



## Curriculum Vitae Prof. Dr. Emmanuelle Charpentier



Image: Hallbauer&Fioretti

**Name:** Emmanuelle Charpentier  
**Born:** 1968

**Main Research Interests:** Molecular infection biology; molecular mechanisms governing physiology and infection-associated processes in Gram-positive bacterial pathogens; research on CRISPR-Cas, the adaptive immune system that protects bacteria against invading genetic elements; small regulatory RNAs that interfere with bacterial pathogenicity; protein quality-control that regulates bacterial adaptation, physiology and virulence; mechanisms of bacterial recognition by immune cells

Emmanuelle Charpentier is a French microbiologist and biochemist. She is an expert in regulatory mechanisms underlying processes of infection and immunity in bacterial pathogens. With her recent groundbreaking findings in the field of RNA-mediated regulation based on the CRISPR-Cas9 system, Emmanuelle Charpentier has laid the foundation for the development of a novel, highly versatile and specific genome editing technology that is revolutionizing life sciences research and could open up whole new opportunities in biomedical gene therapies.

### Academic and Professional Career

- since 2018 Acting and Founding Director of the Max Planck Unit for the Science of Pathogens
- 2015 - 2018 Scientific Member of the Max Planck Society, Director at the Max Planck Institute for Infection Biology, Department of Regulation in Infection Biology, Berlin
- since 2014 Alexander von Humboldt Professor

- since 2014 Lab Head, Visiting Professor, Laboratory for Molecular Infection Medicine Sweden (MIMS), Umeå Centre for Microbial Research (UCMR), Department of Molecular Biology, Faculty of Medicine, Umeå University, Sweden
- 2013 - 2015 Department Head, W3 Professor, Helmholtz Centre for Infection Research (HZI), Braunschweig, Department of Regulation in Infection Biology, Hannover Medical School (MHH)
- 2013 Docent (Medical Microbiology), Faculty of Medicine, Umeå University
- 2009 - 2014 Lab Head, Associate Professor, Laboratory for Molecular Infection Medicine Sweden (MIMS), Umeå Centre for Microbial Research (UCMR), Department of Molecular Biology, Faculty of Medicine, Umeå University
- 2006 - 2009 Lab Head, Associate Professor, Max F. Perutz Laboratories, University of Vienna, Austria
- 2006 Private Docent (Microbiology), Habilitation Dissertation, Centre of Molecular Biology, Vienna BioCenter, University of Vienna
- 2004 - 2006 Lab Head, Assistant Professor, Department of Microbiology and Immunobiology, University of Vienna
- 2002 - 2004 Lab Head, Guest Professor, Institute of Microbiology and Genetics, University of Vienna
- 1999 - 2002 Research Associate, Skirball Institute of Biomolecular Medicine, New York, US
- 1999 Research Associate, St. Jude Children's Research Hospital, Memphis, Tennessee, USA
- 1997 - 1999 Assistant Research Scientist, New York University Medical Center, New York, USA
- 1996 - 1997 Post-Doctoral Associate, The Rockefeller University, New York, USA
- 1995 - 1996 Post-Doctoral Assistant, Pasteur Institute, Paris, France
- 1993 - 1995 University Teaching Assistant, University Pierre and Marie Curie, Paris
- 1992 - 1995 Graduate student, Pasteur Institute, Paris; PhD degree in Microbiology, University Pierre and Marie Curie, Paris
- 1986 - 1992 Studies of Biology, Microbiology, Biochemistry and Genetics, University Pierre and Marie Curie, Paris

#### **Project Coordination, Membership in Collaborative Research Projects**

Nationale Akademie der Wissenschaften Leopoldina  
[www.leopoldina.org](http://www.leopoldina.org)

since 2014 DFG Project „Gentherapie angeborener metabolischer Lebererkrankungen durch gezielte Genommodifikation“

### **Honours and Awarded Memberships**

2019 Richard-Ernst-Medaille, ETH Zürich

2018 Berliner Wissenschaftspreis

2018 Kavli Prize in the field of nanoscience

2016 Human Frontier Science Program Nakasone Award (with Jennifer Doudna)

2016 BBVA Foundation Frontiers of Knowledge Award for Biomedicine

2016 Meyenburg Prize

2016 Gottfried Wilhelm Leibniz Prize of the German Research Foundation (DFG)

2016 L'Oréal-Unesco "For Women in Science" Award

2016 Otto Warburg Medal

2015 Wissenschaftspreis Niedersachsen

since 2015 Member of the German National Academy of Sciences Leopoldina

2015 Carus Medal of the German National Academy of Sciences Leopoldina

2015 Excellence by Choice Jubilee Award, Umeå University, Sweden

2015 Gruber Prize in Genetics

2015 The Hansen Family Award

2015 Princess of Asturias Award for Technical and Scientific Research

2015 The 11th International Society for Transgenic Technologies Prize

2015 Elected Fellow of the American Academy of Microbiology

2015 Louis Jeantet Prize for Medicine

2015 Ernst Jung Prize for Medicine

2015 Breakthrough Prize in Life Sciences

2014 Grand Prix Jean-Pierre Lecocq of the French Academy of Sciences

2014 Dr. Paul Janssen Award for Biomedical Research

2014 Elected Member of the European Molecular Biology Organization (EMBO)

2014 Jacob Heskel Gabbay Award in Biotechnology and Medicine

2014 Göran Gustafsson Prize in Molecular Biology, Royal Swedish Academy of Sciences

2013	Alexander von Humboldt Professorship
2011	Eric K. Fernström Prize, Sweden
2010	Umeå Biotech Incubator Business Idea Award
2009	Prize of the City of Vienna: Theodor Körner Prize for Science and Culture

### Main Research Interests

Emmanuelle Charpentier is a French microbiologist and biochemist. She is an expert in regulatory mechanisms underlying processes of infection and immunity in bacterial pathogens. With her recent groundbreaking findings in the field of RNA-mediated regulation based on the CRISPR-Cas9 system, Emmanuelle Charpentier has laid the foundation for the development of a novel, highly versatile and specific genome editing technology that is revolutionizing life sciences research and could open up whole new opportunities in biomedical gene therapies.

Emmanuelle Charpentier investigates fundamental mechanisms of regulation in processes of infection and immunity with a focus on Gram-positive bacterial pathogens. She is interested in understanding how RNAs and proteins coordinate to modulate gene expression at the transcriptional, post-transcriptional and post-translational level. Her research group studies regulatory RNAs and proteins in various biological pathways such as horizontal gene transfer, adaptation to stress, physiology, persistence, virulence, infection and immunity. In particular, they do research on interference systems in the defense against genetic elements (CRISPR-Cas), small regulatory RNAs that interfere with pathogenic processes, protein quality control that regulates bacterial adaptation, physiology and virulence, and the mechanisms of bacterial recognition by immune cells.

The laboratory of Emmanuelle Charpentier employs a combination of -omics, genetic, molecular, biochemical, physiological and cell infection approaches to identify new molecules and decipher their origins, functions and modes of action at the molecular and cellular level. A pathogen mostly studied in the laboratory is *Streptococcus pyogenes* also called Group A streptococcus that can cause highly aggressive invasive infections such as toxic shock and necrotizing diseases. In the past years, they have also investigated the genetics and biology of *Listeria monocytogenes*, *Staphylococcus aureus* and *Streptococcus pneumoniae*.

The understanding of fundamental mechanisms of regulation in pathogens is critical to generate new findings in basic science and possibly translate them into novel biotechnological and biomedical applications (e.g. genome editing tools, anti-infective strategies). A successful example of the application of the basic research in biotechnology and medicine is the recent discovery by Emmanuelle Charpentier and her group of an RNA-guided DNA cleavage mechanism that has been harnessed as an RNA programmable genome engineering technology and that stems from their

analysis of the adaptive immune CRISPR-Cas9 system in bacterial pathogens.

Additional affiliations: Helmholtz-Zentrum für Infektionsforschung in Braunschweig and The Laboratory for Molecular Infection Medicine Sweden (MIMS), Umeå University, Sweden.