HEINRICH WIELAND PRIZE

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2024 Heinrich Wieland Prize
Symposium and Award Ceremony on 24 October 2024

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Photos and additional material available for download at heinrich-wieland-prize.de/award-symposium/id-2024.html

Boehringer Ingelheim Stiftung

PRESS RELEASE

22 August 2024
For immediate release and reporting

Benjamin F. Cravatt developed a new method to identify disease-causing proteins and drugs targeting those proteins. For this, he is awarded the Heinrich Wieland Prize worth 250,000 euros.

Proteins are the building blocks of life. They enable and regulate the chemical reactions within the body. Understanding their interplay is the goal of American researcher **Benjamin F. Cravatt**, who works in the field of Chemical Biology.

His research at The Scripps Research Institute in La Jolla, USA, aims to understand the role of proteins in the development of diseases to find new therapeutic approaches for their treatment. For this purpose, he invented a technology that allows measurement of the chemical activity of individual proteins in the complex mixture of a cell or even an entire organism. This technology is called Activity-based Protein Profiling, or ABPP for short.

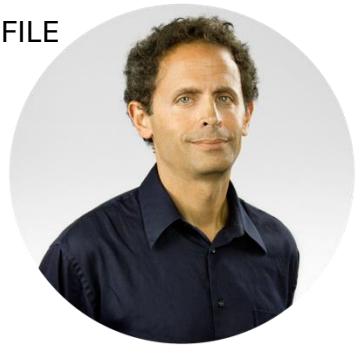
The cornerstones of **ABPP** are small molecules (probes) that selectively match the sites of proteins that are chemically active and irreversibly attach to them. The probes must be tailored to the active site of an individual type of protein such that they recognize these proteins during their course of action only. Such marked proteins can now be distinguished from their inactive copies and all other proteins in a cell and examined. Pathological proteins can also be detected in this way. ABPP is now used worldwide, both in basic research and in drug development, for which this technology has opened up exciting new possibilities.

From the Jury's Statement: *"Benjamin Cravatt's groundbreaking technologies have enabled the uncovering of fundamental mechanisms of human physiology and have revolutionised the way new drugs are discovered and researched. His research has laid the foundation for several new drugs currently being tested in clinical trials for the treatment of cancer and neurological diseases.*" (Professor Franz-Ulrich Hartl, Chairman of the Selection Committee for the Heinrich Wieland Prize).

Christoph Boehringer, Chairman of the Board of the Boehringer Ingelheim Foundation, adds: "*Benjamin Cravatt's work demonstrates what can be achieved when one successfully builds bridges between disciplines and in this way spans the arc from basic research to clinical application.*"

The Heinrich Wieland Prize
The Heinrich Wieland Prize is one of the most prestigious awards in the life sciences conferred by a German foundation. Since 1964, it has annually honoured outstanding scientists worldwide for their groundbreaking research in chemistry, biochemistry, biology, and physiology. On the occasion of its 60th anniversary in 2024, the Boehringer Ingelheim Foundation has increased the prize money from 100,000 to 250,000 euros. This makes the Heinrich Wieland Prize one of the most highly endowed awards for fundamental research in the life sciences in Europe.

The Award Ceremony
On 24 October, the Heinrich Wieland Prize 2024 will be awarded. The festive ceremony at Nymphenburg Palace in Munich will be framed by a scientific symposium. The professional exchange between scientists in chemical biology, biochemistry, biology, and medicine is open to the public. In addition to the laureate, internationally renowned guest speakers are invited, including Nobel Laureate James E. Rothman from Yale University in the USA. Interested parties are cordially invited to attend the award ceremony and the symposium.



Professor Benjamin F. Cravatt III, PhD
The Scripps Research Institute, La Jolla, USA

Benjamin F. Cravatt's research aims to understand the roles of proteins in the development of diseases to find new approaches for their treatment. He develops new technologies at the intersection of chemistry and biology, focusing on their practical applications. He and his team follow the philosophy that the most significant biomedical problems require creative multidisciplinary approaches for their solutions.

Cravatt sought to understand the role of an enzyme in the fat metabolism of the brain and developed the corresponding technology for this purpose. This technology is called "Activity-based Protein Profiling" (ABPP). ABPP is a powerful method to measure the activity of individual proteins within the proteome (the entirety of proteins in a cell or an organism). Using small probes, the activities of proteins are tracked to provide insights into pathological changes and their causes, eventually highlighting potential therapeutic pathways. It turned out that this method could be applied much more broadly. It has already led to the development of new drug candidates for treating neurological disorders and various cancers, which are currently being tested in clinical trials.

Even for Cravatt, it was initially not foreseeable how versatile the new technology could be: "*I have not had THE ONE important epiphany in my career. Instead, the new approaches our lab has produced developed through the persistent search for answers to very specific questions. It was only later that we recognised how our new solutions could be applied to a much broader spectrum of problems. If we want to know how to best foster future scientific innovations, it is crucial to understand the background and history of the development of significant methods and technologies.*"

Academic career

Benjamin F. Cravatt studied biology and history at Stanford University and earned his PhD in macromolecular and cellular structure and chemistry from The Scripps Research Institute in La Jolla, USA, in 1996. Scripps is a non-profit medical research institute. Immediately afterward, he became an Assistant Professor at Scripps and in 2002, the Director of its Helen L. Dorris Child and Adolescent Neuro-Psychiatric Disorder Institute. In addition, he has held the Norton B. Gilula Chair in Chemical Biology at Scripps since 2004 and became a Professor in the Department of Chemistry in 2018. He has received multiple awards, including the R35 Outstanding Investigator Award from the National Cancer Institute, the Jeremy Knowles Award from the Royal Society of Chemistry, the AACR Award for Outstanding Achievement in Chemistry in Cancer Research, and the Wolf Prize in Chemistry. He is an elected member of the National Academy of Medicine, the American Academy of Arts and Sciences, and the National Academy of Sciences.

TOPIC

What is it you are working on, Dr Cravatt?
Understanding how proteins in a cell work together like the players of a sports team.

Benjamin F. Cravatt and his research team in Chemical Biology at The Scripps Research Institute are renowned for their innovative and interdisciplinary approaches that challenge the axioms of medical sciences. In his quest to understand cancerous tumours or to cure neurological diseases, Cravatt altered the usual search pattern. He no longer only looks for the cause of a disease as encoded in the body's genome, but instead, he looks at the interplay of currently present proteins to understand the behaviour of healthy and pathological cells.

He developed a technology called “Activity-based Protein Profiling” that enables him to do this. With it, he visualizes the metabolic networks and signalling pathways of all the proteins in a cell, or even an entire organism, to understand them.

We asked him to explain his research approach in layman's terms.

Benjamin F. Cravatt: "*Imagine our cells are sports teams. In this scenario, the proteins are the players, and each player must take on a specific role for the team to be successful. Now imagine you know the names of all the players, their height and weight, but you do not know exactly which position they play on the field. How would you lead the team to success if you did not know the unique skill set of each player?*
This analogy describes the current state of our understanding of the biochemistry of the cell. Our laboratory is working on methods that can accelerate the assignment of functions – the skill sets – to proteins, so we better understand how the cell operates in healthy and diseased states. In addition to the fundamental insights gained from this research, our studies can also help to develop treatments for dysfunctional proteins to restore their functions."

For his research, Benjamin F. Cravatt will receive the Heinrich Wieland Prize 2024 on 24 October.

STORY

Tiny detectives in cells – How Benjamin Cravatt is revolutionising drug research

The more precisely we understand the composition of different cells in our body and how the proteins in them behave and interact, the better we can understand diseases and develop medications to treat them. However, much is still unknown about the complex composition and biological behaviour of proteins – the so-called proteome – in a cell.

To simplify the detective work of assigning functions to proteins, Professor Benjamin Cravatt developed a clever technology. He sends different molecules (probes) as detectives into the cells. The probes are each specialized for a protein or a protein family, like a key for a single lock or an entire locking system. In the cell, proteins exist in both active and inactive forms. Proteins are activated by changing their shape so that other molecules can dock onto certain structures, the so-called active sites. Since the probes dock onto these active sites, they mark only activated proteins. Depending on the type of probe, the researchers can use Benjamin Cravatt’s technology to identify proteins that when active, for example, cause inflammation in the brain. The probes catch the culprit in the act, so to speak, by attaching to it. With the help of the probes, marked proteins can be distinguished from all other components of the proteome and their chemical activity can be measured at the same time. This opens entirely new ways to address important questions: What are the chemical processes in healthy cells compared to diseased ones? Can we find agents that restore the activity of a protein from a diseased to a healthy state?

Through these probes, we can determine not only when a protein is active, but also with which other proteins it interacts. This helps us to understand the functions of a protein and unravel the complex signalling pathways between the individual proteins in a cell. Only then can researchers get a full picture of how proteins contribute to diseases and find new ways to develop drugs to treat them.

Cravatt's technology, called "Activity-based Protein Profiling" (ABPP), opens up extensive possibilities. The method has already led to new drugs that are currently being tested in clinical trials for the treatment of cancer and neurological diseases.

THE HEINRICH WIELAND PRIZE

The Heinrich Wieland Prize is awarded by the non-profit, independent Boehringer Ingelheim Foundation to outstanding scientists worldwide for groundbreaking basic research in the fields of chemistry, biochemistry, biology, and physiology.

The prize is named after the chemist and Nobel laureate Heinrich Otto Wieland (1877–1957) and has been awarded annually since 1964. It is among the most prestigious scientific awards conferred by a German foundation.

In 2024, the prize celebrates its 60th anniversary. On this occasion, the foundation has increased the prize money from 100,000 to 250,000 euros, making it one of the most highly endowed awards for fundamental research in the natural sciences in Europe.

The prize is symbolised by a bronze medal bearing the silhouette of Heinrich Wieland.

Who can be awarded?

Every year, the Boehringer Ingelheim Foundation invites nominations for the Heinrich Wieland Prize. Scientists worldwide can submit nominations for the prize to the foundation. Self-nominations are not permitted.

An international board of trustees consisting of nine renowned researchers from around the world selects the laureate from the submitted nominations. The trustees perform their duties on an honorary basis.

Laureates

The long list of laureates includes five subsequent Nobel laureates: Michael Brown, Joseph Goldstein, Bengt Samuelsson, James Rothman, and Carolyn Bertozzi.

WHAT IS BASIC RESEARCH?

Basic research explores structures, processes, or relationships within systems, such as cells. Its primary aim is not immediate application but the advancement of knowledge. It uncovers and tests connections, networks, and regularities, thereby generating new insights that serve as the foundation for further research and application. Since basic research does not pursue commercial interests, it relies on external funding. The true value of its outcomes is not always immediately apparent, as it addresses much broader and more open-ended questions, making it a driving force for innovation and progress.

Event Announcement for Publication

THE AWARDING OF THE HEINRICH WIELAND PRIZE 2024

24 October 2024
Schloss Nymphenburg
Munich

The award ceremony is embedded in a symposium featuring scientific lectures.

The symposium begins at 9:30 AM and concludes at 8:30 PM followed by a get-together.

The Heinrich Wieland Prize is traditionally awarded in the baroque halls of Nymphenburg Palace in Munich, Germany.

The award ceremony and symposium are open to the public and free of charge. Interested individuals are warmly invited to attend both the award ceremony and the symposium.

Please register at https://www.heinrich-wieland-prize.de/award-symposium/id-2024.html

Press registration at: hwp@bistiftung.de

SCIENTIFIC SYMPOSIUM

The symposium | Inspiration for the community

Professional exchange and inspirations at Nymphenburg Palace: On 24 October 2024, thirteen lectures by top-tier international scientists will be featured.

Among the invited speakers in 2024 are Nobel Laureate James Rothman and Heinrich Wieland Prize winners Nenad Ban, Jens Brüning, and Gero Miesenböck.

The symposium is aimed at the research community, providing a platform for exchange and new inspirations. It also targets early-career researchers, inviting them to connect with senior colleagues and to build new networks.

Poster competition and travel grants for young scientists

Junior scientists are invited to present their research projects in a poster competition. This offers them the opportunity to discuss their work with experienced colleagues. The foundation will award a jury and an audience prize for the best posters.

The Boehringer Ingelheim Foundation also supports young researchers with travel grants, for which an application can be submitted during the symposium registration.

The symposium will be conducted in English.

TOPICS AND SPEAKERS OF THE SYMPOSIUM

Opening Lecture
"The mechanism of explosive neurotransmitter release" – Nobel Laureate (2013) James Rothman (1990 Heinrich Wieland Prize), Yale University, New Haven, USA

Lecture by the 2024 Heinrich Wieland Prize Winner
"Activity-based proteomics – protein and ligand discovery on a global scale" – Benjamin F. Cravatt, The Scripps Research Institute, La Jolla, USA

Structural Biology
"Revealing the machinery for production of proteins in human cells" – Nenad Ban (2010 Heinrich Wieland Prize), ETH Zurich, Switzerland

"Enabling discovery by in-cell structural biology" – Julia Mahamid, EMBL Heidelberg, Germany

"Safeguarding the ends: Structural mechanisms of human telomeric complexes" – Kelly Nguyen, MRC-LMB Cambridge, UK

Neurobiology
"Mitochondrial origins of the pressure to sleep" – Gero Miesenböck (2015 Heinrich Wieland Prize), University of Oxford, UK

"Plasticity of the parental brain" – Johannes Kohl, Francis Crick Institute, London, UK

Metabolism and Brain–Body Communication
"Neural control of metabolism" – Jens Brüning (2019 Heinrich Wieland Prize), Max Planck Institute for Metabolism Research, Cologne, Germany

"Beyond neurons in the neuroendocrine control of metabolism" – Cristina García Cáceres, Helmholtz Munich, Munich, Germany

"Body–brain communication" – Christoph Thaiss, University of Pennsylvania, Philadelphia, USA

Chemical Biology
"Decoding the protein dance" – Paola Picotti, ETH Zurich, Switzerland

"Chemical biology approaches for drug discovery" – Edward Tate, Imperial College London, UK

"Chemical proteomic approaches to study post-translational and pharmacological landscapes of immune dysregulation" – Ekaterina Vinogradova, The Rockefeller University, New York, USA

Speaker profiles and images to download at
heinrich-wieland-prize.de/award-symposium/id-2024.html

For interviews, please contact:

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