Leopoldina
Nationale Akademie
der Wissenschaften

Curriculum Vitae Professor Carolyn R. Bertozzi Ph.D.

Image: Andrew Brodhead

Name: **Carolyn R. Bertozzi**
Date of birth: **19 May 1966**

Research Priorities: bioorthogonal chemistry, glycobiochemistry, chemical protein engineering, bionanotechnology, tuberculosis

Carolyn Bertozzi is considered a pioneer in the field of glycobiochemistry, an area of science focused on the function of cell surface glycans. These sugar residues play a key role in cell communication and metabolism and change with various diseases. To observe this phenomenon in living cells, Carolyn Bertozzi established a completely new avenue of research: bioorthogonal chemistry.

Academic and Professional Career

since 2015	Professor of Chemistry, Stanford Chemistry, Engineering & Medicine for Human Health Institute (ChEM-H Institute), Stanford University, Stanford, USA
2006 - 2015	Director, The Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, USA
2002 - 2015	Professor of Chemistry and Molecular and Cell Biology, University of California, Berkeley, USA
2008	Founder, Redwood Bioscience Inc., Emeryville, USA
since 2000	Scientist, Howard Hughes Medical Institute, Chevy Chase, USA
2000 - 2002	Professor of Molecular and Cellular Pharmacology, University of California, San Francisco, USA
1999 - 2002	Associate Professor of Chemistry and Molecular and Cell Biology, University of California, Berkeley, USA
1996 - 1999	Assistant Professor of Chemistry, University of California, Berkeley, USA

1993 - 1995	Postdoc, American Cancer Society, University of California, San Francisco, USA
1993	Ph.D. in Chemistry, University of California, Berkeley, USA
1988	Bachelor degree in Chemistry, Harvard University, Cambridge, USA

Honours and Awarded Memberships

2023	Priestley Medal, American Chemical Society (ACS), USA
2022	Nobelprize in Chemistry (together with Morten Meldal, K. Barry Sharpless), Royal Swedish Academy of Sciences, Stockholm, Sweden
2022	Helen Dean King Award, The Wistar Institute, Philadelphia, USA
2022	Dr H.P. Heineken Prize for Biochemistry and Biophysics
2022	Wolf Prize in Chemistry, Wolf Foundation, Herzlia Pituach, Israel
2022	Lifetime Mentor Award, American Association for the Advancement of Science (AAAS), USA
since 2018	Foreign Member, Royal Society, UK
2017	Arthur C. Cope Award, ACS, USA
2015	150th Anniversary Alumni Excellence Award, University of California, San Francisco, USA
2013	Hans Bloemendal Award, Radboud University Nijmegen, Nijmegen, Netherlands
since 2013	Member, National Academy of Inventors, Tampa, USA
2012	Heinrich Wieland Prize, Boehringer Ingelheim Foundation, Mainz, Germany
2011	Tetrahedron Young Investigator Award for Bioorganic and Medicinal Chemistry, Tetrahedron Publications, Elsevier publishing company, Amsterdam, Netherlands
2010	Lemelson-MIT Prize, Massachusetts Institute of Technology and Lemelson Foundation, Cambridge, USA
2009	Albert Hofmann Medal, University of Zurich, Zurich, Switzerland
since 2008	Member, German National Academy of Sciences Leopoldina, Germany
2008	Roy L. Whistler International Award in Carbohydrate Chemistry, International Carbohydrate Organization, Melbourne, Australia
2008	Li Ka Shing Women in Science Award, Li Ka Shing Foundation, Berkeley, USA
2007	Ernst Schering Prize, Schering Stiftung, Berlin, Germany
since 2005	Member, National Academy of Sciences, USA

since 2003	Member, American Academy of Arts and Sciences, USA
since 2002	Fellow, AAAS, Pennsylvania, USA
2002	Irving Sigal Young Investigator Award, Protein Society, Canyon Country, USA
2001	Donald Sterling Noyce Prize for Excellence in Undergraduate Teaching, University of California, Berkeley, USA
2001	Berkeley Distinguished Teaching Award, University of California, Berkeley, USA
1999	MacArthur Foundation (Genius) Award, MacArthur Foundation, Chicago, USA
1998	Beckman Young Investigator Award, Arnold and Mabel Beckman Foundation, Irvine, USA
1996	Exxon Education Fund Young Investigator Award, Exxon Mobil Corporation, Irving, USA
1988	Thomas T. Hoopes Undergraduate Thesis Prize, Cambridge, USA
1988	New England American Institute of Chemists Award, New England American Institute of Chemists, North Andover, USA
	Honorary Doctorate, Freie Universität Berlin, Duke University, Durham, USA and Brown University, Providence, USA

Research Priorities

Carolyn R. Bertozzi is considered a pioneer in the field of glycobiochemistry, an area of science focused on the function of cell surface glycans. These sugar residues play a key role in cell communication and metabolism and change with various diseases. To observe this phenomenon in living cells, Carolyn Bertozzi established a completely new avenue of research: bioorthogonal chemistry.

Bertozzi's research is at the interface of chemistry, biology and medicine. Her interest in glycans led her to an area of science that had up until that time been largely unexplored. A large portion of all proteins is thought to be glycosylated. Carolyn R. Bertozzi wants to understand the role these sugars play in biological processes and how glycosylation patterns change in specific terms as people age or become ill. Such an understanding will enable the development of methods for detecting cancers, infectious diseases or autoimmune diseases, for example, at an early stage, and possibly shed light on treatment approaches.

Previously, there was no process for examining these molecules in a targeted way. But thanks to the bioorthogonal chemistry developed by Bertozzi, this is now possible. Molecules in living cells can now be chemically modified in such a way that allows them to be observed. In this process, cells are fed reporter molecules, which are incorporated into the glycans through cell metabolism. This "labels" the glycans, which are then attached to other chemical substances, enabling them to

be recognised and observed, as well as targeted for therapeutic purposes if necessary. For this to work, the reporter molecules must be bioorthogonal. This means that they must not react with the complex, varied biological environment or be toxic.

Carolyn R. Bertozzi is also developing further chemistry-based methods for modifying biological systems, including a protein engineering process that enables synthetic proteins to be built, which has led to new developments in protein-based agents. She is also focused on nanotools such as nanoneedles or nanoparticles that can be used to examine cells without damaging them. Last but not least, she also conducts research into tuberculosis pathogens.

To ensure that her discoveries are available for medical applications, she established Redwood Bioscience Inc. in 2008.