

CURRICULUM VITAE

Prof. Emmanuelle Charpentier, PhD

Emmanuelle Charpentier was born on December 11, 1968, in Juvisy-sur-Orge in northern France. Professor Charpentier is a French microbiologist, geneticist, and biochemist. In 2020, she received the Nobel Prize in Chemistry together with the American biochemist Jennifer A. Doudna for the development of a genome editing method (using CRISPR-Cas9, also known as 'molecular scissors'). This is the first time in history that the Nobel Prize for Science has been awarded exclusively to two women.

Emmanuelle Charpentier grew up in a small town near Paris. In her youth, she devoted herself to playing the piano and ballet, but very early on, she also showed interest in science. Emmanuelle's father, who worked as a park manager, enjoyed explaining the Latin names of many plants to her, sparking her curiosity in natural sciences. Her mother worked in psychiatry, and perhaps due to this influence, Emmanuelle later leaned towards studying medically oriented topics. At school, she was an enthusiastic and ambitious student, always eager to acquire knowledge and strive for perfection. Even during elementary school, when her older sister started university, she realised that academia was the place to continue with studies, research, teaching, and imparting knowledge. Emmanuelle's parents always encouraged her to develop her academic prowess, giving her even more motivation for further study.

After completing her secondary education in 1986, she moved to Paris to study biochemistry, microbiology, and genetics at the Pierre and Marie Curie University (now Sorbonne). An interest in microorganisms and infectious diseases led her to the Pasteur Institute, where she earned a Ph.D. in Microbiology in 1995. She remained at this institution for another year as a postdoctoral researcher. Her doctoral project involved researching the mechanisms by which bacteria develop resistance to antibiotics.

After completing her doctoral studies, she felt that to broaden her personal and academic horizons, she should travel abroad. Thus, she continued her career in the United States at Rockefeller University in New York in the microbiology laboratory of Elaine Tuomanen. There she researched the pathogen *Streptococcus pneumoniae*. Between 1997 and 1999, she worked as a research assistant at New York University Medical Center (now NYU Langone Health) in Pamela Cowin's laboratory, focusing on the genetic analysis of mouse skin development. She spent a total of five years in the United States and during this time also held a research position at St. Jude Children's Research Hospital in Memphis and at the Skirball Institute of Biomolecular Medicine in New York under the guidance of Richard Novick.

In 2002, she returned to Europe to establish her own research group at the Max Perutz Labs at the University of Vienna in Austria. Here she also successfully habilitated in the field of Microbiology. In Vienna, she worked on several projects aimed at identifying and deciphering RNA- and protein-mediated regulatory mechanisms, mainly in the bacterial pathogen *Streptococcus pyogenes*. One of these projects also involved identifying RNAs with regulatory functions. Based on this research, Professor Charpentier began working on the CRISPR-Cas9 project.

In 2009, she continued researching the CRISPR-Cas9 system in Sweden at the Umeå Center for Microbial Research at Umeå University. In Sweden, she held the position of Lab Head, and from 2014 to 2017 she was also a Visiting Professor. During this period, she also succeeded in her habilitation in the field of Medical Microbiology.



In 2011, she published a research paper in the journal *Nature* identifying the critical function of trans-activating CRISPR RNA (tracrRNA) in the growth of virus resistance mediated by CRISPR. That same year, at a conference in Puerto Rico, Emmanuelle Charpentier met with the American scientist Jennifer Anne Doudna from the University of California, Berkeley, who was addressing CRISPR systems from a structural perspective at the conference. The two scientists immediately began collaborating, which later earned them the Nobel Prize.

Together, they contributed to the development of one of the most important tools in genetic engineering: the CRISPR-Cas9 molecular scissors. With their help, scientists can edit the DNA of animals, plants, and microorganisms with high precision. This technology brings revolutionary changes to all areas of science, opening up, for example, new possibilities in the treatment of genetic diseases, cancer, plant and crop research, the development of antiviral therapies, and also serves as a basic research tool.

In 2015, Professor Charpentier accepted an offer from the Max Planck Society to become a scientific member. From 2015 to 2018, she served as the Scientific Director and Head of the Department of Regulation in Infection Biology at the Max Planck Institute for Infection Biology in Berlin. Since 2016, Emmanuelle has been Honorary Professor at Humboldt University of Berlin. From 2018, she has been the Scientific and Managing Director of the Max Planck Unit for the Science of Pathogens in Berlin, an independent institute that she founded together with the Max Planck Society.

Emmanuelle Charpentier is recognised as a world expert on regulatory mechanisms that underlie the processes of infection and immunity in bacteria responsible for human diseases. Her work, and that of her laboratory, has led to several groundbreaking discoveries and a deeper understanding of the molecular pathways that regulate antibiotic resistance and virulence in bacterial pathogens. Thanks to her groundbreaking discoveries in the field of RNA-mediated regulation based on the CRISPR-Cas9 system (mainly in the human pathogen *Streptococcus pyogenes*), Professor Emmanuelle Charpentier established the foundation for the development of a highly versatile genome editing technology.

Professor Charpentier is the inventor and co-owner of the core intellectual property of the CRISPR-Cas9 technology. She co-founded CRISPR Therapeutics and ERS Genomics, two companies established with Rodger Novak and Shaun Foy to develop the CRISPR-Cas gene engineering technology for use in biotechnology and biomedical applications.

For her contributions to the discovery of CRISPR-Cas9, Professor Charpentier, along with her team, has received numerous international awards and accolades. She has been elected to memberships in national and international scientific academies and has earned many honorary doctorates from universities in Europe, Asia, and North America. Beyond the Nobel Prize in Chemistry, she has also garnered other prestigious awards, including the Japan Prize, the Kavli Prize for Nanoscience, the Wolf Prize for Medicine, the Tang Prize for Biopharmaceutical Science, the Breakthrough of the Year in Life Sciences, the Canada Gairdner International Award, the Massry Prize, and many others.

Structured CV

Date of Birth: 11. December 1968, Juvisy-sur-Orge

Education

- 1992 Bachelor and Master Studies (Life Sciences, Biochemistry, Microbiology and Genetics)
University Pierre & Marie Curie (now Sorbonne University), Paris, France
Pasteur Institute, Paris, France (Patrice Courvalin's Lab)
- 1995 Ph.D. Degree (Microbiology)
University Pierre & Marie Curie (now Sorbonne University), Paris, France
Pasteur Institute, Paris, France (Patrice Courvalin's Lab)
- 2006 Private Docent (Microbiology, "Habilitation" Dissertation)
Centre of Molecular Biology, University of Vienna (UniWien), Vienna, Austria
- 2013 Docent (Medical Microbiology)
Faculty of Medicine, Umeå University (UmU), Umeå, Sweden
- 2016 Honorary Professor
Institute for Biology, Humboldt University Berlin, Germany

Employment

- 1993-1995 University Teaching Assistant
University Pierre & Marie Curie (now Sorbonne University), Pasteur Institute, Paris, France
- 1996-2002 Post-Doctoral Associate, Assistant Research Scientist and Research Associate
Pasteur Institute, Paris, France (Patrice Courvalin's Lab)
The Rockefeller University, New York, NY, USA (Elaine Tuomanen's Lab)
New York University Medical Center (now NYU Langone Health), New York, NY, USA (Pamela Cowin's Lab)
St. Jude Children's Research Hospital, Memphis, TN, USA (Elaine Tuomanen's Lab)
Skirball Institute of Biomolecular Medicine, New York, NY, USA (Richard Novick's Lab)
- 2002-2009 Laboratory Head, Guest, Assistant and Associate Professor
Max F. Perutz Laboratories (MFPL, now Max Perutz Labs), University of Vienna (UniWien), Vienna, Austria
Department of Microbiology & Immunobiology, University of Vienna (UniWien), Vienna, Austria
Institute of Microbiology & Genetics, University of Vienna (UniWien), Vienna, Austria
- 2009-2017 Laboratory Head, Associate and Visiting Professor

The Laboratory for Molecular Infection Medicine Sweden (MIMS), Umeå University (UmU), Umeå, Sweden
Umeå Centre for Microbial Research (UCMR), Umeå University (UmU), Umeå, Sweden
Department of Molecular Biology, Umeå University (UmU), Umeå, Sweden
Faculty of Medicine, Umeå University (UmU), Umeå, Sweden

- 2013-2015 Department Head
Department of Regulation in Infection Biology, Helmholtz Centre for Infection Research (HZI), Braunschweig, Germany W-3 and Alexander von Humboldt Professor
Hannover Medical School (MHH), Hannover, Germany
- 2015-2018 Scientific Director, Department Head
Department of Regulation in Infection Biology, Max Planck Institute for Infection Biology (MPIIB), Berlin, Germany Honorary Professor
Institute for Biology, Humboldt University (HU), Berlin, Germany
- 2018 Founding and Acting Scientific and Managing Director
Max Planck Unit for the Science of Pathogens (MPUSP), Berlin, Germany Honorary Professor
Institute for Biology, Humboldt University (HU), Berlin, Germany
- 2018-2021 Scientific and Managing Director
Max Planck Unit for the Science of Pathogens (MPUSP), Berlin, Germany Honorary Professor
Institute for Biology, Humboldt University (HU), Berlin, Germany
- 2021-present Scientific and Managing Director, Acting Head of Administration
Max Planck Unit for the Science of Pathogens (MPUSP), Berlin, Germany Honorary Professor
Institute for Biology, Humboldt University (HU), Berlin, Germany

Election to International Academies and Organisations

- 2014 Member of the European Molecular Biology Organisation (EMBO)
- 2015 Member of the German National Academy of Sciences Leopoldina
Member of the European Academy of Microbiology
Scientific Member of the Max Planck Society
Fellow of the American Academy of Microbiology
- 2016 Member of the Berlin-Brandenburg Academy of Sciences
Corresponding Member Abroad of the Austrian Academy of Sciences
Foreign Member of the Royal Swedish Academy of Sciences
- 2017 Member of the French Academy of Sciences
Honorary Member of the New York Academy of Sciences
Foreign Member of the Royal Swedish Academy of Engineering Sciences
Foreign Associate of the National Academy of Sciences
Fellow of the American Association for Cancer Research Academy
Member of the German National Academy of Science and Engineering Acatech

2018	Member of the National Academy of Technologies of France Foreign Member of the Norwegian Academy of Science and Letters Ordinary Member of the European Academy of Sciences and Arts
2019	Honorary Member of the Royal Academy of Medicine of Belgium
2021	Foreign Member of the Accademia Nazionale dei Lincei (ceremony yet to take place) Appointed Member of the Pontifical Academy of Sciences (ceremony yet to take place)
2023	Member of the Académie de Berlin International Honorary Member of the American Academy of Arts and Sciences (ceremony yet to take place)

Honorary Doctorate Degrees

2016	École Polytechnique Fédérale de Lausanne (EPFL), Switzerland New York University (NYU), USA KU Leuven, Belgium
2017	Hong Kong University of Science and Technology, China Western University, London, Ontario, Canada Faculty of Medicine, Umeå University, Sweden
2018	Manchester University, UK University of Cambridge, UK Catholic University Louvain-la-Neuve (UCLouvain, UCL), Belgium
2019	McGill University, Canada
2023	Liège University, Belgium

Awards, Decorations, Honors & Prizes

2009	Prize of the City of Vienna: Theodor Körner Prize for Science and Culture
2010	Umeå Biotech Incubator Business Idea Award
2011	Eric K. Fernström Prize
2014	Grand Prix Jean-Pierre LeCocq (French Academy of Sciences) Jacob and Louise Gabbay Award in Biotechnology and Medicine Biotech Meeting Hall of Fame Award Winner for Scientific Achievements Dr Paul Janssen Award for Biomedical Research European Life Science Awards (2nd Investigator of the Year) Göran Gustafsson Prize (Royal Swedish Academy of Sciences) Alexander von Humboldt Professorship
2015	World Technology Award for Biotechnology Science Award of Lower Saxony Massry Prize Princess of Asturias Award for Technical and Scientific Research Umeå University EC Jubilee Award Gruber Prize in Genetics Carus-Medal of the German National Academy of Sciences Leopoldina Hansen Family Award (Bayer Foundation) Ernst Jung Prize for Medicine Louis Jeantet Prize for Medicine Breakthrough Prize in Life Sciences
2016	The Meyenburg Prize

The John Scott Award
 Wilhelm Exner Medal
 Canada Gairdner International Award
 Warren Alpert Foundation Prize
 Tang Prize for Biopharmaceutical Science
 HFSP (Human Frontiers Science Program) Nakasone Award
 Knight French National Order of the Legion of Honour (Chevalier de l'Ordre National de la Légion d'Honneur)
 Research!Sweden Research Award
 Otto Warburg Medal
 L'Oréal-UNESCO For Women in Science Award
 Paul Ehrlich and Ludwig Darmstaedter Prize
 Leibniz Prize
 ABRF Annual Award for Outstanding Contributions to Biomolecular Technologies
 Vallee Visiting Professorship
 2017 German Orden Pour Le Mérite for Sciences and Arts (Der Orden Pour Le Mérite für Wissenschaften und Künste)
 Inventor of the Year Award (Intellectual Property Owners Education Foundation)
 "Biochemical Analytics" Prize (German Society for Clinical Chemistry and Laboratory Medicine)
 The Albany Medical Center Prize in Medicine and Biomedical Research
 Albert Einstein Foundation Leading 100 Visionaries
 BBVA Foundation Frontiers of Knowledge Award
 International Ellis Island Medal of Honor
 The Japan Prize
 The German Innovation Award ("Deutscher Innovationspreis" Future Thinker)
 Novo Nordisk Novozymes Prize
 2018 Bijvoet Medal (Bijvoet Center for Biomolecular Research, Utrecht University)
 Berliner Wissenschaftspreis des Regierenden Bürgermeister von Berlin
 American Cancer Society Medal of Honor
 Premio Lazzaro Spallanzani Scienza Madre
 Austrian Decoration of Honor for Science and Art (Das Österreichische Ehrenzeichen für Wissenschaft und Kunst)
 V de Vida Award (The Spanish Association Against Cancer, AECC)
 Aachen Engineering Award
 The Kavli Prize in Nanoscience
 Precision Medicine World Conference Luminary Award
 2019 Officer of the French National Order of Merit (Officier de l'Ordre National du Mérite) (ceremony still to take place)
 The Scheele Award
 Harvey Prize in Science and Technology
 Knight Commander's Cross, Great Cross with Star of the Order of Merit of the Federal Republic of Germany (Großes Verdienstkreuz mit Stern des Bundesrepublik Deutschland)
 eyeforpharma Lifetime Achievement Award
 Richard R. Ernst Gold Medal

2020	Premio Città di Firenze sulle Scienze Molecolari The Nobel Prize in Chemistry Hall of Fame for German Research (Manager Magazin and Merck) The Wolf Prize in Medicine Carl Friedrich Gauß-Medaille
2021	FEMS-Lwoff Award for Achievements in Microbiology Commander of the French National Order of the Legion of Honour (Commandeur de l'Ordre National de la Légion d'Honneur) (ceremony yet to take place)
2022	The Capo d'Orlando Prize
2023	US National Inventors Hall of Fame (ceremony yet to take place) Prix du Rayonnement Français (catégorie scientifique)

Recognition in the Broader Community of World Affairs Other recognitions (Selected)

2014	Foreign Policy's 100 leading global thinkers ("Innovators") Vanity Fair's 50 most influential French people worldwide (30/100)
2015	TIME's 100 most influential people in the world ("The Pioneers") Fierce Biotech's 25 most influential people in biopharma Vanity Fair's 50 most influential French people worldwide (30/100)
2016	TIME's 100 persons of the year (Short List No. 5: "The trailblazers, The CRISPR pioneers") Vanity Fair's 100 the new establishment ("The Gene-iuses") (59/100) Tagespiegel's 100 Köpfe
2017	OOOM 100: The world's most inspiring people (5/100)
2018	OOOM 100: The world's most inspiring people (17/100) Vanity Fair's 50 most influential French people worldwide (6/50) Forbes's Europe's Top 50 Women in Tech 2018
2019	Manager Magazin/Boston Consulting Group: 100 most influential business women in Germany OOOM 100: The world's most inspiring people (27/100) Web of Science: Highly Cited Researcher
2020	Berlin Boxx Business Magazin: Top 70 OOOM 100: The world's most inspiring people (6/100) Vanity Fair: 50 French women who made 2020 (25/50) Web of Science: Highly Cited Researcher 2019
2021	Web of Science: Highly Cited Researcher Worth: Groundbreakers 2021 – 50 women changing the world
2022	Forbes: 50 Over 50 – EMEA (Europe, the Middle East and Africa) Global Leaders Today: Global 100 Inspirational Leaders (49/100) OOOM 100: The world's most inspiring people (78/100) Web of Science: Highly Cited Researcher
2023	OOOM 100: The world's most inspiring people (47/100)

Publications

Approximately 100 research publications.

Patents

2016 -

95 patents granted worldwide on CRISPR-Cas9 technology (“Methods and compositions for RNA-directed target DNA modification and for RNA-directed modulation of transcription”)

2020

Pending Patent Applications: Charpentier E, Fonfara I, Bratovič M “Cas9 variants with enhanced specificity” (WO20/056639)