



Holy Cross Physicians Association

Distinguished Service Award 2022

James Collins '87

Compiled by Karen Heveron Bagdonas '90

September 17, 2022

The first recipient of the Holy Cross Physicians Association Distinguished Service Award is Dr. James J. Collins. Dr. Collins was a Physics major and a member of the Class of 1987. During his undergraduate years, he was a Dana Scholar, a Fenwick Scholar and the winner of the Presidential Service Award. He graduated Summa Cum Laude and was Valedictorian for the Class of 1987. After graduation, he attended Oxford University on a Rhodes Scholarship, graduating in 1990 with a Doctorate in Medical Engineering.

Dr. Collins taught at Boston University from 1990 to 2014. Presently his the Termeer Professor of Medical Engineering and Science and Professor of Biological Engineering at MIT. Collins is also a core founding member of the Wyss Institute for Biologically Inspired Engineering at Harvard University and an Institute Member of the Broad Institute at MIT and Harvard. He is also faculty lead for life sciences at the MIT Jameel Clinic since 2018.

His work has spanned a wide variety of medically related fields. His seminal paper in 2000 “Construction of a genetic toggle switch in *Escherichia coli*” has been cited over 4000 times and is considered one of the foundational papers in the emerging field of Synthetic Biology. He has made multiple Synthetic Biology breakthroughs in biotechnology and biomedicine, including paper-based diagnostics for Zika and Ebola and programmable cells that serve as living diagnostics and living therapeutics to detect-and-treat infections, rare genetic metabolic disorders, and inflammatory bowel disease. Collins is also a pioneering researcher in Systems Biology, having made fundamental discoveries regarding the actions of antibiotics and the emergence of antibiotic resistance. He was part of the team that recently announced the discovery through deep learning of halicin, the first new antibiotic compound in 30 years, which kills over 35 powerful bacteria, including antimicrobial-resistant tuberculosis and the superbug *C. difficile*.

His many awards include a MacArthur “Genius Award,” a National Institutes of Health Director’s Pioneer Award, the Dickson Prize in Medicine, the Sanofi-Institut Pasteur Award, the HFSP Nakasone Award, the Max Delbruck Prize, the Gabbay Award and the LaGrange Prize. He has also received numerous teaching awards at Boston University. These include the Biomedical Engineering Teacher of the Year Award, the College of Engineering Professor of the Year Award, and the Metcalf Cup and Prize for Excellence in Teaching which is the highest teaching honor awarded at Boston University. He has

been named to the Technology Review list of the top 100 young innovators and the Scientific American list of top 50 outstanding leaders in science and technology. Dr. Collins is also an elected member of the National Academy of Sciences, the National Academy of Engineering, the National Academy of Medicine, the American Academy of Arts and Sciences, as well as a charter fellow of the National Academy of Inventors. (1)

During his award presentation, Dr. Frank Vellaccio shared these words from Dr. Collins describing his work: *“We are employing engineering principles to model, design and build synthetic gene circuits and programmable cells, in order to create novel classes of diagnostics and therapeutics. We are also using deep learning approaches to discover new genetic parts and enhance the synthetic biology design process. As part of the Antibiotics-AI Project, we are harnessing the power of artificial intelligence to discover novel classes of antibiotics and rapidly understand how they work. We are also using deep learning approaches for the de novo design of new antibiotics and the development of combination treatments.”*

Dr. Vellaccio’s opening remarks during the award ceremony truly capture the many reasons why Dr. Collins was chosen for this inaugural honor: *“He is no doubt one of Holy Cross’ most accomplished graduates. He is the only person in the world that I know of who can aptly and genuinely be described as a gifted teacher, brilliant researcher, prolific scientist, a pioneering inventor, an entrepreneurial genius, and a passionate humanitarian while also being a loving spouse, devoted father, and generous friend. Most important to me, however, is that he works intently and relentlessly to improve the quality of my life and my longevity.”*

Dr. Collins is married to Dr. Mary McNaughton Collins, HC 1987. She is an Associate Professor of Internal Medicine at Harvard who practices at Massachusetts General Hospital. Dr. Collins met his future wife in Calculus class during his first year at Holy Cross and reports that 2 other married couples met in that same class. Professors who made a profound impact on him during his undergraduate years include: Dr. Kenneth Prestwich (Animal Physiology), Dr. Frank Vellaccio (Organic Chemistry), Dr. Jeanine Shertzer (Modern Physics and Mathematical Methods for the Physical Sciences), Dr. Maurizio Vannicelli (American Foreign Policy) and Dr. Richard Rodino (Honors Program). (2)

(1) Nomination letter from Dr. Michael McGrath and Award Presentation speech from Dr. Frank Vellaccio. Direct links to awards can be found at [James Collins \(bioengineer\) - Wikipedia](#)

(2) Personal communication with Dr. Collins, September 2022

KHB 9/17/2022