Boehringer Ingelheim Stiftung

2020 & 2021 HEINRICH WIELAND PRIZE

AWARD SYMPOSIUM OF THE 2020 AND 2021 HEINRICH WIELAND PRIZES

Livestream from Nymphenburg Palace, Munich, Germany
Thursday, 21 October 2021

HEINRICH WIELAND PRIZE

The international Heinrich Wieland Prize honours distinguished scientists for their outstanding research on biologically active molecules and systems in the fields of chemistry, biochemistry, and physiology as well as their clinical importance. The prize is endowed with 100,000 euros by the Boehringer Ingelheim Foundation and named after Heinrich Wieland (1877–1957), Nobel Laureate in Chemistry in 1927.

Every year, the Foundation invites scientists to make nominations in an open call. It entrusts the selection of the awardees to a scientific Board of Trustees, all of whom work in an honorary capacity. Presented annually since 1964, the Heinrich Wieland Prize has four subsequent Nobel Laureates among its awardees.

www.heinrich-wieland-prize.de

THE PRIZE

Heinrich Otto Wieland was born on 4 July 1877 in Pforzheim, Germany. Wieland studied chemistry at the Ludwig-Maximilians-Universität (LMU) in Munich, Germany, where he received his doctorate in 1901 and was appointed "außerordentlicher Professor" in 1909. At this time, he was already interested in oxidation processes in the living cell, one of the foundation stones of the field of biochemistry. He worked at the Technische Universität München (TUM), also in Munich, and LMU until 1921 as well as at the Kaiser Wilhelm Institute in Berlin-Dahlem, Germany. Wieland then accepted a call to the University of Freiburg, Germany, but returned to LMU in 1925 to succeed Richard Willstätter as Chair of Chemistry. He retired in 1952 and died in Munich on 5 August 1957.

Heinrich Wieland received numerous awards, among them the 1927 Nobel Prize in Chemistry for his pioneering investigations of bile acids and related substances.

Heinrich Wieland was a cousin of Albert Boehringer, the founder of the company Boehringer Ingelheim. As early as 1903, Wieland worked with the company and, in 1917, his advice led to the company establishing its first scientific department dedicated to innovative research. His scientific findings made it possible, for example, to produce drugs for cardiovascular and respiratory diseases.

The Board of Trustees of the Heinrich Wieland Prize
Its current members are the following professors:

Silvia Arber – University of Basel, Switzerland
Bonnie Bassler – Princeton University, NJ, USA
Stefan Bornstein (Deputy Chair) – University Hospital Carl Gustav Carus, Dresden, Germany
Erick M. Carreira – ETH Zurich, Switzerland
Florian Gantner – C. H. Boehringer Sohn AG & Co. KG, Biberach, Germany
F.-Ulrich Hartl (Chair) – Max Planck Institute of Biochemistry, Martinsried, Germany
Werner Seeger – University Hospital of Giessen and Marburg, Giessen, Germany
Dirk Trauner – New York University, NY, USA
Fiona Watt – King's College London, UK

PROGRAMME

AWARD SYMPOSIUM (all times CEST)

12:30 p.m.	**Registration and introduction to online platform**
1:00 p.m.	**Welcome and opening remarks, introduction to Heinrich Wieland Prize 2020** Professor Dr F.-Ulrich Hartl, Chair of the Board of Trustees of the Heinrich Wieland Prize, Max Planck Institute of Biochemistry, Martinsried, Germany
1:15 p.m.	**How PROTACs work: Molecular recognition and design principles** Professor Alessio Ciulli, PhD University of Dundee, UK
1:45 p.m.	Transition to set up and switch to next presentation
1:50 p.m.	**Surprises in science – lessons from COVID-19** Professor Dr Ivan Đikić Goethe University Frankfurt, Germany
2:20 p.m.	Transition to set up and switch to next presentation
2:25 p.m.	**Molecular basis of histone code cross-talk** Professor Cynthia Wolberger, PhD Johns Hopkins University School of Medicine, Baltimore MD, USA
2:55 p.m.	**Coffee break // Meet-the-speakers Heinrich Wieland Prize 2020**
3:35 p.m.	**Introduction to Heinrich Wieland Prize 2021** Professor Dr F.-Ulrich Hartl
3:40 p.m.	**Sensing DNA as a danger signal inside cells** Professor Dr Andrea Ablasser École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
4:10 p.m.	Transition to set up and switch to next presentation
4:15 p.m.	**Transposons and the evolution of the adaptive immune system** Professor David G. Schatz, PhD Yale University, New Haven CT, USA
4:45 p.m.	Transition to set up and switch to next presentation
4:50 p.m.	**Pharmaceuticals: From chemicals to biologicals and back again?** Professor Sir Gregory P. Winter, PhD MRC Laboratory of Molecular Biology and Trinity College Cambridge, UK
5:20 p.m.	**Closing remarks symposium** Professor Dr F.-Ulrich Hartl
5:30 p.m.	**Break // Meet-the-speakers Heinrich Wieland Prize 2021**

PROGRAMME

AWARD CEREMONY (all times CEST)

6:15 p.m.

Moderation
Dr Stephan Formella, Managing Director Science & Research,
Boehringer Ingelheim Foundation, Mainz, Germany

Musical introduction
Antonín Leopold Dvořák (1841 – 1904),
Waltz in A major, Op. 54, I. Moderato

Laudation Heinrich Wieland Prize 2020
Professor Dr Dirk Trauner
New York University, New York NY, USA

Award presentation
to Professor Craig M. Crews, PhD
Yale University, New Haven CT, USA
by Christoph Boehringer, Chair of the Executive Committee
of the Boehringer Ingelheim Foundation, Mainz, Germany,
and by Professor Dr F.-Ulrich Hartl

Award lecture
Targeted protein degradation: A new therapeutic modality
Professor Craig M. Crews, PhD

Musical interlude
Antonín Leopold Dvořák (1841 – 1904),
String Quartet No. 14 in A-Flat major, Op. 105, II. Molto vivace

Laudation Heinrich Wieland Prize 2021
Professor David G. Schatz, PhD
Yale University, New Haven CT, USA

Award presentation
to Professor Dr Thomas Boehm
Max Planck Institute of Immunobiology and Epigenetics, Freiburg, Germany
by Christoph Boehringer and Professor Dr F.-Ulrich Hartl

Award lecture
Evolutionary novelties in vertebrate immune systems
Professor Dr Thomas Boehm

Musical conclusion
Wolfgang Amadeus Mozart (1756 – 1791),
String Quartet No. 19 "Dissonance" in C major, K. 465, IV. Allegro molto

8:30 p.m.

On-site reception and online get-together

Music performed by Schumann Quartet Munich (members of the Bavarian State Orchestra): Barbara Burgdorf (violin), Traudi Pauer (violin), Stephen Finkentey (viola), Oliver Göske (cello)

Professor Craig M. Crews, PhD

Yale University, New Haven CT, USA

Craig Crews is honoured with the 2020 Heinrich Wieland Prize for pioneering targeted protein degradation as a new therapeutic principle in pharmacology. In his early work, Craig Crews focused on blocking the cell's protein degradation machinery, the proteasome. He discovered how epoxomicin, a small molecule that inhibits the proteasome, functions and developed the first total synthesis of it. Based on synthetic derivatives of expoxomicin, Craig Crews co-founded his first company, Proteolix, whose proteasome inhibitor Kyprolis™ received FDA approval for the treatment of multiple myeloma. In parallel, Craig Crews conceived of and demonstrated proof-of-concept of an entirely new approach to control protein levels in cells: the so-called PROTAC technology (PROteolysis TArgeting Chimera). PROTACs are small dimeric molecules that can be tailored to bind to different molecules in the cell. When they do so, they tether them to the intracellular protein degradation machinery for destruction. In contrast, traditional small molecule drugs only inhibit their targets. PROTACs are therefore the first class of molecules that can also act on those proteins of a cell that are not catalytically active, opening a whole range of possible treatments. The first PROTACs are already in clinical trials by the Yale-based company Arvinas, which Craig Crews founded a few years ago. They target the androgen and estrogen receptors in patients with metastatic prostate and breast cancer.

Craig Crews studied Chemistry at the University of Virginia in Charlottesville, USA, and received his PhD in Biochemistry from Harvard University in Cambridge, USA, in 1993. After two years as a postdoctoral researcher at Harvard University, he joined the faculty at Yale University in New Haven, USA, as Assistant Professor, and was promoted to Associate Professor in 2000. Crews founded his first company, Proteolix, in 2003 and in the same year, became Executive Director of the Yale Center for Molecular Discovery. He is a full professor since 2007, and has been appointed the John C. Malone Professor of Molecular, Cellular, and Developmental Biology with joint appointments in the departments of Chemistry and Pharmacology at Yale University. He is the Chief Scientific Advisor of Arvinas, which he founded in 2013. Craig Crews received many awards including the Khorana Prize of the Royal Society of Chemistry, the Award for Outstanding Achievement in Chemistry in Cancer Research by the American Association for Cancer Research, the UCB Ehrlich Award for Excellence in Medicinal Chemistry, and the Friedrich Wilhelm Bessel Research Award by the Alexander von Humboldt Foundation. He is a fellow of the Royal Society of Chemistry and the American Association for the Advancement of Science.

Professor Alessio Ciulli, PhD, FRSC

University of Dundee, Dundee, UK

Alessio Ciulli is one of the pioneers of using molecular information on protein-protein interactions and protein degradation to discover novel therapeutics. In cancer, one such drug target is the E3 ubiquitin ligase VHL, which can be hijacked by PROTACs (PROteolysis-TArgeting Chimeras) to guide proteins to the proteasome to be destroyed. Ciulli solved the structure of VHL bound to fragments of its natural substrate and analysed it to design and synthesize novel small molecule inhibitors of VHL. He tethered one of these to another small molecule inhibitor of his design targeting BRD4, a protein frequently deregulated in leukemia. The resulting PROTAC bridges BRD4 with VHL and removes BRD4 from leukemic cells. Solving the structure of the ternary bridging complex, he unravelled how the PROTAC induces selective degradation. With the same approach, he has developed further small molecules for hard to target proteins and shown how to improve existing PROTACs.

Alessio Ciulli studied chemistry in Florence, Italy, and obtained his PhD from the University of Cambridge, UK, in 2006. After postdoctoral research in Cambridge and at Yale University, USA, he returned to Cambridge in 2009 to start his independent laboratory. In 2013, he moved to the University of Dundee, UK, where he was promoted to full professor in 2016. He received several awards, including a BBSRC David Phillips Fellowship, an ERC Starting Grant, the ICBS Young Chemical Biologist Award, and the MedChemComm Emerging Investigator Lectureship. He is a Fellow of the Royal Society of Chemistry, and the scientific founder of Amphista therapeutics, a targeted protein degradation company.

Professor Dr Ivan Đikić

Goethe University Frankfurt, Frankfurt, Germany

Ivan Đikić is a leading expert in the fields of ubiquitin biology and autophagy. He is leading a multidisciplinary team of students and postdoctoral fellows to study molecular principles of life and explore pathological alterations in human diseases such as cancer, neurodegeneration, and infection. Ivan Đikić made seminal contributions to our understanding of how ubiquitin signaling controls diverse cellular functions. He was among the first to show that ubiquitinated proteins can communicate with other proteins in various ways, uncovering a rich repertoire of ubiquitin codes for cellular signalling. He also provided structural and molecular basis for insights in how cells maintain homeostasis by digesting organelles or aggregated proteins of pathogens via selective autophagy pathways.

Ivan Đikić received an MD from the University of Zagreb and a PhD in molecular biology from New York University. He was a group leader at the Ludwig Institute for Cancer Research in Uppsala, Sweden, and since 2002 he is Professor of biochemistry at Goethe University in Frankfurt and a Fellow of the Max Planck Institute of Biophysics. He is an elected member of EMBO, the German National Academy of Sciences Leopoldina, the European Academy, and the American Academy of Arts and Sciences. Ivan Đikić is committed to education of the next generations of scientists globally. For his scientific work he received the Ernst Jung Prize for Medicine and the Leibniz Prize of the DFG.

Professor Cynthia Wolberger, PhD

Johns Hopkins University, Baltimore MD, USA

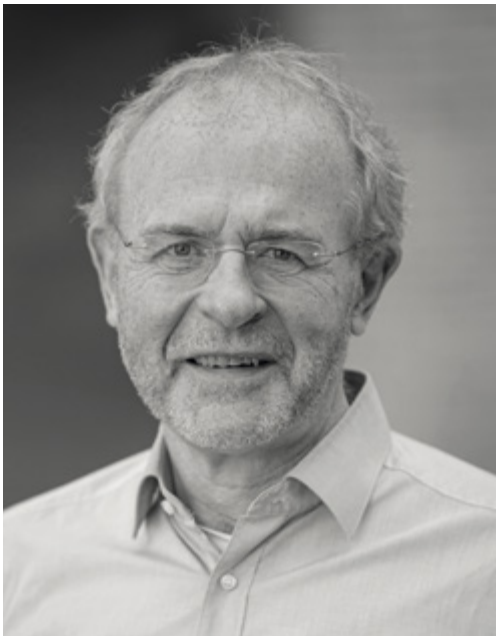
Cynthia Wolberger's pioneering structural and biochemical studies enabled fundamental insights into the mechanisms of eukaryotic transcriptional regulation, the response to DNA damage, and ubiquitin signalling. She uncovered how large enzyme complexes that co-activate transcription recognize certain histone ubiquitination sites. These sites mark nucleosomes situated at genes poised for activation. She also laid the molecular basis of cross-talk between histone modifications during the stepwise activation of gene expression and revealed, for example, how histone ubiquitination triggers histone acetylation or methylation. Her work has uncovered unexpected plasticity in the nucleosome core that has exciting implications for the dynamics and functions of histone modifications.

Cynthia Wolberger studied physics at Cornell University in Ithaca NY, USA, and received her PhD in biophysics from Harvard University, USA, in 1987. After postdoctoral training in San Francisco and Baltimore, USA, she joined the faculty of the Biophysics and Biophysical Chemistry department at the Johns Hopkins University School of Medicine in 1991, became a full professor in 2000, and was recently named Director. She received the Dorothy Crowfoot Hodgkin Award from the Protein Society and the Award for Achievement in Chemistry in Cancer Research from the American Association of Cancer Research. She is a fellow of the American Association for the Advancement of Science and the Biophysical Society, and is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

Professor Dr Thomas Boehm

Max Planck Institute of Immunobiology and Epigenetics, Freiburg, Germany

Thomas Boehm is awarded the 2021 Heinrich Wieland Prize for his ground-breaking contributions to the understanding of the development and evolution of the immune system in vertebrates. Using an impressive spectrum of model organisms, he discovered general design principles of cellular immunity in vertebrates, shifting existing paradigms, and offering entirely new perspectives on adaptive immunity. He identified the transcription factor Foxn1 as an evolutionarily conserved master regulator of epithelial cell differentiation in the thymus, the site of T cell development. He also discovered the long-sought thymus equivalent in jawless vertebrates, resolving a century-old debate about the nature of the immune system in this vertebrate lineage. He reconstructed the evolutionary trajectory of the genetic networks controlling T cell development and recapitulated their step-wise development in vivo. He also discovered an olfactory mechanism by which animals as different as fish and mammals evaluate the composition of major histocompatibility complex (MHC) molecules. Thus, MHC peptides not only distinguish self from nonself in the immune system, but also signal genetic relatedness during mate selection, helping to explain why vertebrates maintain a diverse repertoire of MHC genes. Most recently, Thomas Boehm uncovered that deep-sea anglerfish have switched off key players of their adaptive immunity, such as the RAG genes, which orchestrate antigen receptor assembly. The immunogenetic adaptation in these species enables males to permanently fuse with their much larger female partners, a form of tissue chimaerism that is otherwise unknown in nature. These results demonstrate that co-evolution of innate and adaptive immunity can come to an abrupt end, breaking a central paradigm of evolutionary immunology. The findings also indicate that new forms of innate immunity can evolve to protect vertebrates from infection, with potential relevance for a better understanding of organ transplantation.



© Rockoff, MPI-IE, Freiburg

Thomas Boehm studied medicine and completed his residency in Frankfurt, Germany, in 1987. He then moved to the MRC Laboratory of Molecular Biology in Cambridge, UK. In 1991, he became professor at the University of Freiburg in Germany, and later accepted a call to the German Cancer Research Centre (DKFZ) in Heidelberg. Since 1998, he is a Scientific Member and Director at the Max Planck Institute of Immunobiology and Epigenetics. His achievements have been widely recognized: Among others, he received the Paul Ehrlich and Ludwig Darmstaedter Prize for Young Researchers, the Gottfried Wilhelm Leibniz Prize of the DFG, the Ernst Jung Prize for Medicine, the German Immunology Award, as well as two ERC Advanced Grants. He is a member of EMBO, the German National Academy of Sciences Leopoldina, the Academy of Sciences Heidelberg, and the American Academy of Arts and Sciences.

Professor Dr Andrea Ablasser

Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland

Andrea Ablasser contributed to the discovery of a signalling cascade of the innate immune system, which recognizes DNA floating in the cytosol, a hallmark of many infections. It starts with an enzyme called cGAS, which binds to cytosolic DNA and then catalyses the production of the messenger molecule cGAMP. This in turn activates STING, a protein stimulating interferon genes, which further down the cascade triggers inflammation. She also found that cGAMP travels to neighbouring, non-infected cells and thus propagates the antimicrobial immune response across tissues. Unexpectedly, she found that the cGAS-STING cascade is also triggered when ageing or sick cells release DNA into the cytosol, connecting it to ageing and autoimmune disease. To ameliorate systemic inflammation, she recently developed a small-molecule inhibitor of cGAS-STING signalling and as a co-founder of a biotech company she is testing its therapeutic potential.

Andrea Ablasser studied medicine at LMU Munich, Germany, with rotations at Harvard Medical School, USA, and Oxford University, UK. She moved to the University of Bonn in 2010, first as a postdoctoral researcher and then as junior group leader. In 2014, she accepted a call to EPFL in Lausanne, Switzerland, where she is now full professor. She received several awards, including the EMBO Gold Medal, the Paul Ehrlich and Ludwig Darmstaedter Prize for Young Researchers, the Eppendorf Award for Young European Investigators, the Friedrich Miescher Award, and the William B. Coley Award. She is an elected Member of EMBO.

Professor David G. Schatz, PhD

Yale University, New Haven CT, USA

David Schatz has contributed fundamentally to our understanding of how our adaptive immune system produces its wide variety of antibodies and T cell receptors by recombining the respective genes. He discovered the recombination activating genes, RAG1 and RAG2, which put antigen receptor genes together from small pieces of chromosomal DNA in a process called V(D)J recombination. He also elucidated their origin, regulation, and mechanism of action. Further, he provided key insights into the control of somatic hypermutation: This process mutates antigen receptor genes during infections to optimize the binding of antibodies to pathogens. It also helps establish the “memory” of the immune system, supporting vaccine efficacy and protecting us from recurrent infections with the same pathogen.

David Schatz studied Molecular Biophysics and Biochemistry at Yale University, USA, and Philosophy and Politics at Oxford University, UK. He received his PhD in 1990 from MIT and the Whitehead Institute for Biomedical Research in Cambridge, USA. He joined the faculty of Yale University School of Medicine in 1991. David Schatz was an investigator of the Howard Hughes Medical Institute from 1991 – 2017. He received the BD Biosciences Investigator Award from the American Association of Immunology, and is an elected member of the American Academy of Arts and Sciences, a fellow of the American Association for the Advancement of Science, and a member of the National Academy of Sciences.

Professor Sir Gregory P. Winter, PhD, FMedSci, FRS

Emeritus, MRC Laboratory of Molecular Biology, Cambridge, UK
Fellow, Trinity College, Cambridge, UK

Sir Gregory Winter has revolutionized research on therapeutic antibodies. In his early work, he engineered so-called humanized antibodies. He replaced sections of therapeutic antibodies derived from mouse proteins with fragments from human antibodies, paving the way for powerful drugs against cancer. He then developed technologies to produce fully human antibodies. To do so, he inserted human antibody genes into bacteria to establish a library of human antibodies and selected the useful ones via the phage display technology. The first drug based on this method against rheumatoid arthritis, psoriasis, and inflammatory bowel disease was approved in 2002. More recently, he developed small bicyclic peptides that have the ability to mimic both antibody and chemical ligands. His newest start-up company has used them to target chemical toxins to tumour cells.

Sir Gregory Winter studied natural sciences at Cambridge University, UK, where he earned his PhD at the MRC Laboratory of Molecular Biology (LMB) in 1976. Following one year postdoctoral research at Imperial College London, UK, he returned to MRC-LMB in 1978, joining the staff in 1981, and for a period was deputy director and acting director. He is an elected member of EMBO, a Fellow of the Royal Society and Fellow of the Academy of Medical Sciences, and has been awarded numerous prizes and medals, including the 2018 Nobel Prize for Chemistry. In 2004, he was knighted for services to Molecular Biology.

2020 & 2021 HEINRICH WIELAND PRIZE

BOEHRINGER INGELHEIM FOUNDATION

The Boehringer Ingelheim Foundation is an independent, nonprofit organization that is committed to the promotion of the medical, biological, chemical, and pharmaceutical sciences. It was established in 1977 by Hubertus Liebrecht (1931–1991), a member of the shareholder family of the Boehringer Ingelheim company. Through its Perspectives Programme Plus 3 and its Exploration Grants, the Foundation supports independent junior group leaders. It also endows the international Heinrich Wieland Prize, as well as awards for up-and-coming scientists in Germany. In addition, the Foundation funds institutional projects in Germany, such as the Institute of Molecular Biology (IMB) in Mainz, the department of life sciences at the University of Mainz, and the European Molecular Biology Laboratory (EMBL) in Heidelberg.

Boehringer Ingelheim Stiftung

CONTACT

Boehringer Ingelheim Foundation
Schusterstr. 46–48
55116 Mainz
Germany
Phone +49 (0) 6131 27 508-12
Email hwp@bistiftung.de
www.heinrich-wieland-prize.de
www.boehringer-ingelheim-stiftung.de