Prof. Maxine F. Singer
Professor

Most important awards, prizes and academies

Awards: US Government Senior Executive Service Outstanding Performance Award; National Medal of Science (1992); Vanneva-Bush Award (1999); National Academy of Science, USA; American Academy of Arts and Sciences; Institute of Medicine, National Academy of Sciences; American Philosophical Society; Public Welfare Medal (2007). *Academies*: American Society of Biological Chemists; American Association for the Advancement of Science; American Chemical Society; American Society of Microbiologists; American Society for Cell Biology; Pontifical Academy of Sciences. *Honorary Degrees*: Swarthmore College; Wesleyan University; Harvard University; Yale University.

Summary of scientific research

Maxine Singer received the Ph.D. degree in Biochemistry in 1957 from Yale University. Her interest in nucleic acids (DNA and RNA) began during her post-doctoral work in Leon Heppel's laboratory at the National Institute of Health. Until 1975, she was a Research Biochemist in the Institute of Arthritis and Metabolic Diseases, NIH. During that period she worked on the synthesis and structure of RNA and applied this experience to the work that elucidated the genetic code. She described and studied enzymes that degraded RNA in bacteria. By 1970 she became interested in animal viruses and took a sabbatical leave in the laboratory of Ernest Winocour

(1971-2) at the Weizmann Institute of Science, Israel. There she began work on aspects of simian virus 40. Moving to the National Cancer Institute in 1975, she con tinued this work studying defective SV40 viruses whose genomes contain regions of DNA from the host monkey cells. She also carried out investigations on interaction between histone H1 and DNA as it relates to the structure of chromatin. In the same year she served on the organizing committee for the Asilomar Meeting on Recombinant DNA molecules, the first public discussion of the implication of these new methods. The work on defective SV40 led to an interest in highly repeated DNA sequences in primate, including human genomes. This led, in turn, to the discovery of a transposable element (jumping gene) in human DNA, the topic that was the subject of her most recent research. Looking back, Dr. Singer's scientific interests have evolved from an emphasis on chemistry to an increasing interest in biological phenomena. Her most recent research aimed to elucidate the mechanism whereby the human transposable element replicates and disperses copies to new genomic locations, a process which can be mutagenic. In 1988 she became President of the Carnegie Institution of Washington, retaining her laboratory and the title Scientist Emeritus at the NIH. At Carnegie she renewed her interest in the range of sciences investigated at the Institution's departments: earth science, astronomy, plant and development biology. She also initiated programs designed to improve scientific under standing by the general public including the training of elementary school teachers and a Saturday program for children - *First Light*. She became President Emerita in 2003. Dr. Singer served as chairman of the Editorial Board of the *Proceedings of the National Academy of Sciences of the USA*. Previously she served on the editorial boards of the *Journal of Biological Chemistry* and *Science Magazine*. Dr. Singer was a fellow (trustee) of the Yale Corporation (1975-90), is a member of the Governing Board of the Weizmann In stitute of Science and was co-chairman of its Scientific and Academic Advisory Committee, and was a member of the Board of Johnson & Johnson.

Main publications

Singer, M.F., Jones, O.W. and Nirenberg, M.W., The effect of secondary structure on the template activity of polyribonucleotides, *Proc. Natl. Acad. Sci. USA*, 29, pp. 392-9 (1963); Leder, P., Singer, M.F. and Brimacombe, R.L.C., Synthesis of trinucleoside diphosphates with polynucleotide phosphorylase, *Biochemistry*, 4, pp. 1561-7 (1965); Nossal, N.G. and Singer, M.F., The processive degradation of individual polyribonucleotide chains. I. *Escherichia coli* ribonuclease II, *J. Biol. Chem.*, 243, pp. 913-22 (1968); Moses, R.E. and Singer, M.F., Polynucleotide phosphorylase of *Micrococcus luteus*. Studies on the polymerization reaction catalyzed by primer-dependent and primer-independent enzymes, *J. Biol. Chem.*, 245, pp. 2414-22 (1970); Singer, D.S. and Singer, M.F., Studies on the interaction of H1 histone with superhelical DNA; Characterization of the recognition and binding regions of H1 histone, *Nucleic Acids Res.*, 3, pp. 2531-47 (1976); Rosenberg, H., Singer, M.F. and Rosenberg, M., Highly reiterated sequences of SIMIANSIMIANSIMIANSIMIANSIMIAN, *Science*, 200, pp. 394-402 (1978); Grimaldi, G. and Singer, M.F., A monkey Alu-sequence is flanked by 13 base pair direct repeats of an interrupted α-satellite DNA sequence, *Proc. Natl. Acad. Sci. USA*, 79, pp. 1497-1500 (1982); Skowronski, J. and

Singer, M.F., Expression of a cytoplasmic LINE-1 transcript is regulated in a human teratocarcinoma cell line, *Proc. Natl. Acad. Sci. USA*, 82, pp. 6050-4 (1985); Skowronski, J., Fanning, T.G. and Singer, M.F., Unit length LINE-1 transcripts in human teratocarcinoma cells, *Mol. Cell. Biol.*, 8, pp. 1385-97 (1988); Singer, M.F. and Berg, P., *Genes and Genomes*, University Science Books (1990); Singer, M.F. and Berg, P., *Dealing with Genes: The Language of Heredity*, University Science Books (1992); Hohjoh, H. and Singer, M.F., Sequence specific single-strand RNA-binding protein encoded by the human LINE-1retrotransposon, *EMBO J.*, 16, pp. 6034-43 (1997); Clements, A.P. and Singer, M.F., The human LINE-1 reverse transcriptase: Effects of deletions ouside the common reverse transcriptase domain, *Nucleic Acids Research*, 26, pp. 3528-35 (1998); Berg, P. and Singer M., *George Beadle An Uncommon Farmer: The Emergence of Genetics in the 20th Century*, pp. 383, Cold Spring Harbor Laboratory Press (April 30, 2005).