

A quarterly publication from the AAAS Center for Science Diplomacy

Peter C. Agre, "Fifty Years Ago: Linus Pauling and the Belated Nobel Peace Prize," *Science & Diplomacy*, Vol. 2, No. 4 (December 2013*). <http://www.sciencediplomacy.org/letter-field/2013/fifty-years-ago-linus-pauling-and-belated-nobel-peace-prize>.

This copy is for non-commercial use only. More articles, perspectives, editorials, and letters can be found at www.sciencediplomacy.org. SCIENCE & DIPLOMACY is published by the Center for Science Diplomacy of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society.

*The complete issue will be posted in December 2013.

Fifty Years Ago: Linus Pauling and the Belated Nobel Peace Prize

Peter C. Agre

GRADUATE students have approached me on multiple occasions to inquire about pursuing a career in science diplomacy. My first reaction is to fire back, "And so how is it going in the lab?" This often provokes embarrassment and an occasional confession about the frustrations of being a graduate student. On other occasions I think their questions were primed by the idealism of doing something with importance far beyond the laboratory.

Is it possible that extracurricular activities efforts outside of the laboratory might have special value? And to what extent is the credibility in the lab essential for extracurricular attention? It seemed likely that the international network of scientists who know other scientists represents unique opportunities to use science to foster friendships worldwide. This has caused me to reflect on the many interesting people I have encountered during my career in science. A few were particularly inspirational, and of these, Linus Pauling, the fascinating and colorful American scientist, stands out for opening doors both worldwide and here in the United States.

A Family's Hero

My father, chairman of the chemistry department at Augsburg College in Minneapolis, was a member of the Education Committee of the American Chemical Society and had become well acquainted with Pauling, its most famous and influential member. In the autumn of 1964, Pauling stayed at our home and lectured to scientists at the local colleges about the nature of the chemical bond and the biology of sickle cell disease. During his final evening in Minnesota, Pauling spoke to an overflowing public audience in Si Melby Hall about the dangers of thermonuclear war and testing of nuclear weapons in the atmosphere. Needless to say, Pauling was our family's hero.

It was not altogether clear to me, as a youngster living in Minnesota, that political intrigue, thermonuclear weapons testing, and Cold War drama could be intertwined with glamorous people, brilliant minds, and Nobel Prizes. But at the least, a wonderful legacy remains—that scientists have the ability to communicate their insight to the public and thereby help shape the course of history.

One year earlier on a dreary fall weekend, millions of American families huddled in front of their television sets as the events of November 22, 1963, unfolded and were replayed endlessly. Stunned by the assassination of President John F. Kennedy, most viewers were unaware of the international agreement that prohibited testing of nuclear weapons in the atmosphere that the president had signed just weeks before his death. An essential role in achieving the Limited Test Ban Treaty was played by Linus Pauling, who lobbied for it tirelessly.

The 1962 Nobel Prizes

The previous year the Nobel Committees had announced the winners of the 1962 Nobel Prizes. Included were individuals who became some of the most celebrated on the planet—Max Perutz, James Watson, Francis Crick, and author John Steinbeck. However, without explanation, the Norwegian Nobel Peace Prize Committee had left that award unfilled. So it was a surprise in October 1963 when it was announced that the 1962 Nobel Peace Prize was to be awarded retroactively to Pauling. As the nation mourned its fallen president, the Pauling family prepared for their trip to Oslo, Norway, where he would accept the award.

A rare individual, Pauling achieved unparalleled success as an innovative researcher and extremely popular lecturer. Unafraid of controversy, he also generated a worldwide following as a humanitarian and peace activist. Having already received the 1954 Nobel Prize in Chemistry, Pauling became the only person in history to receive two undivided Nobels.¹ A scientist with voracious curiosity, Pauling was also linked to two of the 1962 science Nobels—Chemistry and Medicine.

The 1962 Nobel Prize for Chemistry went to Max Perutz and John Kendrew for determining the atomic structure of the major oxygen-carrying proteins—

hemoglobin and myoglobin. Pauling had already discovered the molecular basis for the most important disease of human hemoglobin—sickle cell anemia—a discovery for which he received no prize. The story illustrates Pauling’s passion for science as well as his extracurricular engagements.²

Hemoglobin and Sickle Cell Anemia

After World War II, Pauling served as a consultant to the White House Office of Scientific Research and Development (OSRD) organized by Vannevar Bush. While traveling to an OSRD meeting, he shared a train compartment with William B. Castle, an eminent hematologist from Boston. During their long conversation, Castle informed Pauling of a mysterious and often deadly form of inherited anemia fairly common among African Americans.

When Castle explained that the deoxygenated red cells became misshaped into crescents and sickle forms, Pauling immediately inferred that an amino acid substitution predisposed Hemoglobin S to polymerize, and he returned to his lab to prove it. Exhibiting no sympathy for the anti-Japanese sentiment that was then common in the United States, Pauling recruited Harvey Itano, a brilliant young Japanese American who had been confined to an internment camp during the war. Their 1949 report in *Science*, “Sickle Cell Anemia, a Molecular Disease,” heralded the arrival of a new era of medical research.³

DNA Double Helix

The 1962 Nobel Prize for Physiology or Medicine went to Francis Crick, James Watson, and Maurice Wilkins for solving the double helix structure of DNA, a race in which Pauling had been their rival.⁴ Having discovered alpha helix structures in proteins, Pauling was convinced that DNA was also a helix. But his increasingly outspoken opposition to war and nuclear weapons had provoked influential conservatives during the ill-fated McCarthy era. Pauling was viewed as a communist sympathizer, a charge that he vehemently denied. Pauling’s passport was confiscated by the U.S. Department of State, preventing him from attending the May 1952 meeting of the Royal Society in London where Rosalind Franklin presented her X-ray photos showing that DNA had a twofold symmetry.

Based on theoretical considerations, Pauling contributed a paper to the *Proceedings of the National Academy* on December 31, 1952, in which he incorrectly concluded that DNA is a triple helix.⁵ Realizing that Pauling was wrong enlivened the two fledgling scientists—Watson and Crick—to accelerate their model building that yielded the famous double helix. Graciously acknowledging his mistake, Pauling continued his scientific career while at the same time increasing his public appeals to prevent nuclear war.

A Science Activist

Pauling's scientific lecture trips around the world were often accompanied by public events where he spoke on the dangers of testing nuclear weapons in the atmosphere with the release of harmful radioactive fallout. In 1958, he presented a petition to the United Nations signed by 9,235 prominent scientists opposed to nuclear testing. He also wrote *No More War!*, which became an international bestseller.⁶

Nuclear testing had subsided for three years, but preparations resumed around the time of the 1960 U.S. presidential election. Both political parties in Washington postured competitively to appear the stronger on defense, and each proposed further nuclear weapons development. Both the United States and the USSR began testing weapons that were thousands-fold more explosive than the 10–15 kiloton bombs dropped upon Hiroshima and Nagasaki. Following the detonation of a 50-megaton device, testing of a 100-megaton bomb was postponed only because of concerns that it would disrupt Earth's orbit.

An invitation to the White House in April 1962 provided Pauling with a special opportunity to publicly appeal to the president. Kennedy had invited 49 U.S. Nobel laureates to an elegant dinner that he later famously described as “the most extraordinary concentration of talent ... that has ever been gathered at the White House—with the possible exception of when Thomas Jefferson dined alone.”

During the previous afternoon, Pauling led a protest on the sidewalk outside of the White House. Chanting and bearing a placard “MR. KENNEDY, MR. MACMILLAN, WE HAVE NO RIGHT TO TEST,” Pauling had attracted the attention of the national news media. Later at the reception inside the White House, President Kennedy smiled when he met the scientist. “I understand that you have been around the White House a couple of days already.” Pauling grinned as the president continued, “I hope you will continue to express your feelings.” World opinion already supported ending nuclear weapons testing. While the United States was the last holdout, Kennedy changed his views and became a proponent of a ban on testing above the ground. The Limited Test Ban Treaty was finally passed by the U.S. Senate and signed by Kennedy on October 10, 1963, the same day that the Norwegian Nobel Committee announced that Pauling would receive the belated 1962 Nobel Peace Prize.

Afterward

At the 2001 Nobel Prize Centennial, I had the opportunity to meet James Watson at a reception in Stockholm. I introduced myself and explained my fascination with his book *The Double Helix*, which I had just reread the previous summer. After mentioning my distant contact with Linus Pauling, I complimented him on the provocative first sentence of his book, “I have never seen Francis

Crick in a modest mood.” Upon hearing this, Watson beamed a huge grin and replied, “I have also never seen Linus Pauling in a modest mood.” It seems likely that no one ever has. **SD**

Endnotes

1. Thomas Hager, *Force of Nature: The Life of Linus Pauling*, (New York: Simon and Schuster, 1995).
2. C. Lockard Conley, “Sickle Cell Anemia: The First Molecular Disease,” in *Blood, Pure and Eloquent: A Story of Discovery, of People, and of Ideas*, Maxwell M. Wintrobe, ed. (New York: McGraw Hill, 1980): 319–59.
3. Linus Pauling, Harvey A. Itano, S. J. Singer, and Ibert C. Wells, “Sickle Cell Anemia, a Molecular Disease,” *Science* 110, no. 2865 (1949): 543–48.
4. James D. Watson, *The Double Helix: A Personal Account of the Discovery of the Structure of DNA* (New York: W. W. Norton, 1980).
5. Linus Pauling and Robert B. Corey, “A Proposed Structure for the Nucleic Acids,” *Proceedings of the National Academy of Sciences* 39, no. 2 (1953): 84-97.
6. Linus Pauling, *No More War!* (New York: Dodd, Mead, and Co., 1958).