

Mendel Lectures

2019—2020





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

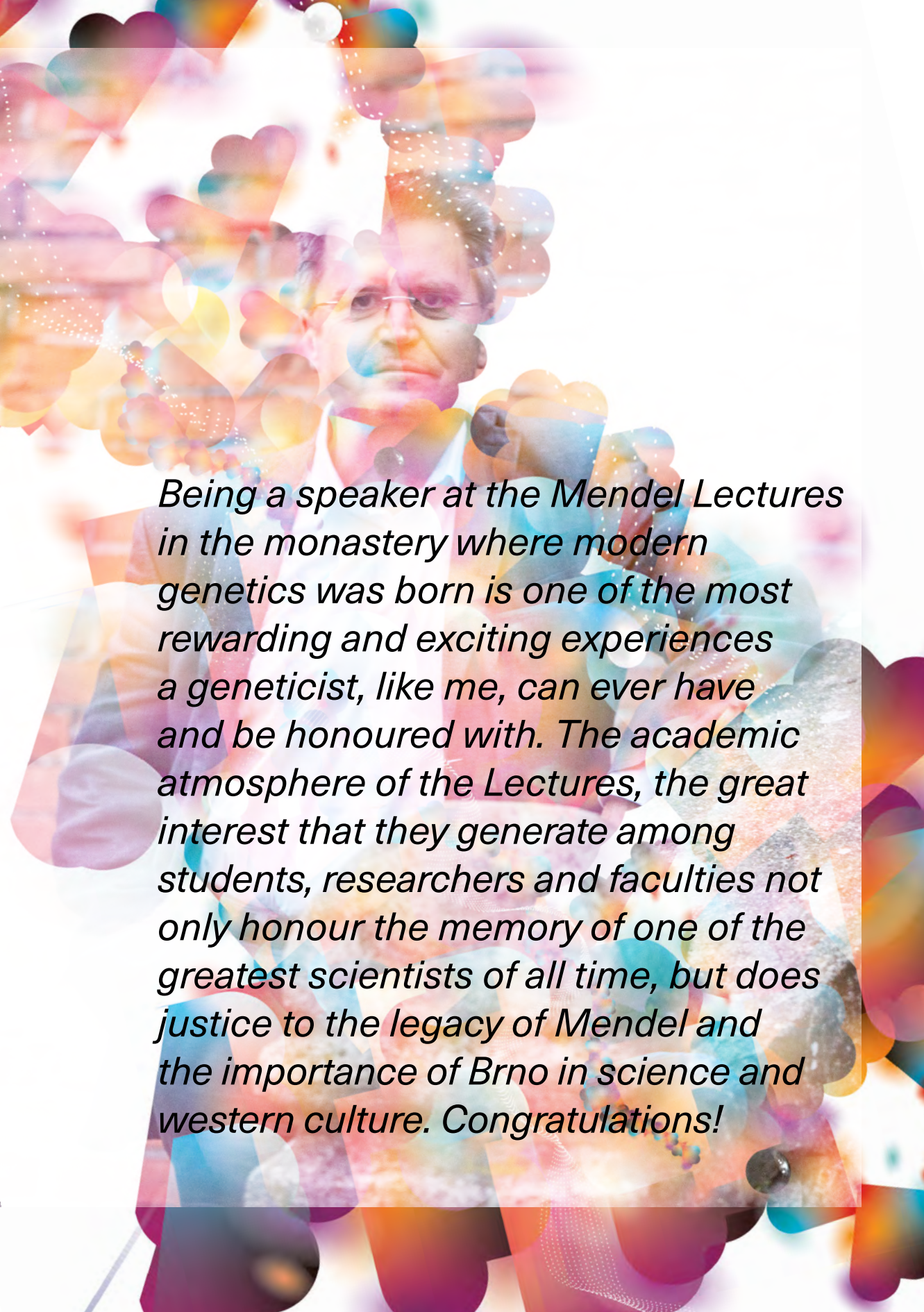
identified the THO complex and its function in mRNP biogenesis and R loop prevention in genome instability.



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'Oréal 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