Sullivan Receives 2004 National Medal of Science

Photo credit: City University of New York.

Dennis Sullivan

On November 14, 2005, the White House announced the names of the eight recipients of the 2004 National Medal of Science. Among those honored is mathematician DENNIS P. SULLIVAN.

According to the White House news release, "The National Medal of Science honors individuals for pioneering scientific research in a range of fields, including physical, biological, mathematical, social, behavioral, and engineering sciences, that enhances understanding of the world and leads to innovations and technologies that give the United States its global economic edge." The award was established by Congress in 1959 and is administered by the National Science Foundation. A list of previous medalists is available at http://www.nsf.gov/nsb/awards/nms/medal.htm.

Dennis Parnell Sullivan was born in Port Huron, Michigan, in 1941. He received his Ph.D. from Princeton University in 1965, under the direction of William Browder. Sullivan has held positions at Princeton, the Massachusetts Institute of Technology, and the Institut des Hautes Études Scientifiques in Paris. Currently he holds the Einstein Chair at the Graduate Center of the City University of New York and is a professor of mathematics at Stony Brook University. His honors include the AMS Veblen Prize in Geometry (1971), the Élie Cartan Prix en Géometrie of the Académie des Sciences de Paris (1981), and the King Faisal Prize (1994). He is a member of the U.S. National Academy of Sciences.

Sullivan's early work was in homotopy theory and surgery, to which he brought a new, geometric point of view. His geometric insights led to many important results on the topology of manifolds. His theory of real and rational homotopy types, based on differential forms, has had profound applications, for example, to the topology of complex algebraic varieties.

Sullivan has made important contributions to the study of foliations and dynamical systems. He has also proved foundational results on quasiconformal and Lipschitz manifolds, categories that are intermediate between the topological and smooth ones. During the 1980s and 1990s, he was responsible for the emergence of the field of conformal dynamics as a lively and important branch of mathematics straddling the traditional borders between pure and applied areas. In recent years, he launched the field of string topology.

—Allyn Jackson

Kenneth Arrow, Economist with Mathematical Outlook, Receives National Medal

One of the recipients of the 2004 National Medal of Science is the economist Kenneth J. Arrow of Stanford University, whose work is quite mathematical and treats such areas as the economics of information and organization, collective decision-making, and general equilibrium theory. Arrow's bachelor's and master's degrees are in mathematics, and he switched to economics for his Ph.D. He has 120 publications listed in MathSciNet. Arrow received the Nobel Prize in Economics in 1972.

—A.J.

Donaldson and Narasimhan Receive 2006 King Faisal Prize

SIMON DONALDSON and M. S. NARASIMHAN have been jointly awarded the 2006 King Faisal International Prize for Science. The prize, presented by the King Faisal Foundation, consists of a gold medal and a cash prize of US$200,000, which the two recipients will share.

Born in 1957 in Cambridge, England, Simon Kirwan Donaldson received his Ph.D. in 1983 from Oxford University, under the direction of Michael Atiyah. Donaldson was a professor at Oxford University and at Stanford University before becoming a professor at Imperial College, London. He is now a Royal Society Research Professor at Imperial and also serves as president of Imperial's Institute of Mathematical Sciences. His many honors include the Fields Medal (1986) and the Crafoord Prize (1994). He is a fellow of the Royal Society, London. Donaldson's early research revolutionized four-dimensional differential topology, revealing surprising new phenomena through the application of ideas from gauge theory. He has also made foundational contributions to complex and symplectic geometry and to global analysis of partial differential equations on manifolds.

Mudumbai Seshachalu Narasimhan was born in 1932 in Thandarai, in the state of Tamiladu, in India. He received his Ph.D. from the University of Bombay in 1960, under the direction of Komaravolu Chandrasekharan. For many years Narasimhan was a professor at the Tata Institute of Fundamental Research in Mumbai. In 1992, he went to the International Centre for Theoretical Physics in Trieste, where he headed the research group in mathematics. He is now an Honorary Fellow of the Tata Institute of Fundamental Research in India. In 1975 he received the Bhatnagar Prize for Mathematics (1975), which is the most prestigious award given in India. He also received the Third World Academy Award for Mathematics in 1987 and is a Fellow of the Royal Society, London. Narasimhan is a pioneer of the study of moduli spaces of holomorphic vector bundles on projective varieties. His work on projectively flat connections was the starting point for the development of the so-called Kobayashi-Hitchin correspondence linking the differential and algebraic geometry of vector bundles over complex manifolds.

Simon Donaldson   **M. S. Narasimhan**

The close connection between the research of the two prize winners is illustrated by the fact that one of Donaldson's earliest papers bears the title "A New Proof of a Theorem of Narasimhan and Seshadri" (*Journal of Differential Geometry*, 1983), referring to the landmark paper "Stable and Unitary Vector Bundles on Compact Riemann Surfaces", by Narasimhan and C. S. Seshadri (*Annals of Mathematics*, 1965). Narasimhan's paper with S. Ramanan on universal connections ("Existence of universal connections", *American Journal of Mathematics*, 1961 and 1963) has been very influential in the exchange of ideas between mathematics and theoretical physics surrounding index theory and gauge theory. This exchange of ideas is also the context for much of Donaldson's important work.

The King Faisal Foundation was established in 1976. Of its many philanthropic activities, the King Faisal International Prize is the most widely known. Prizes for Service to Islam, Islamic Studies, and Arabic Literature were established in 1977 and first awarded in 1979. In 1981 the Prize Board added Medicine; Science was included in 1982. The Science subcategories cover a broad scope: physics, mathematics, chemistry, and biology. The prizes are awarded during a ceremony in Riyadh, Saudi Arabia, under the auspices of the King of Saudi Arabia.

—Allyn Jackson