



Joshua Lederberg



Montclair, USA, 23 May 1925 - New York, USA, 2 Feb. 2008

Nomination 4 Mar. 1996

Field Molecular Genetics

Title Sackler Foundation Scholar, Rockefeller University, New York

Commemoration – The geneticist and microbiologist Joshua Lederberg was without any doubt one of the leading scientists of the 20th century. He was a pioneer of modern microbiology, one of the founders of molecular biology, and a leader in the development of biotechnology. He participated in laying the foundations for genetic engineering and the genetic approaches to medicine. When he was a young professor of genetics at the University of Wisconsin, he published important papers describing his discovery of viral transduction which consists in the ability of viruses that infect bacteria to transfer fragments of DNA from one infected bacteria to another and to insert them into the bacterial genome. Transduction has important applications in bacterial genetics and biotechnology and the use of viruses to manipulate bacterial genomes became the basis of genetic engineering in the 1970s. Already for his thesis work, he discovered important notions. He showed that a sort of sexual reproduction occurs in *E. coli*, so revealing both an unexpected feature of microbial reproduction and providing an essential tool for genetic research. For these achievements, Joshua Lederberg was awarded the Nobel Prize, at the remarkably young age of 33. But his talents and inventiveness were not confined to genetics and microbiology. Lederberg was also interested in Space exploration because of its promises of the discovery of new secrets about nature of the universe and about the origin of life. He helped to design equipment used by the NASA on Space Mission and was one of the founding members of the Space Science Board set up by the US National Academy in 1958. In 1976, with his colleagues at the Instrumentation Research Laboratory at Stanford University, Joshua Lederberg designed instruments for soil analyses used on US Viking Spacecrafts during exploration of the planet Mars. He was also a very competent applied mathematician and was one of the first to realise the potential of computers and artificial intelligence for the future of biomedical research and molecular biology. With a colleague he created some of the first computers. Another of his numerous talents was in Science Communication. Between 1966 and 1971, he wrote a weekly column on Science, Society and Public Policy in the Washington Post called Science and Man. He firmly believed that governments, with the help of the scientific community could improve social welfare, bring about a just and lasting peace and protect the environment. Joshua Lederberg died on February 2 of this year. He was born in Montclair New Jersey, in 1925. His father was an Orthodox rabbi and his mother descended from a long line of rabbinical scholars. His parents immigrated to America from Palestine in 1924 and the family moved to New York when he was 6 months old. He was attracted to Science at an early age. It is said that he declared at the age of 7 that his ambition was to be like Einstein and to discover a few theories in Science. His life was rich in great achievements. The community of humans has lost one of its most brilliant and productive minds.

Nicole M. Le Douarin

Most important awards, prizes and academies

Awards: Nobel Prize in Physiology or Medicine, for studies on organization of the genetic material in bacteria (1958); US National Medal of Sciences (1989); Commandeur, L'ordre des arts et des lettres, République Française (1993); Allen Newell Award, Association for Computing Machinery (1995); New York Academy of Medicine - John Stearns Award for Lifetime Achievement (1996); Columbia P&S Distinguished Service Medal (1988); Columbia Alexander Hamilton Award (1961); Yale's Wilbur Cross Medal (1990); Sigmund Procter Medal (1990). *Academies:* National Academy of Sciences, US (1957); For. Member, Royal Society of London,

(1979); Hon. Life Member, New York Academy of Sciences (1980); Chairman (1994-95); Hon. Fellow, New York Academy of Medicine (1981); Fellow, AAAS; Am. Phil. Soc.; Am. Acad. Arts Sci. (1982); Hon. Member AOA (medical honorary society) (1983); Founding Member, Academie Universelle des Cultures (1993). *Honorary Degrees*: Turin (1969); Tufts (1985); Yale (1960); Wisconsin (1967); Columbia (1967); Yeshiva (1970); Mt. Sinai (1979); Rutgers (1981); NYU (1984); Jewish Theological Seminary (1979); Pennsylvania (1979); Tel Aviv (1991); Uniformed Services University of Health Sciences (USUHS) (1998); Rockefeller (1999). Adjunct Professor of Biology at Columbia (1990).

Summary of scientific research

Joshua Lederberg was born in Montclair, NJ, near New York, the son of Rabbi Zwi H. and Esther Goldenbaum Lederberg, recently emigrated from Israel, on May 23, 1925. He was educated in New York. After a period of study at Columbia P&S medical school, where he began his life-long research in molecular biology, he received his Ph.D. in microbiology at Yale. He served as Professor of genetics at the University of Wisconsin, then at Stanford School of Medicine, before coming to the Rockefeller in 1978. His lifelong research, for which he received the Nobel Prize in 1958 (at the age of 33), was in genetic structure and function in microorganisms. He was actively involved in artificial intelligence research (in computer science) and in the NASA experimental programs seeking life on Mars. He was also a consultant on health-related matters for government and the international community, e.g. having had long service on WHO's Advisory Health Research Council. He received the US National Medal of Science in 1989, where his consultative role was specifically cited. He was a member of the National Academy of Sciences since 1957, and a charter member of its Institute of Medicine, served as Chairman of the President's Cancer Panel, and of the Congress' Technology Assessment Advisory Council, as well as on numerous other consultative panels. From 1978 to 1990 he served as president of the Rockefeller University. He continued his research activities there in the field of genetic control of rapid growth in bacteria. He was appointed Sackler Foundation scholar and professor emeritus of molecular genetics and informatics.

Main publications

Lederberg, J., 'A View of Genetics', *Les Prix Nobel en 1958*, pp. 170-89 (1959); Mark S. Smolinski, Margaret, A. Hamburg and Joshua Lederberg (eds.), *Microbial threats to health: Emergence, Detection and Response*, Institute of Medicine (IOM) 2003; Lederberg, J. (ed. in chief), *Encyclopedia of Microbiology*, 4 vols. (Academic Press, San Diego, 1992); Lederberg, J. (ed.), *Biological Weapons: Limiting the Threat* (MIT Press, 1999); Lederberg, J., 'Infectious History', *Science*, 288, pp. 287-93 (2000).