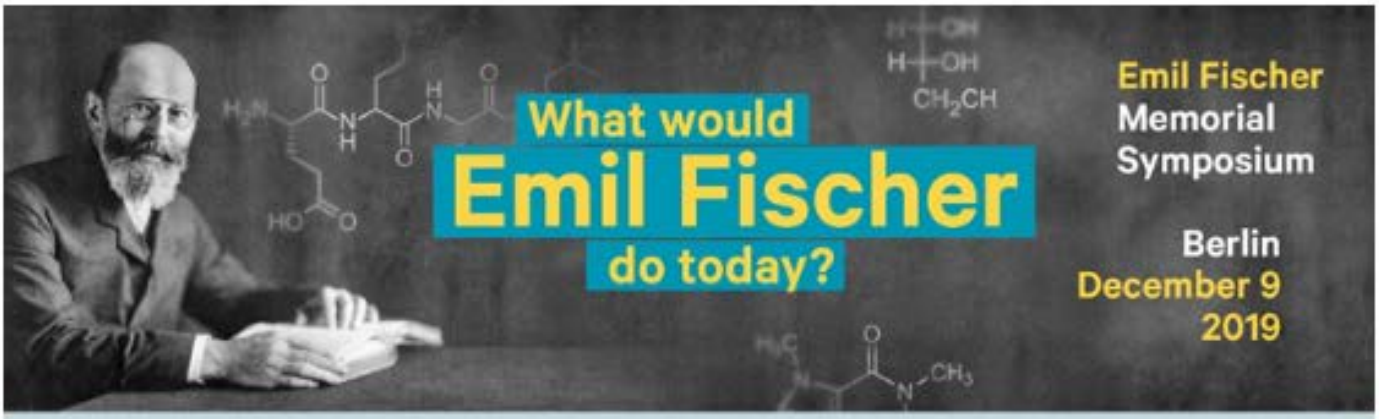
Bust (1905) of Emil Fischer by Fritz Klimsch (1870-1960) and the ACS HIST Citation for Chemical Breakthrough Award to Humboldt Universität zu Berlin for Emil Fischer's 1907 paper "Proteine und Polypeptide," *Zeitschrift für Angewandte Chemie* **1907**, *20*, 913-917.

Information and photographs of the award symposium on the next pages -->

Emil Fischer, the great explorer of carbohydrates, peptides, enzymes and nucleosides, died 100 years ago. His labs in Berlin were the nucleus of key innovations in peptide synthesis, carbohydrate and nucleoside chemistry. The scientists of Berlin are celebrating his pioneering work and the dawn of a new scientific discipline with a One-Day-Symposium "What would Emil Fischer do today?" on December 9th 2019.
At the historically significant setting of the Kaiserin-Friedrich-Haus, our distinguished speakers will update Emil Fischer's ingenious approach and lead us through the contemporary world of chemistry-driven exploration of life.

Organization Committee:

Christian Hackenberger, FMP and Humboldt Universität zu Berlin, chair
Peter Seeberger, Max-Planck-Institut für Kolloid- und Grenzflächenforschung Potsdam
Oliver Seitz, Humboldt-Universität zu Berlin, chair
Roderich Süssmuth, Technische Universität Berlin



Building of the Kaiserin Friedrich Foundation

08:30	Welcome
08:50	**Thomas Carell** "The 2nd code in DNA"
09:30	**Helma Wennemers** "Proline – a fascinating amino acid"
10:10	Coffee Break
10:40	**Yasuhiro Kajihara** "N-Glycans on proteins"
11:20	**Don Hilvert** "Design and evolution of new enzymes"
12:00	**Hermen Overkleeft** "On configurations and conformations of carbohydrates and their analogues and how these fit in glycosidase active sites
12:40	Lunch
13:40	**Stephen Kent** "Bringing the science of proteins into the realm of organic chemistry"
14:20	**Sam Gellman** "Extrapolating from proteins"
15:00	**Geert-Jan Boons** "Probing host-virus interactions using synthetic glycans"
15:40	Coffee Break
16:10	**Eric Kool** "Targeting DNA damage and repair: toward future therapies"
16:50	**Yael David** "Engineering chromatin states toward understanding epigenetic regulation"
17:30	Refreshments
18:15	Welcome **ACS Citation for Chemical Breakthrough Award**
18:45	**Catherine Jackson** "Emil Fischer and the art of chemical experimentation"
Afterwards	Pretzel + Beer

Alexander Kraft (HIST representative)

From Left to right
Prof. Dr. Christian Hackenberger, Prof. Dr. Oliver Seitz, Alexander Kraft (HIST representative, partially turned around), Prof. Dr. Hans Börner, Prof. Dr. Christoph Arenz, Prof. Dr. Klaus Rademann

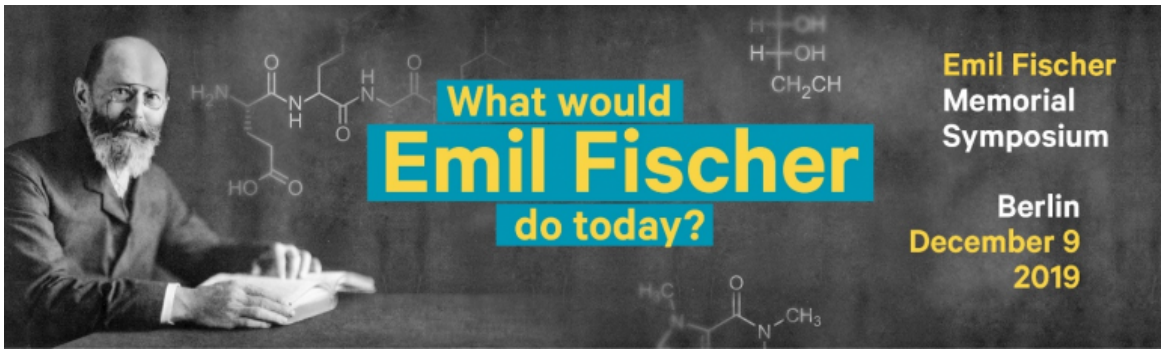
From Left to right
Prof. Dr. Christian Hackenberger, Prof. Dr. Oliver Seitz (hidden), Prof. Dr. Hans Börner, Prof. Dr. Christoph Arenz, Prof. Dr. Klaus Rademann, Alexander Kraft

From Left to right
Prof. Dr. Christian Hackenberger, Prof. Dr. Oliver Seitz, Prof. Dr. Hans Börner, Prof. Dr. Christoph Arenz, Prof. Dr. Klaus Rademann, Alexander Kraft

A Report on the Emil-Fischer Memorial Symposium “What would Emil Fischer do today?”

January 3, 2020 |News

CONFERENCE REPORT
The Emil-Fischer Memorial Symposium “What would Emil Fischer do today?”
Berlin, Germany, 9 December 2019.



Graphic design by Jakob Straub (Grafisches Gestalten)

Emil Fischer, the great explorer of carbohydrates, peptides, enzymes and nucleosides, died 100 years ago. On December 9th, 2019, scientists in Berlin celebrated his pioneering work and the dawn of a new scientific discipline with a One-Day-Symposium. Eleven speakers from six countries followed the invitation from the conference chairs **Oliver Seitz (HU Berlin)** and **Christian Hackenberger (FMP Berlin und HU Berlin)** to update Emil Fischer’s ingenious approach and provided a breath-taking tour through the contemporary world of chemistry-driven exploration of life.

In memoriam Fischer’s first steps into nucleoside chemistry, the symposium was opened with a presentation from **Thomas Carell (LMU Munich)**. He shared latest results on the occurrence and significance of modified cytidines; the components, which make up the 2nd code in DNA. New data suggests that the cofactors required to erase epigenetic marks are produced on site within the nucleus. Afterwards **Helma Wennemers (ETH Zurich)** referred to Fischer’s discovery of proline and its importance as the main component of collagen. She showed how proline modification chemistry enables the creation of peptide tools for imaging of modified collagens formed upon inflammatory processes. **Yasuhiro Kajihara (Osaka University)** reported on the biological effects of protein glycosylation. Using precision chemical synthesis to overcome the microheterogeneity of natural proteins enabled him to pinpoint the biological activity of erythropoetin to specific glycan structures. Perturbations of hydration shells seem to play important roles. In the next talk, **Don Hilvert (ETH Zurich)** alluded to Fischer’s lock-and-key metaphor in enzymology. He presented how the catalytic efficiency of a *de novo* aldolase can be improved by five orders of magnitude. The process involves a computer program to select a suitable protein that accommodates the transition state. Subsequent high-throughput molecular evolution introduces a hydrogen bonding network required for efficient acid-base catalysis. **Hermen Overkleeft (Leiden University)** referenced Fischer’s usage of glycosidases in analysis. Glycosidases are prime targets for the development of drugs for the treatment of, amongst others, lipid storage diseases. Hermen Overkleeft introduced an impressive panel of selective glycosidase inhibitors for usage in chemical biology and as potential leads for inhibitor development.

In the footsteps of Fischer’s landmark achievements on peptide synthesis, **Steve Kent (University of Chicago)** highlighted the power of chemical protein synthesis. His development of native chemicalligation, a capture-rearrangement strategy to chemically ligate a peptide-thioester with an *N*-terminal cysteine-containing peptide, enabled the synthesis of a metabolically stable D-protein antagonist of a growth factor receptor; an impressive achievement, which can only be made by chemical synthesis. The next talk by **Samuel Gellman (UW Madison)** introduced peptidic oligomers with defined secondary structures. These so-called foldamers have been used for the engineering of bioactive or catalytically active scaffolds in organic reactions. He showed that spatially arranged pyrrolidine-containing β-amino acids worked in tandem to catalyse a crossed aldol reaction. This unique example of a rationally designed bifunctional catalyst enabled crossed aldol cyclization reactions and the synthesis of natural products. Afterwards, **Geert-Jan Boons (Utrecht University)** delivered a talk on chemoenzymatic oligosaccharide synthesis, thereby extending Fischer’s first glycoside synthesis to the present. Highlights included the synthesis of complex multi-antennary N-glycans by a “stop and go”-strategy and the development of an automated synthesis platform relying on a catch-and-release approach. The methods facilitate investigations of host-virus interactions and glycoimmunology. **Eric Kool (Stanford University)** highlighted Fischer’s first steps into nucleotide chemistry and showed how designer nucleotides are fashioned into DNA probes that report on the activity of DNA repair enzymes. The new probe molecules enabled the discovery of small molecules that activate DNA repair. This could provide a means to protect DNA from damage during over-reacting inflammatory responses, which are the hallmark of sepsis and stroke. Finally, **Yael David (Sloan Kettering)** delivered the last natural science talk and simultaneously closed the circle on epigenetic research, which opened this symposium. She showed her latest findings on enzymatic and non-

enzymatic covalent histone modifications, for which she uses a whole array of semi-synthetic methods for their site-specific incorporation. A major part of her talk was devoted to probe histone glycation, which allowed her to link perturbed metabolism with epigenetic misregulation in cancer.

The evening session was opened by welcome remarks from German chemical society’s representative Hans-Günther Schmalz (Universität Köln), who referred to the huge impact of Emil Fischer on the German chemical science landscape in general. Afterwards, Alexander Kraft awarded as the representative of the ACS section for the history of sciences, the ACS citation for chemical breakthrough award to the Humboldt-Universität Berlin. This award honored Emil Fischer’s first synthesis of a peptide bond in his laboratories in the Hessische Straße, which occurred just a few steps away from the conference venue.

Last but not least, **Catherine Jackson (Oxford University)** gave the symposium’s final highlight. Based on original archival research, her presentation “*Emil Fischer and the art of chemical experimentation*” showed how Fischer elucidated the structures of carbohydrates, work for which he was awarded the 1902 Nobel Prize. Key to his success were his ingenious and flawless command of essential analytical techniques of nineteenth-century chemistry. Together with his ability to manage large-scale research, this enabled Fischer to assign the three-dimensional composition of carbohydrates correctly, thereby laying the foundations of the modern discipline. Fischer linked experiment with abstract knowledge, beginning to establish stereochemical theory’s predictive power.

After this firework of science, the audience in the fully seeded lecture of the Kaiserin-Friedrich House unanimously agreed: It is time to toast to the chemical genius and founding father of the chemical life sciences Emil Fischer, without whom this most active research field would not exist!

Contributed by Oliver Seitz