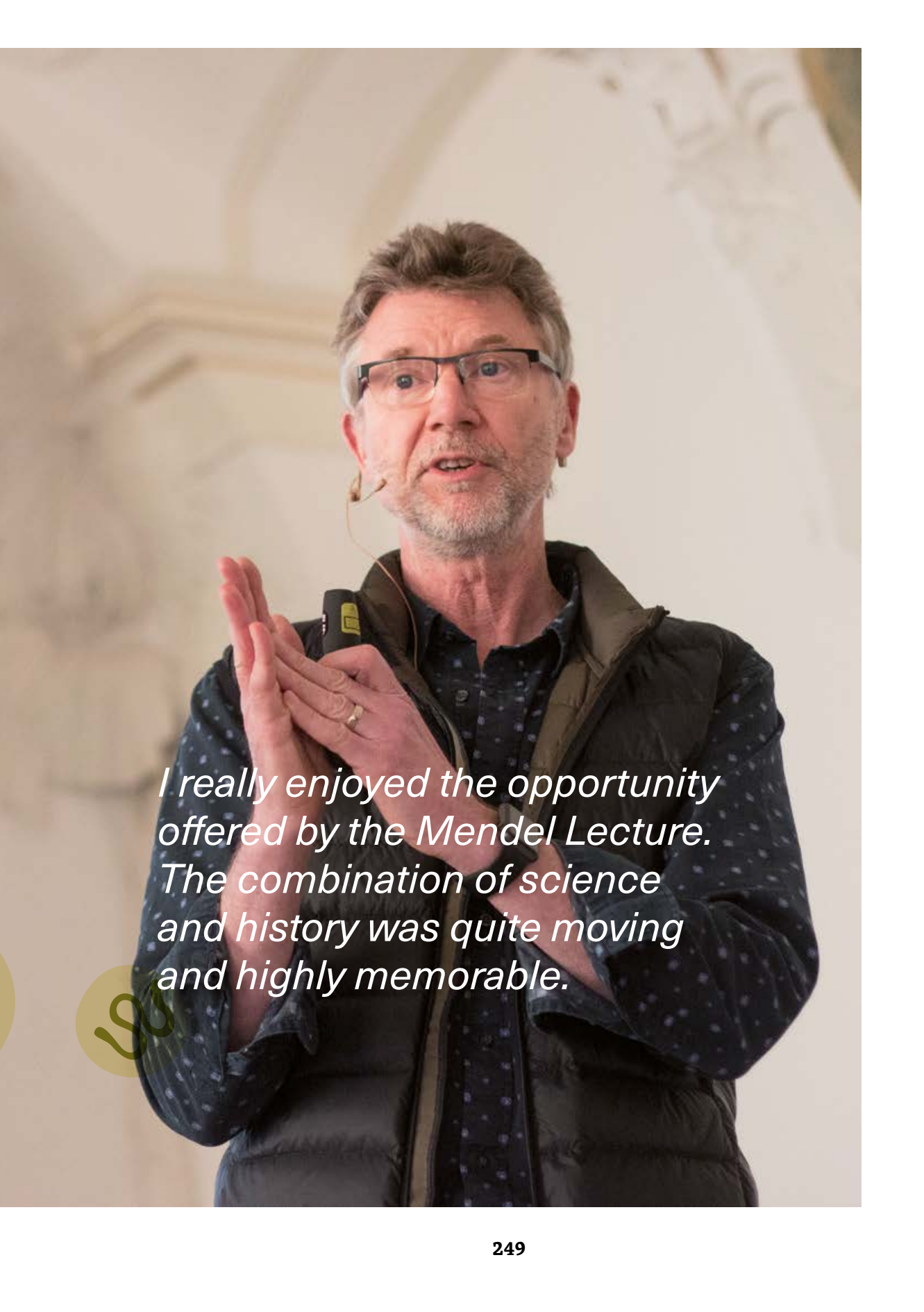
the remarkable protein complex known as the exosome, which can break down RNA molecules. The technology and tools that the Tollervey laboratory has developed have considerable potential for enhancing our understanding of disease states, including infection with viruses and bacteria.

Professor Tollervey is a Fellow of the Royal Society (2004) and of the Royal Society Edinburgh (2004), a Member of EMBO (1999), and past President of the International RNA Society.

Lighting up RNA Interactions in Living Cells

The aim of the Tollervey group is to understand the nuclear pathways that process newly transcribed RNAs and assemble RNA-protein complexes, the mechanisms that regulate these pathways, and the surveillance activities that monitor their fidelity. His current research combines genetics, biochemistry, transcriptomics, bioinformatics, *in vivo* UV crosslinking and high-throughput sequencing to precisely identify sites of RNA-protein interaction and RNA-RNA base pairing. He has long been a world leader in ribosome synthesis and RNA quality control, having characterized



A middle-aged man with short brown hair, glasses, and a goatee is speaking. He is wearing a dark blue patterned shirt under a black puffer vest. A small microphone is clipped to his shirt. He has his hands clasped in front of him. The background is a light-colored wall with faint, large-scale architectural details. Overlaid on the lower left is a yellow circle containing a stylized 'S' logo.

I really enjoyed the opportunity offered by the Mendel Lecture. The combination of science and history was quite moving and highly memorable.

Paul Modrich

* 1946

*Department of Biochemistry, Duke University Medical Center /
Howard Hughes Medical Institute, Durham, USA*

May 18, 2017

Paul Lawrence Modrich is an American biochemist and 2015 laureate of the Nobel Prize in Chemistry. He is known for his research on DNA mismatch repair.

Modrich obtained a BS degree from the Massachusetts Institute of Technology in 1968 and his PhD in biochemistry from Stanford University in 1973. After postdoctoral work at the Harvard Medical School (1973–1974), he was appointed Assistant Professor in the Chemistry Department at the University of California, Berkeley. He joined Duke University's faculty in 1976 and was a Howard Hughes Investigator from 1994–2019.

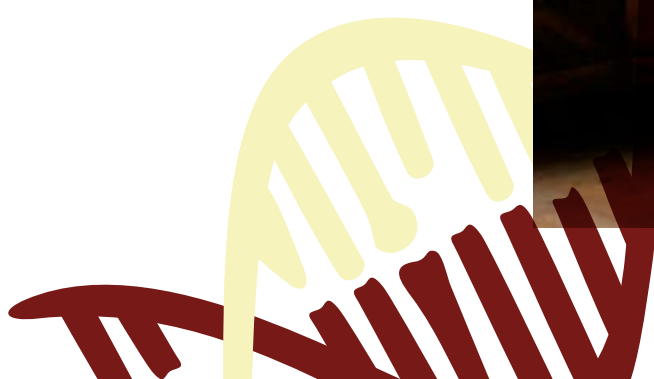


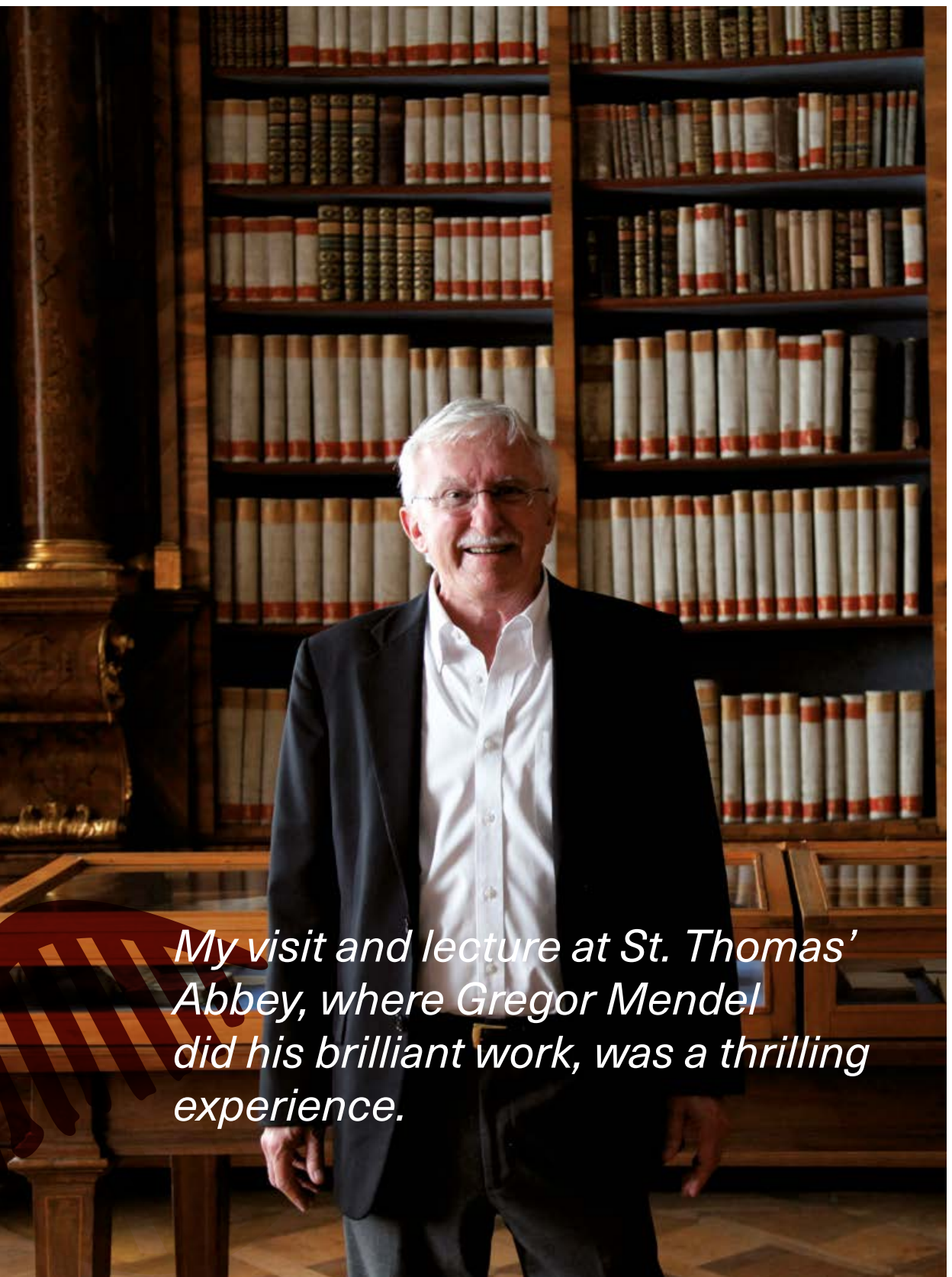
Modrich studies mismatch repair, a pathway that corrects base-pairing errors in the DNA helix and plays an important role in the control of mutation production. His laboratory identified multiple proteins and enzymes responsible for mismatch repair in *E. coli* and human cells and established basic features of the pathway in both organisms. During the course of this work, Modrich and colleagues demonstrated that Lynch syndrome cancers and certain sporadic tumours are defective in mismatch repair and identified the components of the

repair system that are lacking in these cancer cells. They also showed that mismatch repair-defective cells are resistant to certain anti-cancer drugs.

For his scientific achievements, he received the 1983 Pfizer Award in Enzyme Chemistry, the 1996 Charles S. Mott Prize in Cancer Research, the 1998 Robert J. and Claire Pasarow Foundation Medical Research Award, and the 2005 American Cancer Society Medal of Honor. In 2015 he was awarded the Nobel Prize in Chemistry, jointly with Tomas Lindahl and Aziz Sancar, “for mechanistic studies of DNA repair”. In 2016 he received the Arthur Kornberg and Paul Berg Lifetime Achievement Award in Biomedical Sciences. Modrich was elected to the US National Academy of Sciences in 1993 and the following year became a Howard Hughes Medical Institute Investigator. He is also an elected member of the US National Academy of Medicine and a fellow of the American Academy of Arts and Sciences.

Mechanisms in DNA Mismatch Repair





My visit and lecture at St. Thomas' Abbey, where Gregor Mendel did his brilliant work, was a thrilling experience.







2017—2018



Erich Nigg

* 1952

University of Basel, Switzerland

 **October 12, 2017**

Erich Nigg is a Swiss cell biologist and former director of the Biozentrum, University of Basel.

Erich Nigg studied biochemistry and microbiology at ETH in Zurich, Switzerland, where he obtained his PhD in 1980. Following postdoctoral work at the University of California, San Diego, USA, he carried out research at ETH Zürich and at the Swiss Institute for Experimental Cancer Research (ISREC). From 1995 he was professor of molecular biology at the University of Geneva before he was appointed, in 1999, to a directorship at the Max Planck Institute of Biochemistry in Martinsried, Germany. From 2009 to 2018 Nigg was a professor of cell biology and director of the Biozentrum at the University of Basel, Switzerland.

After his early work on biological membranes, the structure of the cell nucleus and mechanisms of intracellular signal transduction, Nigg's research focused on the cell cycle. His studies have contributed to our understanding of the segregation of human chromosomes during cell division, the regulation of mitosis, as well as the structure and function of human centrosomes. His work has contributed to a better molecular understanding of disease development, since mitotic errors

contribute to the genetic instability of cancer cells and centrosome abnormalities are known to cause disease, notably brain diseases and ciliopathies.



Erich Nigg is a member of several scientific associations, including the European Molecular Biology Organization (1991), the Academia Europaea (1998), the German Academy of Sciences Leopoldina (2005), and the European Academy of Cancer Sciences (2009). He is a recipient of the 1992 Friedrich Miescher Prize, the 1993 Robert Wenner Prize for Cancer Research, and the 2004 Meyenburg Prize.

Cell Cycle Control of Chromosome Segregation





The Mendel lecture in the magnificent Augustinian Abbey in Brno was one of my last public lectures prior to retirement, a great honour and vividly remembered!

Shizuo Akira

* 1953

Osaka University, Japan

📅 October 19, 2017

Shizuo Akira has made groundbreaking discoveries in the field of immunology, most significantly in the area of innate host defence mechanisms.

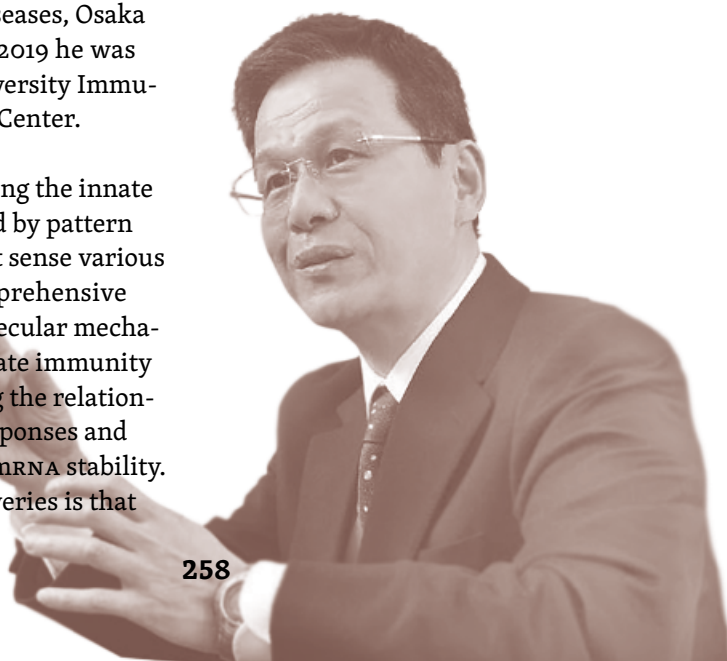


Akira gained his MD in 1977 and PhD in 1984 at the Osaka University School of Medicine. Till 1987, he did postdoctoral research at the University of California, Berkeley. After his return to Japan he held a position at the Institute for Molecular and Cellular Biology at Osaka University till 1995 when he became a professor at Hyogo College of Medicine. Since 1999 he has been a professor at the Research Institute for Microbial Diseases, Osaka University. From 2007 to 2019 he was director of the Osaka University Immunology Frontier Research Center.

Akira has been investigating the innate immune response induced by pattern recognition receptors that sense various pathogens. To gain a comprehensive understanding of the molecular mechanisms responsible for innate immunity *in vivo*, his lab is exploring the relationship between immune responses and mechanisms that ensure mRNA stability. Among his greatest discoveries is that

of pattern recognition receptors, which detect intruding pathogens and initiate the antimicrobial response in the host. He demonstrated, through the ablation of toll-like receptor (TLR) genes, that TLRs recognize a discrete collection of molecules of microbial origin, and later the RNA helicases, RIG-I (retinoic-acid-inducible protein I) and MDA5 (melanoma differentiation-associated protein 5).

Akira is the recipient of several international awards, including the Robert Koch Prize (2004), the William B. Coley Award (2006), the Milstein Award (2007), the Imperial Prize and Japan Academy Prize (academics) (2007), the Keio Medical Science Prize (2010), and the Gairdner Foundation International Award (2011). Besides being the world's most-cited scientist, he also on the list of most influential biomedical researchers.





Functional Diversity of Macrophage/ Monocyte Subsets

Macrophages play an important role in host defense and tissue repair. Macrophages are abundantly present in all tissues. Although tissue-resident macrophages were long thought to be of a single lineage, recent studies have shown that they can originate from different sources, including early embryonic hematopoiesis and adult bone marrow. Tissue-resident macrophages can enter the tissue during inflammatory events, such as infection, tissue injury, and diseases. Although tissue-resident macrophages have many functions, they are extremely heterogeneous in their phenotypes and surface marker expression.

Greg Hannon

* 1964

Cancer Research UK Cambridge Institute, University of Cambridge, UK

📅 December 14, 2017

Gregory Hannon is a pioneer in the study of small RNA biology and mammalian genomics.

Hannon received his BA in biochemistry in 1986 and his PhD in molecular biology in 1992 at Case Western Reserve University. He was formerly an HHMI Investigator and a professor at Cold Spring Harbor Laboratory. He served as Director of Cancer Genomics at the New York Genome Center. He is currently a Professor of Molecular Cancer Biology and a Senior Group Leader at the Cancer Research UK Cambridge Institute at the University of Cambridge. He is a Fellow of Trinity College, Cambridge, and an adjunct professor at Cold Spring Harbor Laboratory. In 2018 he became the Director of the Cancer Research UK Cambridge Institute.

The Hannon lab has focused on studying the roles of small RNAs in germ cells, which tend to have the most elaborate set of small RNA pathways of any cell type. They have discovered an essential role for small RNAs, called Piwi-interacting RNAs (piRNAs), which are critical for proper oocyte development and guard the genome against transposable elements. His lab also developed selective re-sequencing strategies (exome capture) that are used in the clinic to guide patient care. Furthermore, he developed tools and strategies for manipulation of gene expression, generated genome-wide short-harpin RNA libraries, and demonstrated the roles of microRNA in cancer. His research strives to understand the biology of cancer cells, with a focus on breast and pancreatic cancer. Another

research thrust of Hannon's team exploits the power of next-generation sequencing to understand the biology of the mammalian genome.



Hannon has accepted numerous awards including the Pew Scholar Award (1997), the US Army Breast Cancer Research Program Collaborative Scholars and Innovators Award (2002), the AACR Award for Outstanding Achievement in Cancer Research (2005), the National Academy of Sciences Award (2007), and the Memorial Sloan-Kettering Cancer Center Paul Marks Prize (2007). He has been a Member of the National Academy of Sciences since 2012, a Member of the Academy of Medical Sciences since 2017, a Member of EMBO and a Fellow of the Royal Society since 2018, a Fellow of the European Academy of Cancer Sciences since 2019, and a Fellow of the American Association for Cancer Research Academy since 2020.

A Small RNA-based Innate Immune System Guards the Integrity of Germ Cell Genomes



Elena Conti

* 1967

Max Planck Institute of Biochemistry, Germany

📅 March 6, 2018

After graduating in chemistry at the University of Pavia in 1991, Conti earned a PhD in biophysics at the Imperial College in London in 1996, with a dissertation on the crystal structure of firefly luciferase. From 1997 to 1999 she worked as a postdoctoral fellow at the Rockefeller University in New York City. From 1999 she was a group leader at the European Molecular Biology Laboratory in Heidelberg, Germany, and in 2006 she became director and a scientific member at the Max Planck Institute of Biochemistry in Martinsried, Germany, in the Structural Cell Biology Department.

The Conti group studies the cellular control mechanisms that monitor and eliminate RNA molecules that are either no longer needed or are aberrant because of deleterious genomic mutations or errors in their production. In recent years, Conti's group has deciphered the atomic structures and biochemical mechanisms of large macromolecular complexes involved in RNA recognition and degradation, such as the exosome and deadenylation complexes. Their current work aims at understanding how the RNA degradation machinery is physically coupled and coordinated with the translation machinery.

In 2008, Conti was awarded the Gottfried Wilhelm Leibniz Prize, the most prestigious prize awarded to researchers in Germany. In 2014 she received the Louis-Jeantet Prize for Medicine and in 2018 the Bijvoet Medal of the Bijvoet Center for Biomolecular Research of Utrecht University.



She is an elected member of the European Molecular Biology Organization and of the Academy of Sciences Leopoldina.

The RNA Exosome- Ribosome Connection: Coupling Synthesis to Degradation



Tom Misteli

* 1966

National Cancer Institute, NIH, Bethesda, USA

 **April 19, 2018**

Tom Misteli, PhD, is a Swiss-born cell biologist known for his pioneering work in the field of genome cell biology.

After completing a master's thesis in cell biology at the University of Basel, and a PhD in biochemistry at the University of London in 1995, he performed postdoctoral work at Cold Spring Harbor Laboratory. In 1999 he joined the NIH's National Cancer Institute (NCI) as a tenure-track Investigator, in 2005 was appointed Associate Director in the NCI Center for Cancer Research, and was named its Director in 2016. In the same year, he was also appointed as an NIH Distinguished Investigator.



Misteli's laboratory aims to uncover the fundamental principles of higher order genome organization and to apply this knowledge to the development of novel diagnostic and therapeutic strategies for cancer and aging. He is best known for his work on elucidation of how genomes function in living cells. While a postdoc at the Cold Spring Harbor Laboratory, he developed methods to visualize proteins in the nucleus of living mammalian cells, allowing for the first time the study of gene expression in intact cells. His

more recent work has focused on the role of genome organization and nuclear architecture on differentiation and disease. His cell biological elucidation of the mechanisms involved in Hutchinson-Gilford progeria syndrome has revealed novel mechanisms of human aging.

In recognition of his contributions Misteli has received numerous awards, including the 2011 Gold Medal of the First Faculty of Medicine of Charles University in Prague, the 2012 Flemming Award, the 2013 Wilhelm Bernhard Medal, and the 2016 Herman Beerman Award.

The Cell Biology of the Genome





*The Mendel Lecture is very unique.
The connection to history and the
excitement for the future of biology
is palpable.*

Mark Ptashne

* 1940

Sloan Kettering Memorial Cancer Center, New York, USA

 **May 3, 2018**

Mark Ptashne earned his undergraduate degree at Reed College in Portland, Oregon, in 1961 and his PhD from Harvard in 1968, after which he joined the faculty of Harvard. He was named professor there in 1971 and became chair of the Department of Biochemistry and Molecular Biology in 1980. In 1993 he was awarded an endowed chair, and in 1997 joined the Sloan Kettering Memorial Cancer Center in New York.



The focus of his scientific career has been gene regulation. Ptashne was the first scientist to demonstrate specific binding between protein and DNA, and his lifelong work has been the elucidation of the molecular mechanisms of switch between lytic and lysogenic lifecycle of bacteriophage lambda, as well as how the yeast transcriptional activator Gal4 works. Over the decades Ptashne and his laboratory not only clarified gene regulation in bacteriophage lambda, they extended these profound discoveries from bacteria to eukaryotes, making it possible to think about development and evolution rationally, in molecular terms. Ptashne's lab is currently immersed in a study of how gene regulators deal with the fact that genes in eukaryotes

are wrapped in nucleosomes, using new techniques for quantitating nucleosome formation.

In 1980 he cofounded Genetics Institute, Inc., with Thomas Maniatis, which at that time was new and considered controversial. In 1985, he was awarded the Louisa Gross Horwitz Prize from Columbia University. He won the Albert Lasker Award for Basic Medical Research in 1997, and the Massry Prize from the Keck School of Medicine, University of Southern California, in 1998. Mark Ptashne is a fellow of American Academy of Arts and Sciences and a member of the National Academy of Sciences. He has written popular books for a wider audience, including his book *Genes and Signals*.

The Logic of Gene Regulation





Steven Benner

* 1954

Foundation for Applied Molecular Evolution, Alachua, USA

 **May 17, 2018**

Steven Benner attended Yale University, receiving his BS and MS in molecular biophysics and biochemistry in 1976. He then continued at Harvard University, receiving his PhD in chemistry in 1979. After graduating, he was an assistant professor in the Department of Chemistry at Harvard University from 1982 to 1986. In 1986, he moved to ETH Zurich, where he stayed for 11 years. In 1997, Benner joined the University of Florida as a professor of both chemistry and anatomy and cell biology. He was appointed the v. t. and Louise Jackson Distinguished Professor of Chemistry at the University of Florida's Department of Chemistry in 2004. He left the University in late December 2005 to found the Westheimer Institute of Science and Technology (twist) and the Foundation for Applied Molecular Evolution. Benner also founded the companies EraGen Biosciences in 1999 and Firebird BioMolecular Sciences LLC in 2005.

Benner and his colleagues were the first to synthesize a gene encoding an enzyme, an important beginning in the field of protein engineering. He and his co-workers developed the first unnatural DNA base pair followed by six-letter artificially expanded genetic information. He was also instrumental in establishing the field of paleogenetics, where genes and proteins from ancient organisms are resurrected. Benner is deeply interested in the origin of life and the chemical conditions and processes needed to produce RNA ablogically, a key part of the RNA-world model for the origin of life. In particular, his work defined roles for impact

glasses, borate, opals, and molybdate as important to the abiological formation of carbohydrates and the stabilization of prebiotically formed RNA. He has worked with NASA to develop detectors for alien genetic materials, using the definition of life developed by the NASA Exobiology Discipline Working Group in 1992, "a self-sustaining chemical system capable of Darwinian evolution".

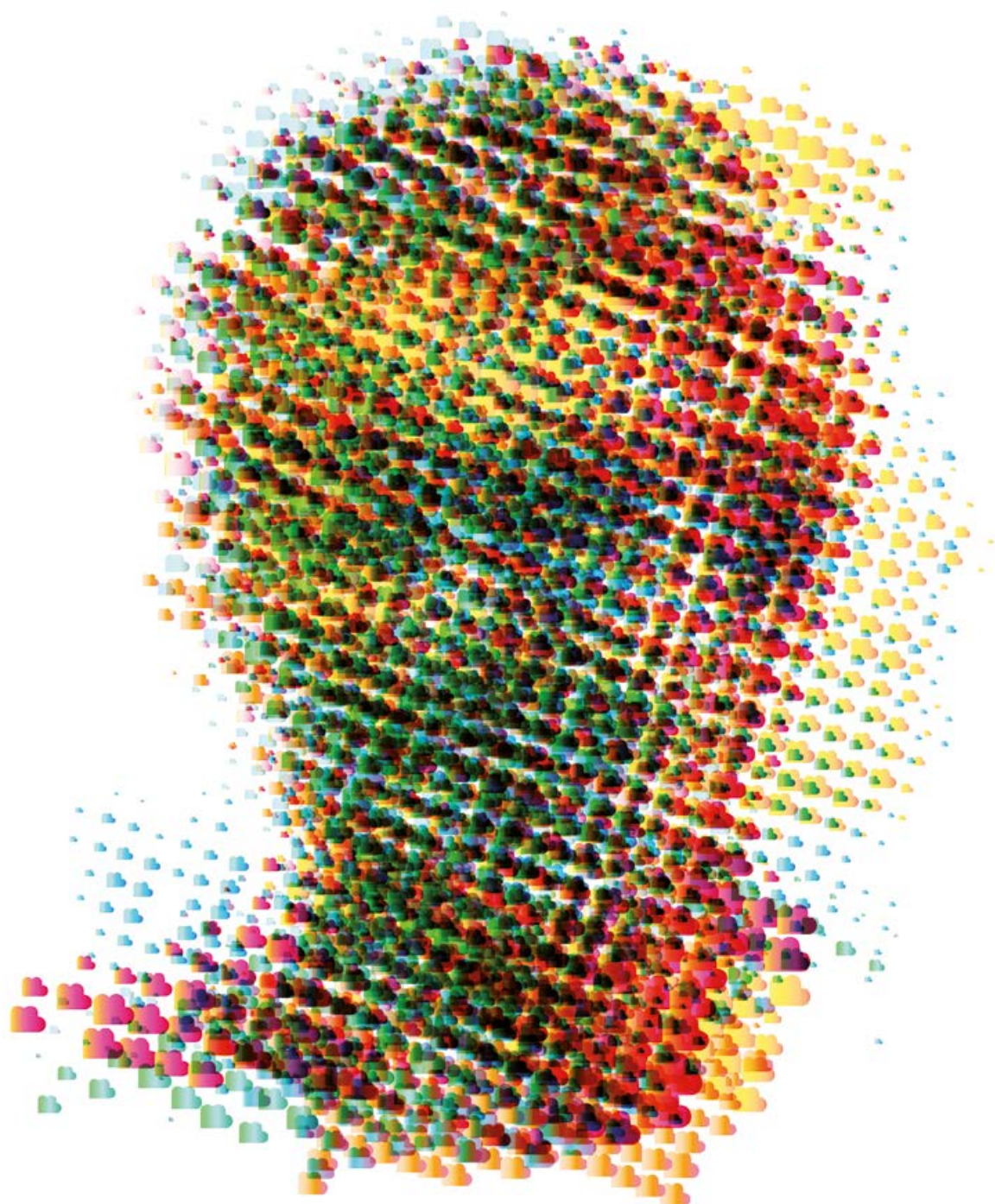
Benner is a recipient of several scientific awards, including the 1993 Anniversary Prize from the Federation of European Biochemical Societies, the 1998 Nolan Summer Award, the 2001 B. R. Baker Award, and the 2005 Sigma Xi Senior Faculty Award. He is a Fellow of the American Association for the Advancement of Science and a Fellow of the International Society for the Study of the Origin of Life.

Artificial Genetics and Evolution in the New Millennium





In addition to founding genetics, Mendel's legacy continues in a lecture series that, for me, introduced me to collaborators at Masaryk University who are helping to continue the tradition of genetics, here the genetics that comes from synthetic biology.



2018 — 2019

Eric F. Wieschaus

* 1947

*Howard Hughes Medical Institute / Department of Molecular Biology,
Princeton University, USA*

📅 October 4, 2018

Eric Francis Wieschaus is an American evolutionary developmental biologist and 1995 Nobel Prize winner.

Wieschaus obtained his BS in Biology from the University of Notre Dame in Indiana in 1969 and continued his studies at Yale University, obtaining his PhD in 1974. He pursued postdoctoral work at the University of Zurich, Switzerland, in 1975–1978. In 1978, he moved to his first independent job, at the European Molecular Biology Laboratory in Heidelberg, Germany, and in 1981 he moved to Princeton University in the United States where he became a Professor in 1997. The same year he became an HHMI Investigator.

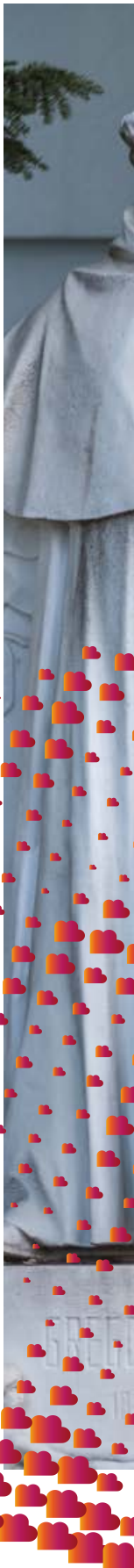


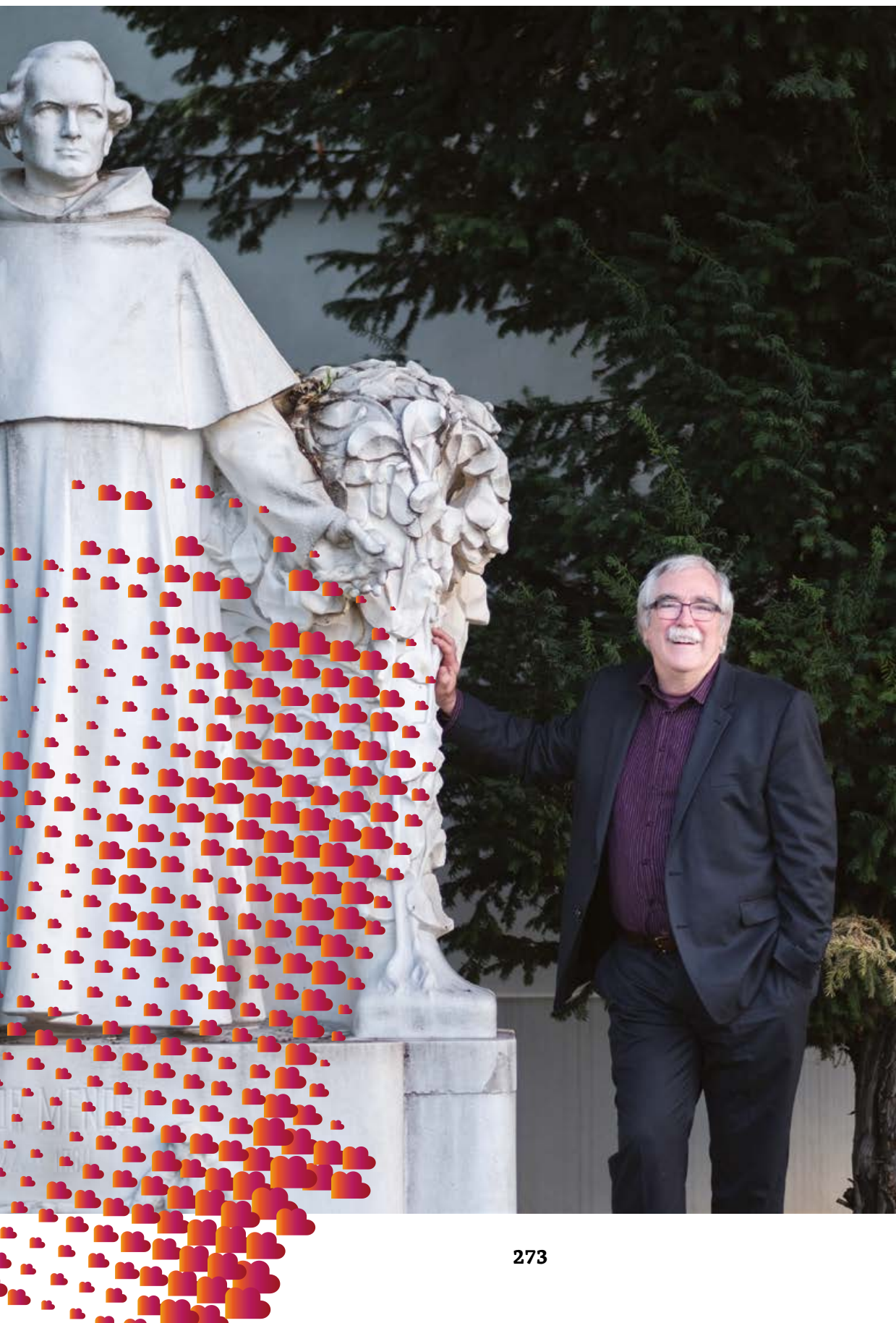
Much of his research has focused on embryogenesis in the fruit fly *Drosophila melanogaster*, specifically in the patterning that occurs in the early *Drosophila* embryo. Together with Nüsslein-Volhard, he discovered that about 5000 fruit fly genes are important for embryonic development, with 140 being essential. Their widely accepted model defined three sets of genes controlling subdivision in the developing embryo. Most of the gene products used by the embryo at these

stages are already present in the unfertilized egg and were produced by maternal transcription during oogenesis. A small number of gene products, however, are supplied by transcription in the embryo itself. He has focused on these “zygotically” active genes because he believes the temporal and spatial pattern of their transcription may provide the triggers controlling the normal sequence of embryonic development.

Wieschaus is a Fellow of the American Academy of Arts and Sciences (1993) and a Member of the National Academy of Sciences (1994). In 1995, he was awarded the Nobel Prize in Physiology or Medicine with Edward B. Lewis and Christiane Nüsslein-Volhard “for their discoveries concerning the genetic control of early embryonic development”. In 1998 he was elected a Member of the American Philosophical Society and a Member of EMBO, and in 2003 he was inducted into the NICHD Hall of Honor.

Genes and the Mechanics of Cell Shape





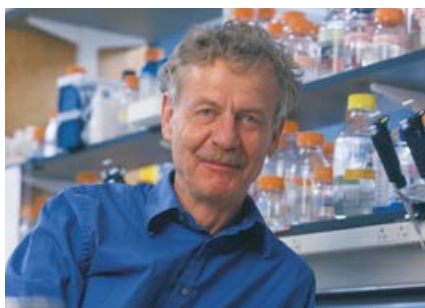
Rudolf Jaenisch

* 1942

Whitehead Institute for Biomedical Research, MIT, Cambridge, USA

📅 October 11, 2018

Rudolf Jaenisch is a founding member of the Whitehead Institute for Biomedical Research. He is a pioneer of transgenic science, in which an animal's genetic makeup is altered.



Jaenisch completed his MD at the University of Munich in 1967 and studied for another two years at Munich and the Max Planck Institute before moving to the United States in 1970 to carry out postdoctoral research at Princeton University, the Fox Chase Institute for Cancer Research, and subsequently at the Salk Institute. He returned to Germany in 1977 to become the head of the Department of Tumour Virology at the Heinrich Pette Institute at the University of Hamburg. After seven years in Germany, Jaenisch moved to the Whitehead Institute for Biomedical Research in Cambridge, Massachusetts.

His first breakthrough showed that foreign DNA could be integrated into the DNA of early mouse embryos, generating the first transgenic mammals in history. His current research focuses on the epigenetic regulation of gene expression, which has led to major advances in creating embryonic stem cells and

“induced pluripotent stem” (iPS) cells, and their use in therapeutic applications. In 2007, the Jaenisch laboratory was one of the first three laboratories worldwide to report reprogramming cells taken from a mouse's tail into iPS cells. He has since shown therapeutic benefits of iPS cell-based treatment for sickle-cell anaemia and Parkinson's disease in mice. Additional research focuses on the epigenetic mechanisms involved in cancer and brain development.



Jaenisch received various awards during his career, including the Inaugural Genetics Prize of the Gruber Foundation (2001), the Robert Koch Prize (2003), the Max Delbrück Medal (2006), the Vilcek Prize (2007), the National Medal of Science (2010), the Wolf Prize in Medicine (2011), and the Otto Warburg Medal (2014). He is a fellow of the American Academy of Arts and Sciences (from 1992) and an elected member of the US National Academy of Sciences (from 2003). He also served as president of the International Society for Stem Cell Research (2014–15).



Epigenetic Regulation in Development, Aging and Disease States

Patrick Sung

*1959

*Department of Molecular Biophysics and Biochemistry, Yale University /
University of Texas, USA*

📅 October 18, 2018

Patrick Sung obtained his BSc degree from the University of Liverpool in 1981 and his DPhil degree from Oxford University in 1985. He received his training as a postdoctoral fellow with Louise Prakash and Satya Prakash at the University of Rochester before joining the faculty at the University of Texas Medical Branch at Galveston in 1993. He moved to the University of Texas Health Sciences Center at San Antonio in 1997, where he became full professor in 2001. In 2003, he joined Yale University as a professor of molecular biophysics and biochemistry, where he also served two three-year terms as department chair between 2009 and 2015. He returned to the University of Texas Health Sciences Center at San Antonio in 2019 as a professor of biochemistry and structural biology, Associate Dean for Research in the Long School of Medicine, and the Robert A. Welch Distinguished Chair in Chemistry. He also serves as co-leader of the Cancer Development and Progression Program in the National Cancer Institute-designated Mays Cancer Center.

Sung's research focuses on DNA double-strand break repair by homologous recombination in yeast and humans. In 1994, he showed that the yeast RAD51 protein, a key member of the RAD52 epistasis group, mediates the homologous DNA pairing and strand exchange reaction central to all recombination-dependent processes, including the repair of DNA double-strand breaks. This finding marked the beginning of studies on homologous recombination enzymology in eukaryotic organisms and has created a

much-needed experimental framework for dissecting the role of the other proteins, including the tumour suppressors BRCA1 and BRCA2, in the recombination reaction.

Sung is a member of the Connecticut Academy of Science and Engineering and a recipient of the Recruitment of Established Investigators Award from the Cancer Prevention and Research Institute of Texas, and the Outstanding Investigator Award from the National Cancer Institute. He has served as an associate editor of the *Journal of Biological Chemistry* since 2014, being in charge of the DNA and Chromosomes section of the journal.



Mechanism of Homology- directed Chromosome Damage Repair in Eukaryotes



The Mendel Lectures honour the Father of Genetics and also serve as a fabulous tool to encourage students to pursue advanced biological research.

Richard J. Davidson

* 1951

Center for Healthy Minds, University of Wisconsin–Madison, USA

📅 March 14, 2019

Richard Davidson is a professor of psychology and psychiatry known for his ground-breaking work studying emotion and the brain.



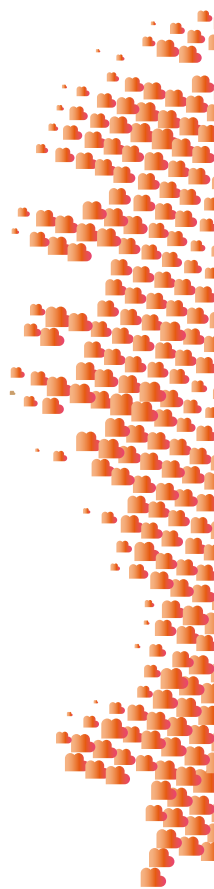
Davidson received his BA in psychology from New York University in 1972 and his PhD at Harvard University in personality, psychopathology, and psychophysiology in 1976. After that he took a teaching post at the State University of New York at Purchase where he subsequently held several posts including research consultancies at the Department of Pediatrics and Infant Laboratory at Roosevelt Hospital in New York, and the Laboratory of Neurosciences in the National Institute on Aging at the NIH. In 1984 he joined the faculty of the University of Wisconsin at Madison where he has worked since. He previously served as the director of the Laboratory for Affective Neuroscience and of the Waisman Laboratory for Brain Imaging and Behavior. He is founder and director of the Center for Healthy Minds.

Davidson's research is broadly focused on the neural bases of emotion and emotional style as well as methods to promote human flourishing, including meditation and related contemplative practices. He

has been popularizing the idea of the plasticity of brain, such that one can learn happiness and compassion as skills like sports or playing a music instrument. His studies have centred on people across the lifespan, from birth through old age. In addition, he has conducted studies involving individuals with emotional disorders such as mood and anxiety disorders and autism, as well as expert meditation practitioners with tens of thousands of hours of experience. Davidson has been a long-time friend of the 14th Dalai Lama, and some of his work involves research on the brain as it relates to meditation.



Davidson was nominated to the National Academy of Medicine and received the Distinguished Scientific Contribution Award for lifetime achievement from the American Psychological Association; the William James Fellow Award from the American Psychological Society; the Mani Bhaumik Award for advancing the understanding of the brain and conscious mind in healing; and the Paul D. MacLean Award for Outstanding Neuroscience Research in Psychosomatic Medicine.





Well-being Is a Skill: Perspectives From Affective and Contemplative Neuroscience

Emanuelle Charpentier

*1968

Max Planck Institute for Infection Biology, Berlin, Germany

📅 March 21, 2019

Emmanuelle Marie Charpentier is a French biologist known for her role in the discovery and characterization of the CRISPR/Cas9 system and winner of the 2020 Nobel Prize in Chemistry.

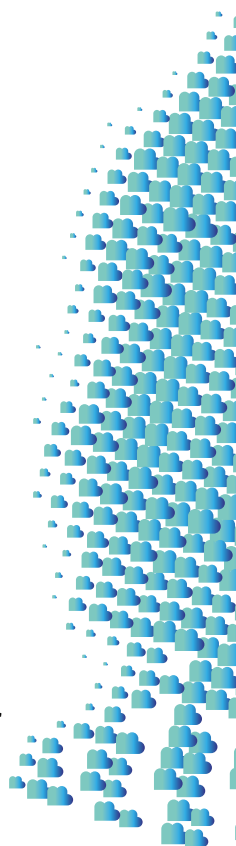


Charpentier studied biochemistry, microbiology and genetics at the Pierre and Marie Curie University (today the Faculty of Science of Sorbonne University) in Paris. She was a graduate student at the Institut Pasteur from 1992 to 1995, where she continued after graduation as a postdoctoral fellow (1995–1996) before moving to the United States for further postdoctoral research at the Rockefeller University in New York (1996–1997). She worked as an assistant research scientist at the New York University Medical Center from 1997 to 1999 and held the position of Research Associate at the St. Jude Children's Research Hospital and at the Skirball Institute of Biomolecular Medicine in New York (1999–2002). She returned to Europe and spent 2002–2009 at several departments of the University of Vienna. In 2009, Charpentier moved to Sweden to the Laboratory for Molecular Infection Medicine Sweden (MIMS) at Umeå University (till 2014). Then she moved to Germany as a department head

and Professor at the Helmholtz Centre for Infection Research in Braunschweig and the Hannover Medical School from 2013 until 2015. In 2015 she became a director at the Max Planck Institute for Infection Biology in Berlin. In 2018, she founded an independent research institute, the Max Planck Unit for the Science of Pathogens.

Charpentier is best known for her role in deciphering the molecular mechanisms of the bacterial CRISPR/Cas9 immune system and repurposing it into a tool for genome editing. In particular, she uncovered a novel mechanism for the maturation of a non-coding RNA which is pivotal in the function of CRISPR/Cas9. In collaboration with Jennifer Doudna's laboratory, Charpentier's laboratory showed that Cas9 could be used to make cuts in any DNA sequence desired. The method they developed involved the combination of Cas9 with easily created synthetic "guide RNA" molecules. Researchers worldwide have employed this method successfully to edit the DNA sequences of plants, animals, and laboratory cell lines.

Charpentier has been awarded numerous international prizes, awards, and acknowledgements, including the Breakthrough Prize in Life Sciences (2015), the Louis-Jeantet Prize for Medicine (2015), the Gruber Foundation International Prize in Genetics (2015), the Leibniz Prize (2016), the Canada Gairdner International Award (2016), the Tang Prize (2016), the Japan Prize (2017), and the Kavli Prize in Nanoscience. She also received the BBVA Foundation Frontiers of



Knowledge Award jointly with Jennifer Doudna and Francisco Mojica, whose pioneering work has ignited “the revolution in biology permitted by CRISPR/Cas9 techniques”. In 2020, Charpentier, together with Jennifer Doudna of the University of California, Berkeley, was awarded the Nobel Prize in Chemistry “for the development of a method for genome editing”.

In 2013, Charpentier co-founded CRISPR Therapeutics and ERS Genomics along with Shaun Foy and Rodger Novak.

CRISPR/Cas9: A Bacterial Immune System Repurposed as a Transformative Genome Engineering Technology



Manolis Kellis

* 1977

Computer Science & Artificial Intelligence Lab and the Broad Institute of MIT and Harvard, USA

📅 May 2, 2019

Dr. Kellis lived in Greece and France before moving to the USA, where he studied and conducted research at MIT, the Xerox Palo Alto Research Center, and the Cold Spring Harbor Lab.

He obtained his BS in 1999 and PhD in 2003 from the Massachusetts Institute of Technology. He worked as a postdoctoral fellow at Cold Spring Harbor and Harvard (2003–2004). Prior to his work on computational biology, he worked at MIT and at the Xerox Palo Alto Research Center on artificial intelligence, sketch and image recognition, robotics, and computational geometry. He is a professor of computer science at MIT, a member of the Broad Institute of MIT and Harvard, a principal investigator of the Computer Science and Artificial Intelligence Lab at MIT, and head of the MIT Computational Biology Group.

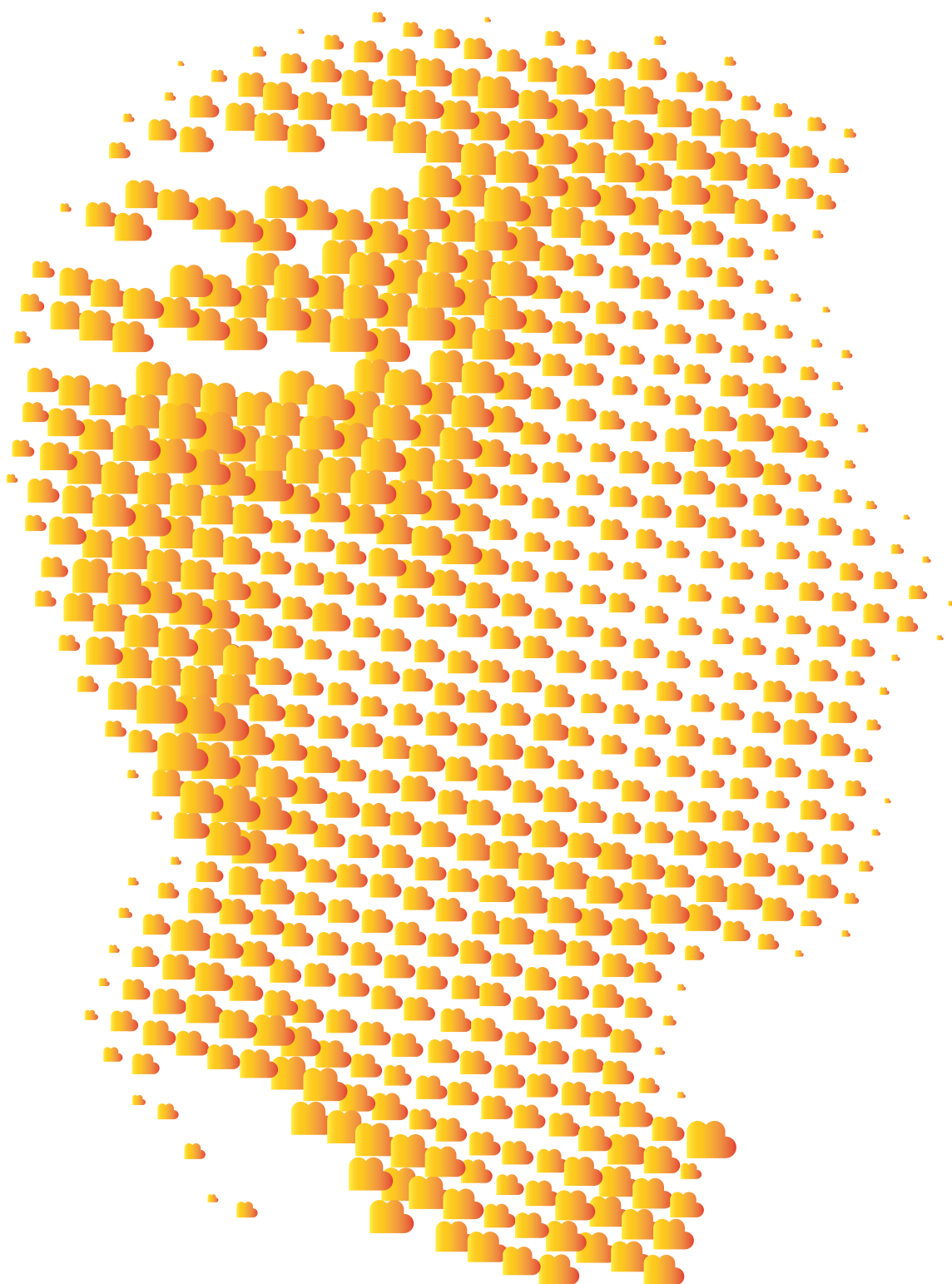


His research focuses on disease circuitry, genetics, genomics, epigenomics, coding genes, non-coding RNAs, regulatory genomics, and comparative genomics, and how they underpin disorders and diseases such as Alzheimer's disease, obesity, schizophrenia, cardiac disorders, cancer, and immune disorders. Dr. Kellis has led

several large-scale genomics projects, including the Roadmap Epigenomics project, the ENCODE project, the Genotype Tissue-Expression (GTEx) project, and comparative genomics projects in mammals, flies, and yeasts.

He received the US Presidential Early Career Award for Scientists and Engineers (PECASE) from US President Barack Obama, the Mendel Medal for Outstanding Achievements in Science, the NIH Director's Transformative Research Award, the Boston Patent Law Association award, the NSF CAREER award, the Alfred P. Sloan Fellowship, the Technology Review TR35 recognition, the AIT Niki Award, and the Sprowls award for the best PhD thesis in computer science at MIT. He has authored over 245 journal publications has been cited more than 130,000 times, and obtained more than 20 multi-year grants from the NIH. His trainees hold faculty positions at Stanford, Harvard, CMU, McGill, Johns Hopkins, UCLA, and other top universities.

From Genomics to Therapeutics: Uncovering and Manipulating the Genetic Circuitry of Human Disease



Sir Fraser Stoddart

* 1942

Department of Chemistry, Northwestern University, Evanston, USA

 **May 16, 2019**

Sir James Fraser Stoddart is a Scottish-born chemist and laureate of the 2016 Nobel Prize in Chemistry.

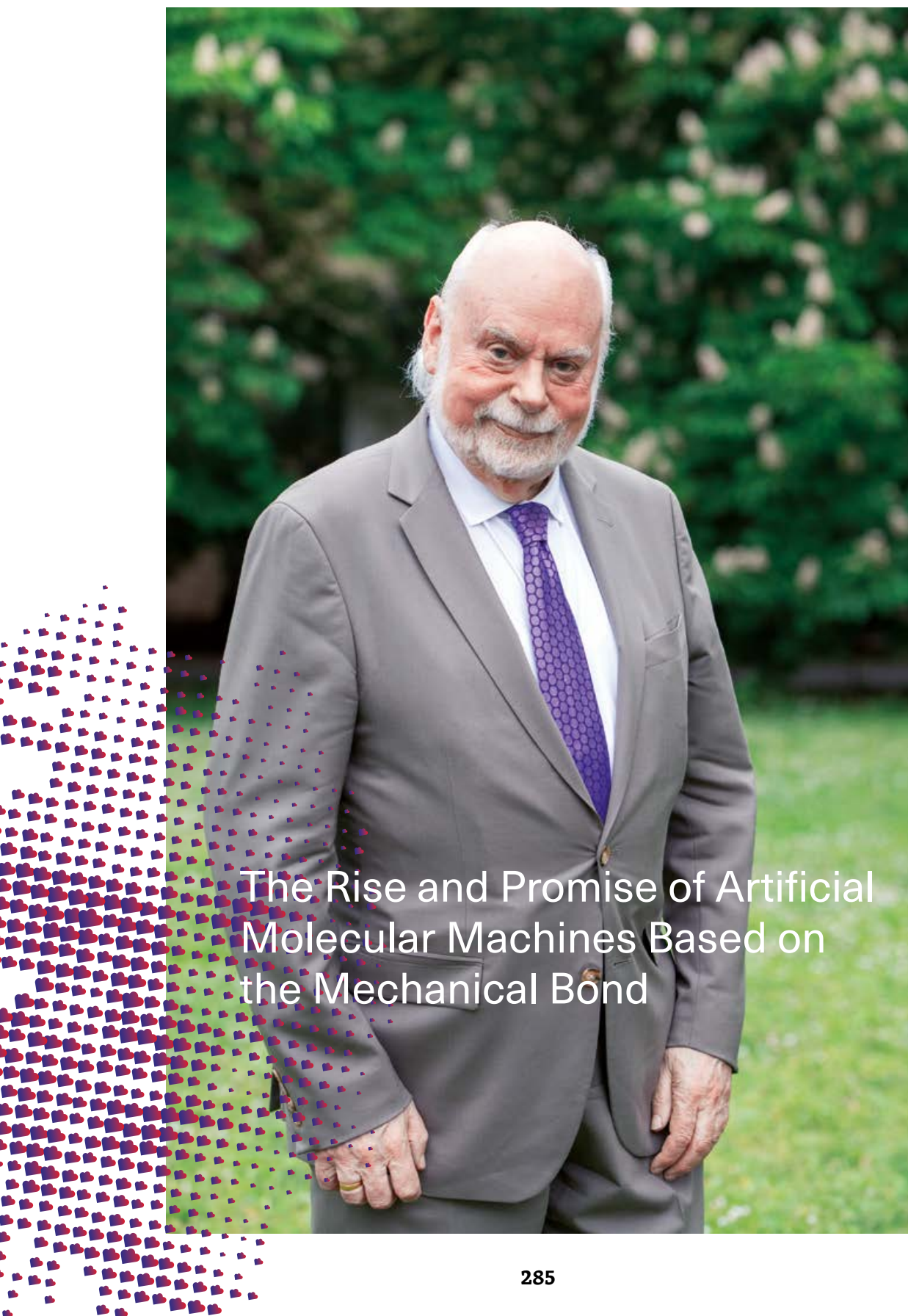


Fraser Stoddart received his BSc (1964) and PhD (1966) degrees from Edinburgh University. In 1967, he went to Queen's University in Canada as a Postdoctoral Fellow, and in 1970 to Sheffield University as a Research Fellow. He was a Senior Visiting Fellow at the University of California, Los Angeles (UCLA) in 1978. After spending a sabbatical (1978–81) at the ICI Corporate Laboratory in Runcorn, he returned to Sheffield where he was promoted to a Readership in 1982. He was awarded a DSc Degree by Edinburgh in 1980 for his research into “stereochemistry beyond the molecule”. In 1990, he took up the Chair of Organic Chemistry at Birmingham University and was Head of the School of Chemistry there (1993–97) before moving to UCLA as a Professor of Chemistry in 1997. In July 2002, he became Co-Director of the California NanoSystems Institute (CNSI). In 2003, he was appointed Director of the CNSI, where he stayed till 2007, and assumed the Fred Kavli Chair of NanoSystems Sciences. In 2008 he joined the faculty at Northwestern University and was appointed Emeritus Professor of Chemistry at UCLA.

Stoddart is one of the few chemists of the past several decades to have created a new field of organic chemistry – namely, one in which the mechanical bond is a pre-eminent feature of molecular compounds. He has pioneered the development of the use of molecular recognition and self-assembly processes in template-directed protocols for the syntheses of two-state mechanically interlocked molecules (MIMS) (i.e. bistable catenanes and rotaxanes). They have been employed as molecular switches that operate based on the movement of the various components with respect to each other. These molecules have potential uses in the fabrication of molecular electronic devices (MEDS) and Nano Electro Mechanical Systems (NEMS) and in the development of artificial molecular machines (AMMs).

His efforts have been recognized by numerous awards including the Carbohydrate Chemistry Award (1978), the International Izatt-Christensen Award (1993), the Cope Scholar Award (1999), the Nagoya Gold Medal (2004), the King Faisal International Prize (2007), the Albert Einstein World Award of Science (2007), the Cope Award of the American Chemical Society (2008), the Davy Medal of the Royal Society (2008), and the Science and Technology Cooperative Award of the Chinese Government (2019). In 2016 he shared the Nobel Prize in Chemistry together with Ben Feringa and Jean-Pierre Sauvage “for the design and synthesis of molecular machines”.





The Rise and Promise of Artificial Molecular Machines Based on the Mechanical Bond

Andrew G. Myers

*1959

Department of Chemistry and Chemical Biology, Harvard University, Cambridge, USA

May 23, 2019

Andrew G. Myers graduated from MIT in 1981 with a BSc and followed with study at Harvard University from 1981–1986, both as a graduate student and then briefly as a postdoctoral researcher. Myers began his independent academic career at Caltech (1986), where he was Assistant, Associate, and then full Professor (1994). In 1998, he moved to the Department of Chemistry and Chemical Biology at Harvard University, served as Chair of the Department from 2007–2010, and is currently Amory Houghton Professor of Chemistry.



Myers' research involves the synthesis and study of complex molecules of importance in biology and human medicine. His group has developed laboratory synthetic routes to a broad array of complex natural products, including the ene-diyne antibiotics neocarzinostatin chromophore, dynemicin A, N1999A2, and kedarcidin chromophore, undertakings greatly complicated by the chemical instability of all members of the class. His laboratory developed the first practical synthetic route to the tetracycline antibiotics, allowing for the synthesis of more than three thousand fully synthetic analogues by a scalable process. Among

these was the antibiotic eravacycline, approved (FDA, EMA) for the treatment of complicated intra-abdominal infections, discovered and manufactured using Myers' chemistry. Platform technology his laboratory developed for the synthesis and discovery of new macrolide antibiotics led to the commercial production of more than 2,000 novel candidates. In 2021 the Myers laboratory reported the discovery of the iboxamycin class of synthetic antibiotics, with potent activity against bacterial strains broadly resistant to virtually all current antibacterial drugs. His laboratory is dedicated to the development of highly convergent synthetic pathways that provide practical, scalable solutions for the construction of molecular classes multiplicatively expanded by incorporation of modular variations.

Myers has also discovered numerous fundamental transformations in organic chemistry, many of which bear his name. These include the Myers-Saito cyclization, the Myers deoxygenation reaction, the Myers allene synthesis, the Myers reductive coupling reaction, and the suite of extremely practical transformations collectively known as Myers asymmetric alkylation chemistry, used for the construction of optically active ketones, carboxylic acids, primary alcohols, aldehydes, and alpha-amino acids.

A photograph of a middle-aged man with grey hair, smiling, standing outdoors. He is wearing a grey blazer over a blue and white checkered shirt and dark trousers. In the background, there is a large, light-colored stone statue of a person in a long robe, possibly a monk or saint, set against a backdrop of green foliage.

Progress Toward the Discovery
of New Antibiotics with Efficacy
Against Multi-drug Resistant
Bacterial Pathogens

Roel Nusse

*1950

Howard Hughes Medical Institute, Department of Developmental Biology, Stanford University, School of Medicine, Stanford, USA

May 30, 2019

Dr. Roel Nusse's research was seminal in the discovery of Wnt signalling, a family of pleiotropic regulators involved in development and disease.



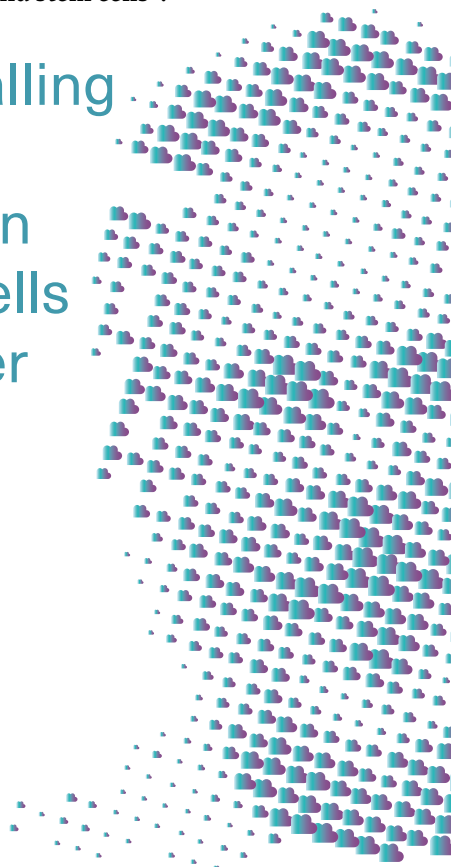
Nusse holds a BS and PhD from the University of Amsterdam. He did a postdoctoral fellowship under the guidance of Harold Varmus at the University of California, San Francisco, where in 1982 Nusse and Varmus discovered the Wnt1 gene. Following his postdoctoral training, he joined the Netherlands Cancer Institute and carried out much of the foundational work on Wnt signalling in fruit flies. He joined the Developmental Biology Department at Stanford University and the Howard Hughes Medical Institute in 1990.

The Nusse Laboratory at Stanford studies the function of Wnt signalling molecules during the proliferation and differentiation of stem cells, with the aim of understanding the regulation of the growth, development, and integrity of a wide variety of animal tissues. Working *in vivo* and in cell culture, the team studies multiple different organs and stem cell types, trying to identify common principles, and then extends these investigations

to cancer and injury repair. They seek to understand the impacts of physiological changes, such as those occurring during hormonal stimuli, injury, or tissue degeneration, on stem cell signalling and function.

Nusse is a member of the US National Academy of Sciences, the American Academy of Arts and Sciences, the European Molecular Biology Organization, and the Royal Dutch Academy of Sciences (since 1997). He has received numerous awards including the Peter Debye Prize from the University of Maastricht in 2000, the 2017 Breakthrough Prize in Life Sciences, the 2020 Canada Gairdner International Award "for pioneering work on the Wnt signalling pathway and its importance in development, cancer and stem cells".

Wnt Signalling and the Generation of New Cells in the Liver





I felt greatly honoured to deliver a Mendel Lecture in 2019 and to be able to visit the monastery where Mendel discovered the fundamental laws of genetics.





2019 — 2020

Stefan Knapp

* 1965

SGC Frankfurt, Germany

📅 October 3, 2019

Stefan Knapp studied chemistry at the University of Marburg and the University of Illinois. He did his PhD work in protein crystallography at the Karolinska Institute in Stockholm and continued his career at the Karolinska Institute as a postdoctoral scientist (1996–1999). In 1999, he joined the Pharmacia Corporation as a principal research scientist in structural biology and biophysics. He left the company in 2004 to set up a research group at the Structural Genomics Consortium at Oxford University (SGC). From 2008 to 2015 he was a professor of structural biology at the Nuffield Department of Clinical Medicine (NDM) at Oxford University and between 2012 and 2015 he was the Director for Chemical Biology at the Target Discovery Institute (TDI). He joined Frankfurt University in Germany in 2015 as a professor of pharmaceutical chemistry. Since 2017 he has been the chief science officer of the newly founded SGC node at the Goethe-University Frankfurt.



Knapp's research focuses on understanding the molecular mechanisms that regulate the protein function of key signalling molecules and how these mechanisms can be utilized for the development of highly selective and potent inhibitors (so-called

chemical probes). As a basis for this work his group has generated a comprehensive set of high-resolution crystal structures that cover most members of the protein family of interest. His research team is particularly interested in targeting protein interactions modules such as bromodomains that specifically recognize ϵ -N-lysine acetylation motifs, a key event in the reading process of epigenetic marks. A second major research focus is protein kinases. His laboratory has determined an impressive number of crystal structures of this large protein family, offering the opportunity to understand the molecular mechanisms of their regulation and developing new strategies for their selective targeting.



The scientific contributions of Stefan Knapp have been recognized with many awards and honours, including the 2014 Rita and John Cornforth Award of the Royal Society of Chemistry and the 2017 Biochemical Society Award. He has been a Member of the American Chemical Society since 2012, a Fellow of the American Chemical Society since 2012, and an EMBO Member since 2018.



Challenges of Selective Targeting of Protein Kinases in Cellular Environments

It was a great honour to have been invited to this prestigious lecture series commemorating the founder of modern day genetic research.

Andrés Aguilera

* 1957

Department of Molecular Biology, University of Seville, Spain

📅 November 7, 2019

Andrés Aguilera obtained his PhD in Seville in 1983. After two postdoctoral stays in the Darmstadt Technical University (GER) and the New York University Medical Center (USA), he started his own lab dedicated to genome instability in 1991 at the University of Seville. He is co-founder and director of the Andalusian Centre for Molecular Biology and Regenerative Medicine (CABIMER).



His main research interests are the mechanisms by which replication stress, transcription and RNA processing and export cause genome instability. Using yeast and human cells, he identified and characterized several factors involved in counteracting transcription-replication conflicts through regulation of the invasion of RNA transcripts into dsDNA, known as R-loop formation. His research

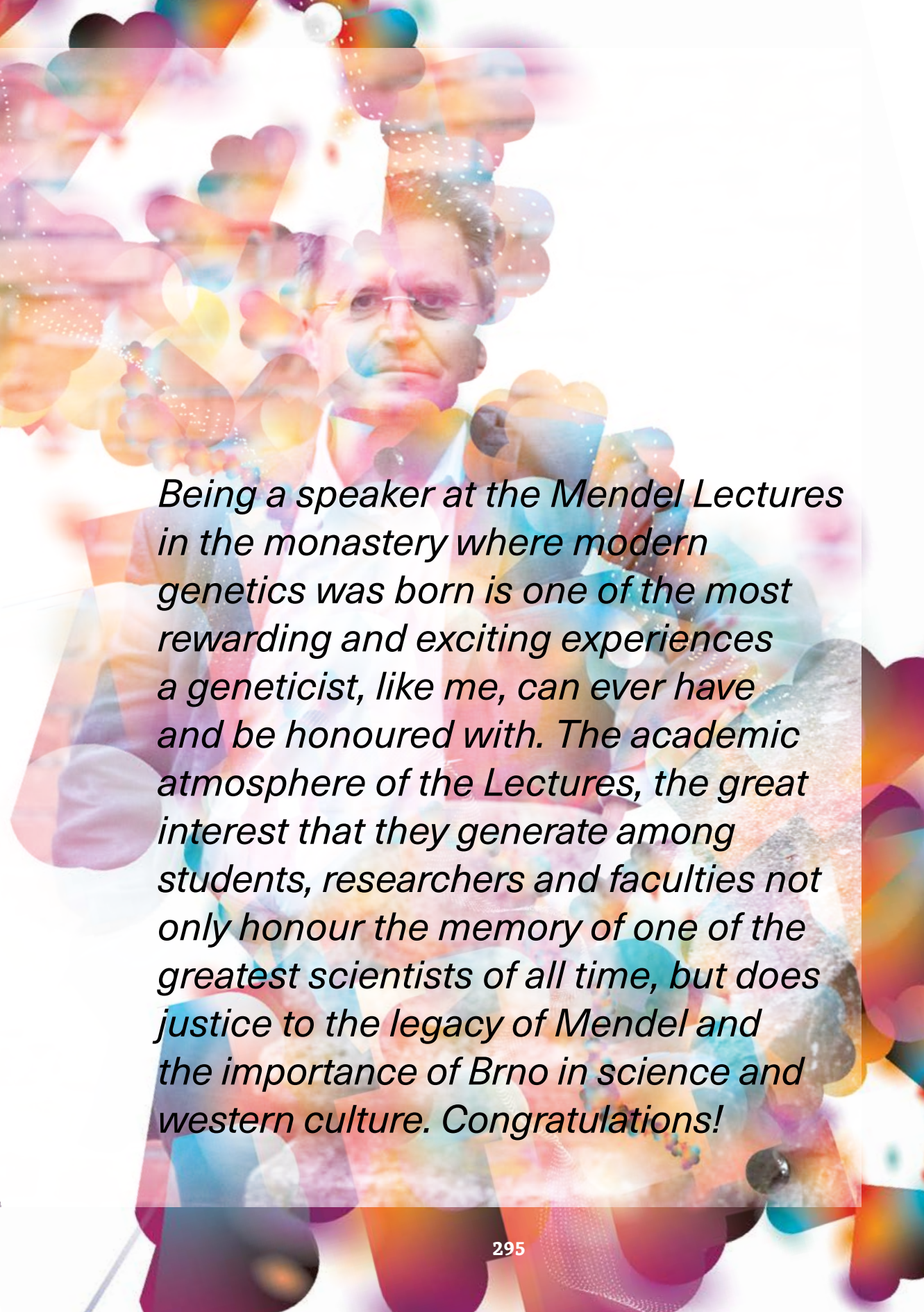
identified the THO complex and its function in mRNP biogenesis and R-loop prevention in genome instability.



He demonstrated a connection between R-loop metabolism and chromatin modifications, and has contributed greatly to understanding the mechanisms by which transcription-replication conflicts cause replication stress and genome instability, commonly associated with aging and cancer predisposition.

Andrés Aguilera has been a member of EMBO since 2000 and has been awarded several national scientific prizes in Spain, including the Carmen y Severo Ochoa Prize for Molecular Biology, the Francisco Cobos Foundation Prize in Biomedicine, and the National Prize of Genetics.

RNA-mediated Genome Instability



Being a speaker at the Mendel Lectures in the monastery where modern genetics was born is one of the most rewarding and exciting experiences a geneticist, like me, can ever have and be honoured with. The academic atmosphere of the Lectures, the great interest that they generate among students, researchers and faculties not only honour the memory of one of the greatest scientists of all time, but does justice to the legacy of Mendel and the importance of Brno in science and western culture. Congratulations!

Caroline Dean

* 1957

John Innes Centre Norwich, UK

📅 November 14, 2019

Caroline Dean is a British plant scientist working on understanding the molecular mechanism used by plants to seasonally control when to flower.



Dean was educated at the University of York, where she was awarded a Bachelor of Arts in Biology in 1978 and a PhD in Biology in 1982. She then spent five years as a postdoctoral research fellow in a biotech company working on how to achieve high level protein expression in transgenic plants at Advanced Genetic Sciences, Oakland, California. She took up an independent group leader position at the John Innes Centre, Norwich, UK in September 1988 and served there as Associate Research Director in 1999–2008.

Dean has made outstanding contributions in the research of developmental timing in plants. Her work has revealed the mechanism by which plants remember they have experienced winter. Furthermore, she demonstrated novel RNA processing mechanisms controlling flowering and determined the molecular basis of natural variation in *Arabidopsis* flowering time. This mechanistic analysis is focused on floral repressor FLC and its epigenetic switching and regulation. Her

discoveries have broad significance in the fields of epigenetics, post-transcriptional regulation, and molecular evolution. Dean has also made a massive contribution to the development of *Arabidopsis* as a model, establishing resources for genetic mapping and insertional mutagenesis, and providing the physical maps that underpinned the sequencing of the genome.



Dean was elected to EMBO in 1999, became a Fellow of the Royal Society in 2004, and joined the US National Academy and German Leopoldina Academy in 2008. She was awarded the Genetics Society Medal in 2007, a BBSRC Excellence in Bioscience award in 2014, the FEBS/EMBO Woman in Science award in 2015, the Royal Society Darwin Medal, and was appointed Dame Commander in 2016. She was awarded a 2018 L'Oreal Woman in Science Laureate and in 2019 a Royal Society Professorship to link her laboratory's activities with structural analysis at the Laboratory of Molecular Biology, Cambridge. In 2020 she received the Wolf Prize in Agriculture.



Antisense-mediated Chromatin Regulation

*It was a delight and honour to
give the Mendel Lecture and visit
the site where Gregor Mendel
undertook his important work
on peas.*

Gerald P. Schatten

* 1949

UNESCO's International Cell Research Organization / Ob-Gyn-Repro Sci and Bioengineering / Pittsburgh Development Center, University of Pittsburgh, USA

📅 November 21, 2019

Gerald (Jerry) Schatten is a cell and developmental biologist who studies the first and last moments in every organism's life, i.e. fertilization at the beginning and in the adult gametogenesis, respectively. His team has pioneered advanced imaging of fertilization *in vitro* and during clinical ART (Assisted Reproductive Technologies) in humans and many other species, with special attention to the centriole and centrosome partially transmitted by the sperm to create the zygote and sperm-triggered calcium waves during egg activation.



After earning his AB and PhD degrees under renowned Professor Daniel Mazia at the University of California at Berkeley, the Rockefeller Foundation sponsored his postdoctoral studies at Berkeley and the German Cancer Research Center. Professor Schatten has held appointments at the Florida State University, University of Wisconsin – Madison, and the Oregon Health and Sciences University, with affiliations at the Wisconsin, and later Oregon, National Primate Research Centers, and now the Magee-Womens Research Institute and Foundation.

He is currently Professor of Obstetrics-Gynecology-Reproductive Sciences; Cell Biology and Bioengineering, Director of the Ob-Gyn-RS Division of Development and Regenerative Medicine at the University of Pittsburgh's Schools of Medicine and Engineering, and he directs the Pittsburgh Development Center and is a member of the McGowan Center for Regenerative Medicine and Pitt's NIH-sponsored Cancer Center.



As the President of UNESCO's International Cell Research Organization (ICRO), he has launched successful self-sustaining NIH-sponsored training and mentoring courses at the MBL in Woods Hole (Reproduction; Stem Cells and Regeneration) as well as numerous under-represented venues within the USA and globally: domestically, at HBCUs (Historically Black Colleges and Universities) like Morehouse School of Medicine, Xavier University of New Orleans, and Howard University; HSIs (Hispanic-speaking institutions) like Puerto Rico's Ponce Health and Science University, San Diego State-uc San Diego; and in 2022 partnering in Duluth with JHU's Center for American Indian Health at their Great Lakes Hub. Globally, he has

organized influential programmes in South Africa (less than three weeks after Nelson Mandela became president), Chile, China, Czech Republic, Egypt, Israel, India, Jordan, Slovakia, Slovenia, Sri Lanka, Tanzania, Thailand, Taiwan, and Turkey, among others.

He has been awarded numerous NIH grants, including a ten-year MERIT award; election as an AAAS Fellow and Delegate; the Doctor Honoris Causa from the University of Nova Gorica, presented by the President of Slovenia; the Czech Academy of Sciences' Purkinje Medal of Science; a Mentor Award from the American Society for Cell Biology; the Daniel Mazia Award from Stanford University; and the Gregor Mendel Medal for Outstanding Scientific Accomplishments, awarded at Mendel's monastery in Czech Republic. Former President Barak Obama and First Lady Michelle Obama's Netflix movie *Crip Camp* documents the disabled youth leaders who fought for, and eventually enabled, the enactment of the Americans with Disabilities Act, and Professor Schatten's contributions in 1969 and 1970 at the featured Camp Jened and later his hosting of those future leaders at his Berkeley domicile. His more than 300 papers on development, stem cells, regeneration, fertilization, cell biology, imaging, and clinical infertility, as well as strategies for rectifying past injustices in scientific careers, have appeared in premier journals, including *Nature* and *Science*, and he has been an Editorial Board Member for *Scientific Reports*.

Would Gregor Mendel Be Alarmed that Designer Babies Walk Among Us?



Adrian Krainer

* 1958

Cold Spring Harbor Laboratory, USA

📅 March 5, 2020

Adrian R. Krainer is a Uruguayan-American biochemist and molecular geneticist whose research focuses on the mechanisms, regulation, and fidelity of pre-mRNA splicing.



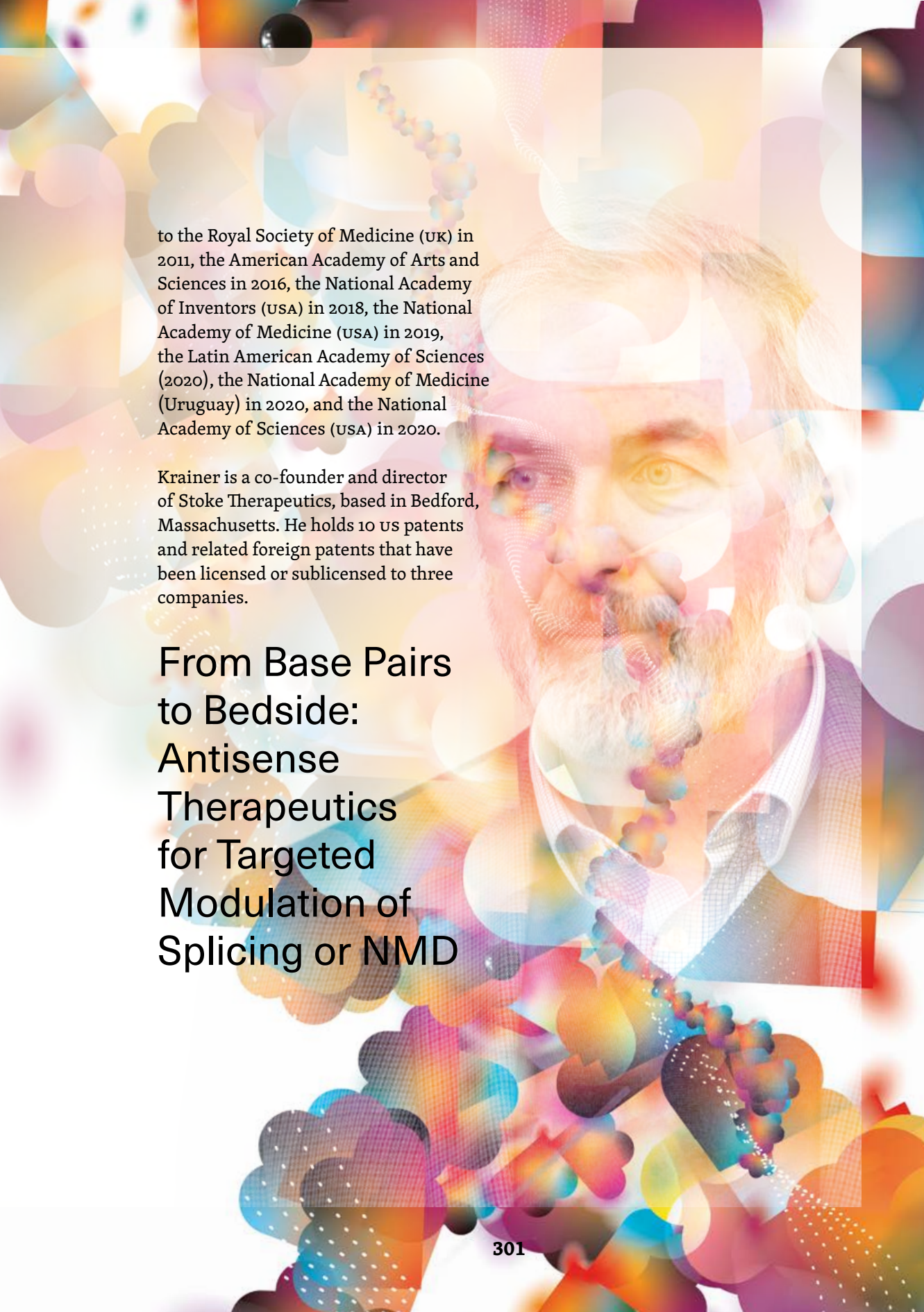
Krainer completed a BA degree in Biochemistry at Columbia University in 1981, and earned a PhD degree in Biochemistry from Harvard University in 1986. He then spent three years as a Fellow at the Cold Spring Harbor Laboratory, after which he joined the faculty, becoming a full professor in 1994. He also serves as Deputy Director of Research of the NCI-designated CSHL Cancer Research Center (since 2019). Krainer is also a faculty member of the graduate programmes in Genetics, Molecular and Cellular Biology, and Molecular Genetics and Microbiology at Stony Brook University. He served as the president of the RNA Society in 2014.

His lab uses multidisciplinary approaches to elucidate splicing mechanisms, alternative splicing regulation, underlying RNA-RNA and RNA-protein interactions, and the role of defective splicing in genetic diseases and cancer. He identified, purified, and functionally characterized the first human protein splicing factor,

SRSF1. Utilizing antisense technology, he developed novel therapeutics that target pre-mRNA or mRNA to post-transcriptionally modulate gene expression. He used this knowledge to develop, in collaboration with Ionis Pharmaceuticals and Biogen, the antisense oligonucleotide nusinersen (Spinraza), the first drug approved to treat the neurodegenerative disease spinal muscular atrophy. Krainer's research has also implicated splicing alterations in carcinogenesis, and his lab is currently pursuing antisense-therapeutic approaches in the context of various genetic diseases and cancers.



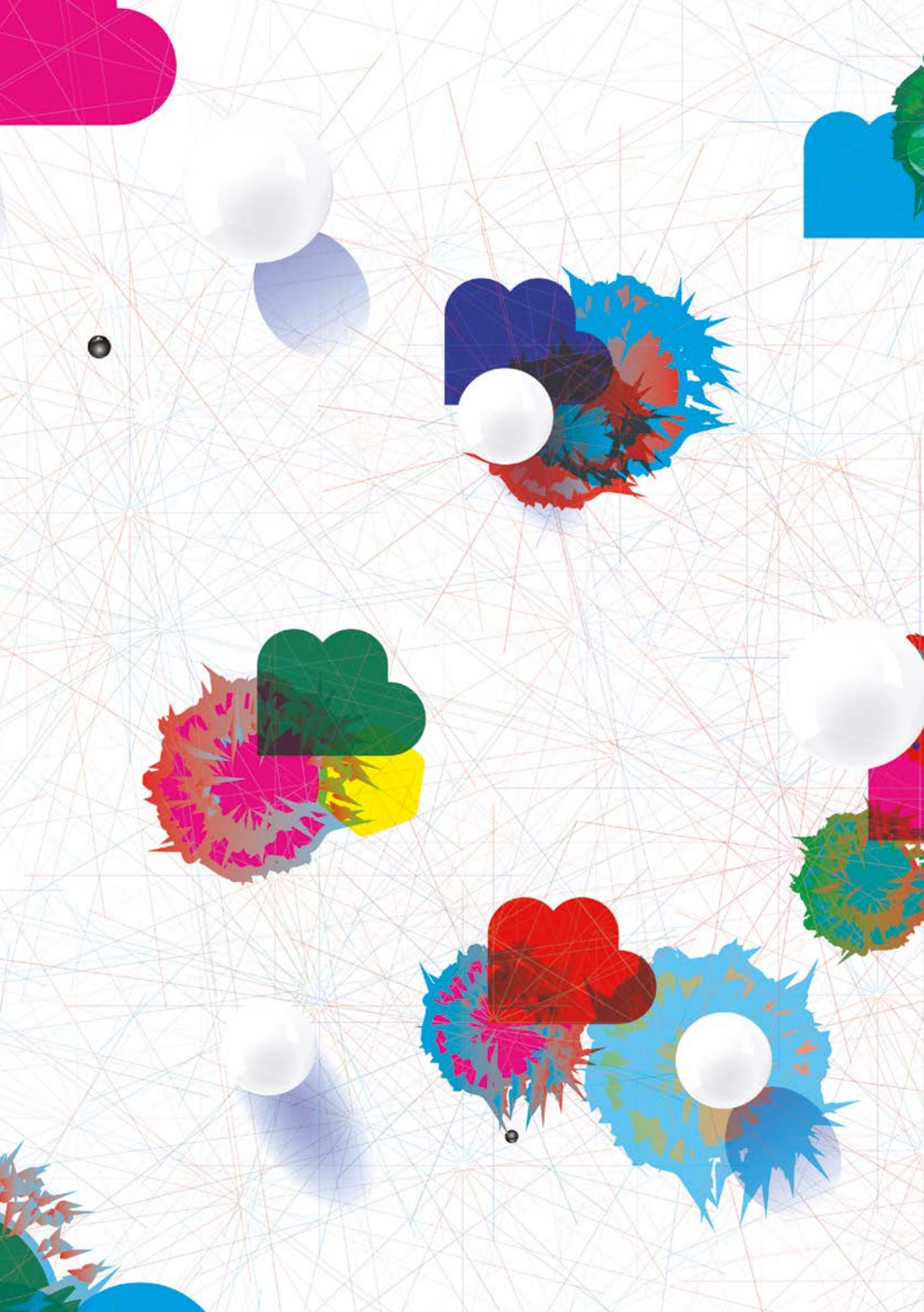
For his achievements in science, Krainer has received the 2019 Breakthrough Prize in Life Sciences, the 2019 RNA Society's Lifetime Achievement Award, the 2019 Gertrud Reemtsma Foundation's International Prize for Translational Neuroscience, the 2019 ETH-Zurich's Peter Speiser Award in Pharmaceutical Sciences, the 2020 Ross Prize in Molecular Medicine, the 2020 Takeda Pharmaceuticals' Innovators in Science Senior Scientist Award in Rare Diseases, the 2021 Wolf Prize in Medicine, and the 2021 Jacob and Louise Gabbay Award in Biotechnology and Medicine. Professor Krainer was elected

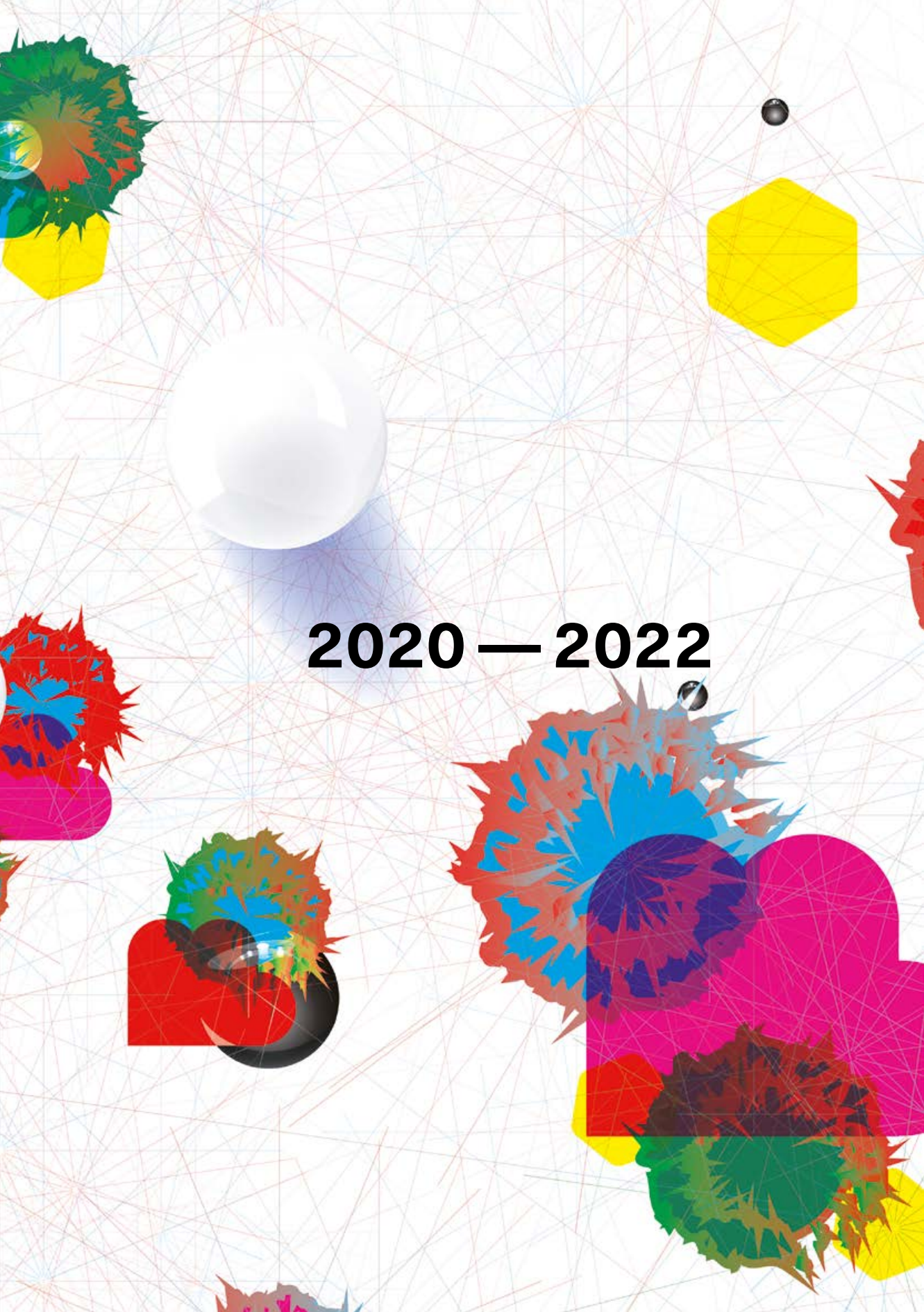


to the Royal Society of Medicine (UK) in 2011, the American Academy of Arts and Sciences in 2016, the National Academy of Inventors (USA) in 2018, the National Academy of Medicine (USA) in 2019, the Latin American Academy of Sciences (2020), the National Academy of Medicine (Uruguay) in 2020, and the National Academy of Sciences (USA) in 2020.

Krainer is a co-founder and director of Stoke Therapeutics, based in Bedford, Massachusetts. He holds 10 US patents and related foreign patents that have been licensed or sublicensed to three companies.

From Base Pairs to Bedside: Antisense Therapeutics for Targeted Modulation of Splicing or NMD





2020 — 2022

Andrew deMello

* 1970

ETH Zürich, Switzerland

📅 September 16, 2021

Andrew deMello obtained a bachelor's degree in Chemistry and a PhD in Molecular Photophysics from Imperial College London. Subsequently he took up a post-doctoral fellowship in the Department of Chemistry at the University of California, Berkeley. Prior to his appointment as Professor of Biochemical Engineering at ETH Zürich, he was a professor in the Chemistry Department at Imperial College London between 1996 and 2011 and Head of the Nanostructured Materials and Devices Section.



His group is engaged in a range of activities in the fields of microfluidics and nanoscale science. His primary specializations include the development of microfluidic devices for high-throughput biological experimentation, ultra-sensitive optical detection techniques, and point-of-care diagnostics. A key focus of recent research efforts has been the development of droplet-based microfluidic systems for high-throughput biology and the development of imaging flow cytometry for cellular analysis at throughputs approaching half a million cells per second.

Science originating from the deMello group has been recognized through a number of awards, including the Clifford Paterson Medal from the Royal Society of Great Britain, the Corday Morgan Medal from the Royal Society of Chemistry, the Pioneers of Miniaturization Award by the Royal Society of Chemistry, and the Advances in Measurement Science Lectureship from the American Chemical Society.



Rise of the Micromachines: Biology on the Small Scale



Marek Mlodzik

* 1959

Icahn School of Medicine at Mount Sinai, USA

📅 November 18, 2021

Marek Mlodzik completed his undergraduate and PhD work at the University of Basel, and he has been interested in the molecular basis of intercellular communication and signalling since his postdoctoral studies at the University of California at Berkeley. He initiated his independent research when appointed Group Leader at the EMBL Heidelberg in 1991. In 2000, he became a professor at the Icahn School of Medicine at Mount Sinai in New York City, and in 2007 became the Lillian and Henry M. Stratton Professor and Chairman of the Department of Cell, Developmental, and Regenerative Biology.



In the past 20 years his work has focused on the molecular mechanisms of Wnt/PCP (Planar Cell Polarity)-signalling and how this regulates cell polarity and cell migration in development and disease. Most recently his research has addressed the role of ciliary proteins in non-ciliated contexts, and the role of the ciliary transport complex (IFT-A) in the cytoplasm and in nuclear translocation of b-catenin. He is also studying the mechanisms of Wnt and Notch signalling pathways interaction in normal organogenesis and patterning and disease contexts, including cancer,

neural tube closure defects, and ciliopathies. The Wnt/PCP pathway and Wnt signalling in general are also critical in many stem cell niche interactions and in stem cell maintenance. The Notch signalling pathway shares many of these functions during tissue regeneration and homeostasis. Mlodzik's lab primarily uses the *Drosophila* model for *in vivo* studies and mammalian cell-based work for functional biochemical assays.

In 1997, Marek Mlodzik was elected a member of the European Molecular Biology Organization. He is also currently (2021–2023) holding the honorary position of Chair of the DEV-1 review panel at the National Institutes of Health.

Wnt/Frizzled Planar Cell Polarity Signalling in Development and Disease



Ben Feringa

* 1951

University of Groningen, Netherlands

 **March 17, 2022**

Ben L. Feringa received his MSc degree from the University of Groningen in 1974. He subsequently obtained a PhD degree at the same university in 1978. Following a period at Shell in the Netherlands and the United Kingdom, he was appointed as lecturer at the University of Groningen in 1984 and full Professor in 1988. He is currently the Jacobus H. van t Hoff distinguished Professor of Molecular Sciences.



His early career was focused on homogeneous catalysis and oxidation catalysis, and especially on stereochemistry. His research resulted in major contributions in the field of enantioselective catalysis, including monophosphine ligand used in asymmetric hydrogenation, asymmetric conjugate additions of organometallic reagents, including the highly reactive organolithium reagents, organic photochemistry and stereochemistry and pioneering work in photopharmacology. In the 1990s, Feringa's work in stereochemistry led to the discovery of the first unidirectional light-driven molecular rotary motor and later a molecular car driven by electrical impulses was designed.

Feringa was elected Foreign Honorary Member of the American Academy of

Arts and Sciences and is a member of the Royal Netherlands Academy of Sciences, a foreign member of the US National Academy, the Royal Society London, the German Academy Leopoldina and the Chinese National Academy of Sciences. In 2008 he was knighted by Her Majesty the Queen of the Netherlands. Feringa's research has been recognized with numerous awards including the Körber European Science Award (2003), the Spinoza Award (2004), the Prelog gold medal (2005), the Norrish Award of the ACS (2007), the Paracelsus Medal (2008), the Chirality Medal (2009), the RSC Organic Stereochemistry Award (2011), the Humboldt Award (2012), the Nagoya gold medal (2013), the ACS Cope Scholar Award (2015), the Chemistry for the Future Solvay Prize (2015), the August Wilhelm von Hoffman Medal (2016), the 2016 Nobel Prize in Chemistry, the Tetrahedron Prize (2017) and the European Chemistry Gold Medal (2018). In 2019 he was elected as a member of the European Research Council.

The Art of Building Small

A man with glasses and a headset microphone is giving a presentation. He is wearing a blue shirt and a dark jacket. Behind him is a large screen displaying a presentation slide. The slide has a light blue background with a dark blue header that says "Mendel-Channel". Below the header, there is a red line and the text "open & close with" in red. Further down, the text "sensitive Channel from" is visible. To the right of the text, there is a diagram showing a horizontal line with an arrow pointing to the right. The background of the slide also features colorful, abstract floral patterns in red, yellow, and green. The overall image has a decorative border with a network of thin, intersecting lines in various colors (red, blue, green, yellow) and large, stylized floral motifs in the corners.

Standing on the shoulders of such a giant, it was a great privilege to be a Mendel lecturer, and may the commemoration of his achievements continue to be a source of inspiration for many future generations of scientists.





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Money and finance



At the beginning, financing of the Lectures was supported by Vienna geneticist Gustav Ammerer (through his charity the vFG), IMP Vienna, the Academy of Sciences of the Czech Republic, the British Council, the Regional Authority of South Moravia, the City of Brno, and the Augustinian Abbey in Old Brno. Between 2012 and 2014 the Lectures were supported by a grant from the Czech Ministry of Education and the European Union (Pluricell). Since 2015, the Mendel Lectures have been co-supported by the International Clinical Research Centre of St. Anne's University Hospital in Brno, and since 2016 have been supported by Masaryk University.





**Warm thanks to those who helped with
the organization of Mendel Lectures:**



The Augustinian Abbey in Brno

Lenka Adamírová

Gustav Ammerer

Simon Boulton

Vítězslav Bryja

Aaron Ciechanover

Ondřej Dostál

Petr Dvořák

Dominika Hobzová

Marie Hochmanová

Michaela Jarkovská

Stanislav Julínek

Brigita Kolářová

Lumír Krejčí

Blanka Křížová

Miloš Liška

Jan Motlík

Anna Nasmyth

Kim Nasmyth

Hana Novotná

Gabriela Pavlíková

Martina Petříková

Lucia Ráheřová

Jiřina Relichová

Jana Sadílková

Eliška Skalická

Petr Svoboda

Jiří Šišma

Martina Vráblíková

Daniela Vránová

Lucie Vychodilová



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Mendel Lectures 2002 — 2022

Edited by

Lumír Krejčí

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Design and typesetting by

Hrdina Pavlík

Photos by

Tomáš Hájek, Martina Petřílková,

Archives of Mendel Lectures and Mendel Museum

(where not stated otherwise)

Printed by

Tiskárna Helbich, a. s.

Published by

Masaryk University Press

Žerotínovo nám. 617/9

Brno, Czech Republic

First Edition

Brno, 2022

© 2022 Masaryk University

ISBN 978-80-280-0057-8



ISBN 978-80-280-0058-5

(online ; PDF)

DOI.ORG/10.5817/CZ.MUNI.M280-0058-2022



MENDELLECTURES.MUNI.CZ

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📖 The Mendel Lectures series was established to highlight the importance of Gregor Johann Mendel's work on inheritance, one of the greatest discoveries in the history of biology. It was the sophistication and design of his experiments, together with combinatorial mathematical analysis, that allowed Mendel to formalise his findings and later enabled many discoveries in biology. His work provided the revolutionary empirical foundation now appreciated by scientists all around the globe as a pillar of modern genetics indispensable to our society.

The route to acknowledging Mendel's legacy was not simple, however, as for several decades his findings went unrecognised and unappreciated. As often the prophet is honoured everywhere but in his own country, Mendel's theories were rejected during the communist era, in favour of other concepts. Ultimately, it required the action of foreign scientists to establish the Mendel Museum and to initiate scientific meetings in the Abbey.

The Mendel Lectures not only revive the legacy of Mendel but also attract world-class researchers to present their scientific work in Brno, in the hope of planting seeds for future ground-breaking discoveries in the place where Mendel, many years ago, performed his key experiments.

This book is a celebration of 20 years of Mendel Lectures and is dedicated to everyone, from speakers to audience, who have helped to put Brno back on the international research map and made the Augustinian Abbey a sacred place for discussions on science and education.

— Lumír Krejčí

