



Boehringer Ingelheim
Stiftung

2016

HEINRICH WIELAND PRIZE



AWARD SYMPOSIUM OF THE 2016 HEINRICH WIELAND PRIZE

Nymphenburg Palace, Munich, Germany
Thursday, October 13, 2016

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 (see page 7 for current members). Presented annually since 1964, the Heinrich Wieland Prize has four subsequent Nobel Laureates among its awardees.

www.heinrich-wieland-prize.de



PROGRAMME

AWARD SYMPOSIUM

- 3:30 P.M. **Registration**
- 4:00 P.M. **Welcome and opening remarks**
Professor Dr Wolfgang Baumeister, Chair of the Board of Trustees of the Heinrich Wieland Prize, MPI of Biochemistry, Martinsried, Germany
- 4:10 P.M. **“Innovation by evolution: expanding the enzyme universe”**
Professor Frances H. Arnold, PhD,
California Institute of Technology, Pasadena, CA, USA
- 4:50 P.M. **“Reprogramming the genetic code”**
Professor Jason W. Chin, PhD,
MRC Laboratory of Molecular Biology, Cambridge, UK
- 5:30 P.M. **Coffee break** including **“Meet the Speakers”** for selected students
- 6:10 P.M. **“‘Houdini’ proteins: discovery and applications of ultrafast inteins”**
Professor Tom Muir, PhD,
Princeton University, Princeton, NJ, USA
- 6:50 P.M. **Award ceremony**
- Moderation**
Dr Claudia Walther,
Managing Director of the Boehringer Ingelheim Foundation, Mainz, Germany
- Musical prelude**
Vittorio Monti (1868-1922): Czardas
- Laudation**
Professor Dr Peter Seeberger,
MPI of Colloids and Interfaces, Potsdam, Germany
- Award presentation**
to Professor Peter G. Schultz, PhD, The Scripps Research Institute, La Jolla, CA, USA,
by Christoph Boehringer, Chairman of the Executive Board of the Boehringer
Ingelheim Foundation, Mainz, Germany, and Professor Dr Wolfgang Baumeister
- Musical interlude**
Klingande: Jubel (“jubilation”)
- Award lecture**
“An expanding genetic code”
Professor Peter G. Schultz, PhD
- Musical conclusion**
Božidar Milošević Boki (*1931),
A Call from the Mountain
- 8:00–10:00 P.M. **Get-together**

Music by the Duo Modéré: Adrian Planitz (saxophone) and Zdravko Zivkovic (accordion).

Professor Peter G. Schultz, PhD

The Scripps Research Institute, La Jolla, CA, USA

The chemist Peter Schultz is honoured with the 2016 Heinrich Wieland Prize for his fundamental contributions to the biologically inspired synthesis of new molecules including his groundbreaking work on expanding the genetic code. Using his toolbox to extend the genetic code, over 100 amino acids with novel functions have been introduced site-specifically into proteins allowing to solve cellular processes *in vivo* in unprecedented detail. Schultz has applied this method to evolve and create organisms with enhanced properties, recently a 21 amino acid bacterium. Besides, he has pioneered the development of large combinatorial chemical libraries together with cell-based screens leading to drugs against neurodegenerative diseases, multiple sclerosis, lung and blood cancers, and malaria.

Peter Schultz received his PhD from the California Institute of Technology, Pasadena, CA, USA, in 1984. After a postdoctoral year at the Massachusetts Institute of Technology, Boston, MA, USA, he became a professor at the University of California, Berkeley, and Principal Investigator at the Lawrence Berkeley National Laboratory; later also an investigator at Howard Hughes Medical Institute. In 1999, he moved to The Scripps Research Institute, La

Jolla, CA, USA, where he is currently professor of chemistry as well as its CEO. Schultz founded his first biotech company, Affymax Research Institute, in 1988. Eight institutions at the interface between chemistry, material science, and medicine followed; among them are the Genomics Institute of the Novartis Research Foundation and the non-profit California Institute for Biomedical Research, which aims at discovering paradigm-changing medicines for unmet needs. He holds almost 100 patents and has been named the top translational researcher in 2013 by Nature Biotechnology.



Professor Frances H. Arnold, PhD

California Institute of Technology, Pasadena, CA, USA

Frances Arnold pioneered methods of directed evolution, which enable proteins to be engineered for use in biomedical research, medicine, chemistry, and alternative fuel production. In directed evolution, beneficial mutations are accumulated by iterative gene mutagenesis and screening the corresponding proteins for desired functions, such as brighter fluorescence or higher enzymatic activity. Her recent efforts focus on engineering membrane channels for neuroscience and enzymes that catalyze reactions not known in nature. Her work has resulted in approximately 50 patents and two companies, which she co-founded to produce fuels and chemicals from renewable resources and to develop new, sustainable approaches to crop protection.

Arnold studied mechanical and aerospace engineering at Princeton University, NJ, USA, which she followed with a PhD in chemical engineering from the University of California, Berkeley, CA, USA, in 1985. She stayed in Berkeley for a postdoc in biophysical chemistry. In 1986, she joined the California Institute of Technology, where she now holds the Dick and Barbara Dickinson Chair of Chemical Engineering, Bioengineering and Biochemistry and is director of the Donna and Benjamin M. Rosen Bioengineering Center.

Professor Jason W. Chin, PhD

MRC Laboratory of Molecular Biology, Cambridge, UK

Jason Chin is a leader in reprogramming the genetic code to introduce designer amino acids into proteins. He has created a parallel translation pathway within the cell and reconfigured ribosomes to read artificial codons containing four instead of the usual three bases, paving the way for the cellular synthesis of unnatural polymers. He has pioneered the development of the pyrrolysyl-tRNA synthetase/tRNA pair for unnatural amino acid incorporation. Starting with single cells of *E. coli*, yeast or mammals, Jason Chin has now expanded the genetic code of multicellular organisms such as *C. elegans* and *D. melanogaster*. His advances have provided transformational approaches to understanding post-translational modifications, for rapidly controlling and imaging protein function in cells and animals and, for defining cell-specific proteomes in animals.

Jason Chin studied chemistry at Oxford University, UK, and received his PhD in Organic Chemistry from Yale University, New Haven, CT, USA, in 2001. He did his postdoctoral work at The Scripps Research Institute, La Jolla, CA, USA. In 2003, he started at the MRC Laboratory for Molecular Biology in Cambridge, UK, where he now heads the Centre for Chemical Synthetic Biology. He also holds a chair in Chemistry and Chemical Biology in the Department of Chemistry at the University of Cambridge.

Professor Tom Muir, PhD

Princeton University, Princeton, NJ, USA

Tom Muir studies cellular signalling networks using protein engineering. He has developed many chemistry-driven tools to unravel protein structure and function. His method of expressed protein ligation, for instance, allows to incorporate unnatural amino acids, posttranslational modifications and isotopic probes into specific protein sites *in vitro*. Using these tools, the Muir lab works on histone modifications, intein splicing, histidine phosphorylation, and quorum sensing of *Staphylococcus aureus*.

Muir studied chemistry at the University of Edinburgh, UK, where he also received his PhD in organic chemistry in 1993. After a postdoc in bioorganic chemistry at The Scripps Research Institute, CA, USA, he joined The Rockefeller University, New York, in 1996, and was promoted to full professor in 2002. In 2010, Muir joined Princeton University, NJ, USA, where he is the Van Zandt Williams, Jr. Class of '65 Professor of Chemistry, Chair of the Department of Chemistry, and Professor of Molecular Biology.

Professor Dr Peter Seeberger

Max Planck Institute of Colloids and Interfaces, Potsdam, Germany

Peter Seeberger is a renowned expert in the chemistry and biology of carbohydrates. He revolutionized the glycosciences by creating the first automated oligosaccharide synthesizer. Building on this technology, Seeberger develops carbohydrate-based vaccines against malaria and bacterial infections such as those caused by hospital germs. He is a pioneer of continuous flow synthesis and developed efficient methods to produce the most important Malaria and HIV drugs at greatly reduced cost. He was voted one of the top ten most influential people in drug development in 2015 by the British journal *Medicine Maker*.

Peter H. Seeberger studied chemistry at the University of Erlangen, Germany, followed by a PhD in biochemistry at the University of Colorado at Boulder, USA. After a postdoc at the Sloan-Kettering Cancer Center in New York, he became a professor at the Massachusetts Institute of Technology, Cambridge, USA, and later at the Swiss Federal Institute of Technology (ETH) Zurich, Switzerland. Since 2009, he is Director at the MPI of Colloids and Interfaces in Potsdam and Professor at Freie Universität Berlin, Germany. He helped to found several spin-off companies as well as the Tesfa-Ilg "Hope for Africa" Foundation.

THE PRIZE

Heinrich Otto Wieland was born on July 4, 1877, in Pforzheim, Germany. Wieland studied chemistry at the Ludwig-Maximilians-Universität München (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 August 5, 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:

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BOEHRINGER INGELHEIM FOUNDATION

The Boehringer Ingelheim Foundation is an independent, non-profit organization 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 company Boehringer Ingelheim. With the Perspectives Programme “PLUS 3” and the Exploration Grants, the foundation supports independent junior group leaders. It also endows awards for up-and coming scientists. In addition, the foundation has donated 100 million euros over ten years to finance the scientific running of the Institute of Molecular Biology (IMB), Mainz, Germany, and a further 50 million euros for the development of the life sciences at the University of Mainz.



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