The Academy of Medical Sciences

Honorary Fellow citation for Dr Bruce Alberts

Delivered by Professor Martin Raff FRS FMedSci 02 July 2014

Bruce Alberts has lived multiple lives during his scientific career—as a pioneering scientist, as the President of the US National Academy of Sciences (NAS), as the Editor-in-Chief of the world-renowned journal *Science*, as President of the American Society for Cell Biology, as a founding co-author of the influential cell biology textbook *Molecular Biology of the Cell*, and as Special Science Envoy of the US State Department to Islamic countries. He has received far too many honours to list here, including many honorary degrees and membership in every honorary science organisation I have ever heard of (and many I haven't heard of), and he has served on and chaired an even larger number of influential national and international committees. Perhaps the most important of these committees was the National Research Council's Committee on Mapping and Sequencing the Human Genome, which he chaired from 1986-88. His leadership on this historic committee brought the warring giants of molecular genetics together to agree a strategy for taking on this controversial and daunting task, the successful completion of which revolutionized biomedical science forever.

He was born in Chicago in 1938. He did his undergraduate and PhD studies at Harvard College. After only one-year of postdoctoral research at the Molecular Biology Institute in Geneva, he was appointed Assistant Professor in chemistry and biochemical sciences at Princeton University. He remained at Princeton for 10 years, before moving to UCSF Medical School, where he became Chairman of the world-renowned Department of Biochemistry and Biophysics in 1985—and he is still there.

His early career was devoted to the study of DNA replication, using the bacteriophage T4 as a model system. He invented DNA affinity chromatography as a method to purify and identify DNA-binding proteins—a method he and many others later adopted to study other kinds of proteins involved in a variety of cell processes. He went on to identify and purify all of the essential proteins required for the replication of T4 DNA, analysed their individual functions and interactions, and, in a grand culmination, he reconstituted the process *in vitro* using the purified proteins—something no one had achieved before, making it a landmark achievement in modern protein biochemistry and molecular cell biology. It was this classic work on DNA replication that led him to propose the concept of *macromolecular machines*, in which individual proteins work together in a co-ordinated way to carry out a complex cell process. This was a fundamental and extremely influential concept that revolutionized how we think generally about how proteins function in cells.

Having dominated the field of DNA replication for years and influenced work in other fields of biological and biomedical research, he switched tack and turned his attention to *Drosophila* development and cell biology. He and his colleagues, for example, used a similar affinity chromatography approach to identify and study *Drosophila* cytoskeletal proteins—especially actin-binding and tubulin-binding

proteins. Some of his papers studying nuclear and cytoskeletal dynamics in the early fly embryo became classics and are still highly cited today.

It was his passionate belief in the importance of science and the scientific method and their potential for solving global problems that led him, with some trepidation, to prematurely (he was only 55) give up running a highly productive laboratory and accept the Presidency of the National Academy of Sciences (and, later, the Editorship of *Science*). From that point on, he devoted himself to science policy, science education, and the pursuit of international understanding and cooperation through science.

In his 12 years as President of the NAS, he transformed the Academy and advanced his educational agenda—to improve the teaching of science and mathematics at all levels, but especially in schools. He had earlier been active locally in the San Francisco School District, where he set up partnerships between science teachers and young scientists that were so successful that, with his help, they spread to other cities, to other States, and to other countries, including the UK, where they continue to thrive. As NAS President, he oversaw a National Research Council working party that published the first ever "National Science Education Standards" for the United States, which emphasized science as enquiry. He strongly supported the National Science Resources Center, a joint project with the Smithsonian Institute that developed curriculum materials for school science courses. He established, within the National Research Council, a Board on Science Education, which collects, summarizes, and spreads the results of education research. It always bothered him that such research rarely influenced how teachers teach. All these initiatives have been remarkably effective and have expanded nationally and internationally, largely through his efforts and his ability to attract and inspire others to join in the battle to improve science and math education. In his 5 years as Editor-in-Chief of *Science*, he continued to promote his vision of science in the pages of the Journal—in public policy and science education.

Bruce has a dream—which he outlined in his Annual Address to NAS members in 1999—"of a world permeated by the best representations of science and scientific values—honesty, generosity, respect for evidence, openness to ideas and opinions irrespective of their source." To help realize this world vision, he supported the founding of the InterAcademy Panel—a global network of the world's science academies established in 1993 to help member academies—especially those in the developing world—to advise their citizens and public officials on how to bring science to bear on the most challenging local and global problems. In 2000, he helped establish the InterAcademy Council to mobilize the best scientists and engineers worldwide to give advice to international bodies such as the UN and World Bank. He co-chaired the Council for its first nine years, during which time it produced influential reports on Capacity Building for World Science, African Agriculture, Women for Science, and Paths to a Sustainable Energy Future.

From an international perspective, Bruce may well be one of the few most admired and influential life scientists alive today. I can't think of any one else

who has worked so tirelessly and effectively to promote the scientific enterprise around the World. His effectiveness has depended on a remarkable combination of personal qualities—absolute integrity, exceptional intelligence, high standards, passion, commitment, vision, outstanding judgement, and focus. Together, these qualities inspire deep respect, loyalty, and affection, which enable him to recruit other talented and like-minded individuals to join his crusades. Despite being an inspirational and powerful leader, he has remained approachable and modest, without a trace of pomposity or arrogance.

President, Fellows, colleagues and friends, I commend Bruce Alberts to you as an Honorary Fellow.