



## Manfred Eigen



Bochum, Germany, 9 May 1927 – Göttingen, Germany, 6 Feb. 2019

**Nomination** 12 May 1981

**Field** Physical Chemistry

**Title** Professor, Nobel laureate in Chemistry, 1967

### Professional address

### Most important awards, prizes and academies

**Awards:** Nobel Prize in Chemistry (1967); Otto-Hahn-Prize; Linus Pauling Medal; Carus Medal; Palmes Académiques; Ordre pour le mérite; Paul Ehrlich/Ludwig Darmstädter Prize; Paracelsus Medal; Keilin Medal; Faraday Medal; Helmholtz Medal; Diesel Medal, Küpfmüller Ring. **Honorary Degrees:** Washington (St. Louis), Harvard, Chicago, Nottingham, Jerusalem, Hull, Bristol, Cambridge, Debrecen, München, Bielefeld, Utah, Alicante. **Academies:** Deutsche Akademie der Naturforscher, Halle; Akademie der Wissenschaften, Göttingen; Bayerische Akademie der Wissenschaften, München; Berlin-Brandenburgische Akademie der Wissenschaften; Honorary member, Österreichische Akademie der Wissenschaften; Royal Society, London; Honorary member, Weizmann Institute of Sciences; Royal Danish Academy of Sciences; Institut de France, Paris; Académie Royale de Belgique; Honorary member, Hungarian Academy of Sciences; Pontifical Academy of Sciences; Russian Academy of Sciences; American Philosophical Society, Philadelphia; National Academy of Sciences, USA; American Academy of Arts and Sciences; Honorary member, New York Academy of Sciences; Honorary member, European Academy of Arts and Sciences.

### Summary of scientific research

The mechanisms of biochemical reactions (enzyme kinetics, code reading, biopolymerization); the origins and evolution of life (theory and experiments); evolutionary biotechnology.

### Main publications

Eigen, M., Über die Kinetik sehr schnell verlaufender Ionenreaktionen in wässriger Lösung, *Z. phys. Chem. N.F.*, 1, p. 176 (1954); Eigen, M., Methods for Investigation of Ionic Reactions in Aqueous Solutions with Half Times as Short as 10<sup>-9</sup> sec., *Disc. Farad. Soc.*, 17, p. 194 (1954); Eigen, M., Proton Transfer, Acid-Base Catalysis, and Enzymatic Hydrolysis, *Angew. Chem. Intern. Ed.*, 3, pp. 1-19 (1964); Eigen, M., Kinetics of reaction control and information transfer in enzymes and nucleic acids. Nobel Symp. 5 on Fast Reactions and Primary Processes, *Chem. Kinetics* (Stig Claesson, ed.), Almquist & Wiksell, Stockholm, *Intersci. Publ.*, p. 333 (1968); Eigen, M., Die "unmeßbar" schnellen Reaktionen Nobelvortrag, *Les Prix Nobel en 1967*, p. 151 (1968); Eigen, M., Selforganization of Matter and the Evolution of Biological Macromolecules, *Naturwissenschaften*, 58, p. 465 (1971); Eigen, M., Das Spiel – *Naturgesetze steuern den Zufall*, Piper-Verlag, München 1975 (with Winkler-Oswatitsch, R.), *Laws of the Game – How the Principles of Nature Govern Chance*, Alfred A. Knopf (New York, 1981) (with Winkler-Oswatitsch, R.); Eigen, M., The Hypercycle, "A Principle of Natural Self-Organization", *Naturwissenschaften*, 64, pp. 541-65 (1977), 65, pp. 7-41 and 65, pp. 341-69 (1978) (with Schuster, P.); Eigen, M., Die Kunst zu Titrieren. Vom klassischen Endpunktverfahren zur modernen differentiellen und dynamischen Analyse, *Angew. Chem.*, 91, pp. 20-51 (1979) (with Winkler-Oswatitsch, R.); Eigen, M., Evolutionary Molecular Engineering Based on RNA Replication, *Pure & Appl. Chem.*, 56, pp. 967-978 (1984) (with Gardiner, W.); Eigen, M., *Stufen zum Leben. Die frühe Evolution im Visier der Molekularbiologie*, R. Piper-Verlag, München (1987), *Steps towards Life, A Perspective on Evolution*, Oxford University Press (Oxford, 1992), pp. 173 (with Winkler-Oswatitsch, R.); Eigen, M., The Molecular Quasispecies, *Adv. Chem. Phys.*, 75, Ch. 4, pp. 149-263 (1987) (with McCaskill, J.S. and Schuster, P.); Eigen, M., Sequence Space and Quasispecies Distribution, *RNA Genetic* (Domingo, E., Holland, J.J. und Ahlquist, P., Hrsg.), vol. III, *Variability*

of RNA Genomes, pp. 211-45, CRC Press, Boca Raton, FL (1988) (with Biebricher, C.K.); Eigen, M., Statistical Geometry in Sequence Space: A Method of Quantitative. Comparative Sequence Analysis, *Proc. Natl. Acad. Sci. USA*, 85, pp. 5913-7 (1988) (with Winkler-Oswatitsch, R. and Dress, A.); Eigen, M., *Perspektiven der Wissenschaften*, Deutsche Verlagsanstalt, Stuttgart, p. 288, S. (1988); Eigen, M., How Old Is the Genetic Code? Statistical Geometry of tRNA Provides an Answer, *Science*, 244, pp. 673-9 (1989) (with Lindemann, B.F., Tietze, M., Winkler-Oswatitsch, R., Dress, A. and von Haeseler, A.); Eigen, M., The Hypercycle, Coupling of RNA and Protein Biosynthesis in the Infection Cycle of an RNA Bacteriophage, *Biochem.*, 10, pp. 11005-18 (1991) (with Biebricher, C.K., Gebinoga, M. and Gardiner, W.C.); Eigen, M., The Fifth Paul Ehrlich Lecture, Virus Strains as Models of Molecular Evolution, *Medicin. Res. Rev.*, 13, pp. 385-9 (1993); Eigen, M., Sorting single molecules: Application to diagnostic and evolutionary biotechnology, *Proc. Natl. Acad. Sci. USA*, 91, pp. 5740-7 (1994) (with Rigler, R.); Eigen, M., Quasispecies: The concept and the word, *Molecular Basis of Viral Evolution* (A. Gibbs, C.H. Calisher, eds.), pp. 181-91, Cambridge University Press, Cambridge (1995) (with Domingo, E., Holland, J., Biebricher, C.); Eigen, M., *Die 'unmeßbar' schnellen Reaktionen. Frühe Arbeiten* (1954-1967). Mit einem Vorw. und Einf. von R. Winkler-Oswatitsch. Ostwalds Klassiker der exakten Wissenschaften Band 281, Verlag Harri Deutsch, Frankfurt am Main (1996); Eigen, M., Detection of HIV-1 RNA by nucleic acid sequence-based amplification combined with fluorescence correlation spectroscopy, *Proc. Natl. Acad. Sci. USA*, 93, pp. 12811-6 (1996) (with Oehlenschläger, F. and Schwille, P.); Eigen, M., Prionics or the kinetic basis of prion diseases, *Biophysical Chemistry*, 63, (1996) A1-A18 – M. Eigen; Eigen, M., Rapid assay processing by integration of dual-color fluorescence cross-correlation spectroscopy: High throughput screening for enzyme activity, *Proc. Natl. Acad. Sci. USA*, 95, pp. 1421-6 (1998) (Koltermann, A., Ketting, U., Bieschke, J., Winkler, T., Eigen, M.); Eigen, M., BSE und das Prionen-Problem, *Spektrum der Wissenschaft*, 4, pp. 40-9 (2001).