

JOACHIM FRANK



Joachim Frank is a German-born American biochemist who won the 2017 Nobel Prize for Chemistry for his work on image-processing techniques that proved essential to the development of cryo-electron microscopy. He shared the prize with Swiss biophysicist Jacques Dubochet and British molecular biologist Richard Henderson. In 2008, he assumed his current professor position at Columbia University.

ACADEMIC AND PROFESSIONAL CAREER

Joachim Frank was born 1940 in Siegen, Germany. He studied physics at the University of Freiburg, progressing to the University of Munich where he considered the possibility of using electrons to study molecules. He did his graduate work at the Max Planck Institute in Munich, but it was a visiting scientist's carelessness that gave him his next clue by joggling the electron microscope, creating blurred images of carbon films. Viewing the images by optical diffraction, Frank saw striped patterns that he realised indicated the high precision with which images of molecules could be aligned in the computer by cross-correlation.

After his doctorate at the Technical University of Munich in 1970, Frank gained a Harkness fellowship that allowed him to visit labs of his choice in the USA. He picked the Jet Propulsion lab at Caltech before joining Bob Glaeser, one of the cryo-EM pioneers, at the University of California, Berkeley, and finished his US tour at Cornell University. In 1973 he moved to the Cavendish Lab, Cambridge, where he continued his work on image analysis and calculated the minimum electron dose to ensure accuracy of alignment without damaging the molecule.

In 1975, Frank was invited to join the Wadsworth Laboratory in Albany, NY, where he and his students combined EM images into 3D reconstructions, using the ribosome to test his methods. Frank joined the University of Albany in 1985 and the following year was made Professor of Biomedical Sciences. During a sabbatical in 1987, he returned briefly to Cambridge to work with Richard Henderson at the Laboratory for Molecular Biology of the MRC.

As the ribosome images became sharper with improved programmes, he decided to study the mechanism of protein synthesis. His efforts were boosted during a research stay in 1994 at the Max Planck Institute for Medical Research in Heidelberg, Germany. Thanks to precisely-timed samples, Frank has been able to create frame-by-frame representations of how mRNA and tRNA interact with the ribosome. From 1998 until 2017, Frank was a Howard Hughes Medical Institute Investigator. In 2008, he joined Columbia University as Professor of Biochemistry and Molecular Biophysics and Professor of Biological Sciences. Away from work, Frank writes poetry, fiction and is a photographer.

AWARDS AND HONORS

- 1994 Humboldt Research Award of the Alexander von Humboldt Foundation
- 2006 Fellow of the American Academy of Arts and Sciences
- 2006 Member of the National Academy of Sciences
- 2014 Benjamin Franklin Medal in Life Science of the Franklin Institute
- 2017 Wiley Prize in Biomedical Sciences
- 2017 Nobel Prize in Chemistry
- 2018 Honorary Doctorate, University of Siegen, Germany
- 2018 Honorary Fellow of the Royal Microscopical Society