

Magnetic Resonance Conference, and the 1994 National Medal of Science. Many of his publications, all characterized by his signature clarity and simplicity, are classics.

Overhauser was widely regarded as a valuable colleague and a superb teacher and adviser. Anecdotes abound about his legendary condensed-matter and statistical mechanics lectures, notes, and creative homework sets. At Purdue, students and even faculty sought his advice on quantum mechanics. His door was always open, as it was the day before his passing.

Although we have lost a distinguished colleague, a teacher, and a friend, the intellectual reverberations and practical relevance of Overhauser's fertile mind still shine.

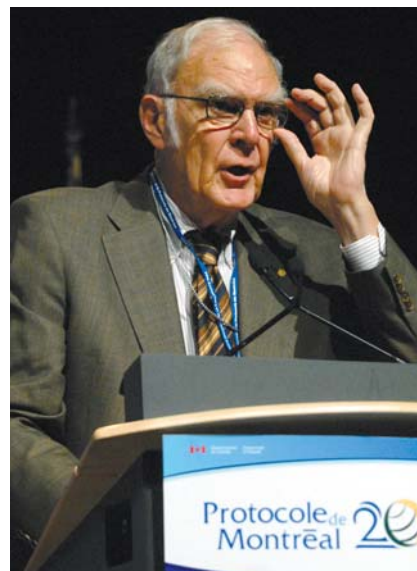
**Gabriele F. Giuliani**  
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## Frank Sherwood Rowland

Chemist, physicist, Earth champion, and Nobel laureate Frank Sherwood "Sherry" Rowland

died from complications of Parkinson's disease on 10 March 2012 at his home in Corona del Mar, California. With Mario Molina in 1974, Sherry warned that chlorofluorocarbons (CFCs) were destroying the ozone layer and immediately called for a ban on aerosol products containing those chemicals; he persisted in advocating atmospheric protection throughout his career.

Stratospheric ozone protects Earth from UV radiation that causes skin cancer and cataracts, suppresses the human immune system, and damages agricultural crops and ecosystems. Absent early warnings and subsequent national and international action under an agreement called the Montreal Protocol on Substances that Deplete the Ozone Layer, up to two-thirds of the ozone layer would have been destroyed by 2065, with a resultant millions of deaths from skin cancer and the loss of half or more of global agricultural production. Furthermore, most ozone-depleting substances are also greenhouse gases: If left unregulated, they would have reached the equivalent of 24–76 gigatons of carbon dioxide and would potentially change climate at a rate too fast for human civilization to adapt.



Frank Sherwood Rowland

Fortunately, the public reacted quickly to the 1974 warning by Sherry and Molina. Product boycotts were so successful that US sales of CFC hair-spray and deodorant crashed long before those products were banned in 1978. For a decade and more after publication of the pair's seminal article, skeptics of stratospheric ozone deple-

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tion tried to discredit the message and the messengers. But Sherry and Molina persisted, and they and their colleagues documented the buildup and long lifetime of CFCs in the atmosphere; found the chemical proof that CFCs break down in the stratosphere, catalytically depleting ozone; and, most importantly, motivated the public and policy-makers to take action.

When British scientists in 1985 confirmed massive recurring ozone depletion in the Southern Hemisphere, it was Sherry who coined the attention-getting phrase "Antarctic ozone hole" for the press and the public. In response, the United Nations organized diplomatic meetings that led to the Vienna Convention for the Protection of the Ozone Layer in 1985 and the Montreal Protocol in 1987. A decade later, in 1995, Sherry and Molina, along with Paul Crutzen, shared the Nobel Prize in Chemistry "for their work in atmospheric chemistry, particularly concerning the formation and decomposition of ozone." The citation might more accurately have said, "For sounding the ozone alarm just in time to save Earth and its people."

Today, 38 years after the ozone warning and 25 years after the Montreal Pro-

col was signed, 97% of almost 100 ozone-depleting chemicals have been phased out worldwide, the stratospheric ozone layer is on its way to recovery, and a growing coalition of nations supports expanded use of the protocol to address hydrofluorocarbon greenhouse gases.

Born on 28 June 1927 in Delaware, Ohio, Sherry skipped grades, excelled in sports, and often monitored the official regional weather station. He graduated high school at age 15 in 1943 and was age-exempt from the military draft while he attended two years of college at Ohio Wesleyan University. He joined the US Navy in 1945, but with the war over, his 14 months' service was mostly spent in competitive athletics for naval-base teams. He returned from service and graduated from Ohio Wesleyan in 1948, then entered the graduate school at the University of Chicago.

Sherry was an interdisciplinary scientist with undergraduate majors in chemistry, physics, and mathematics. At Chicago he studied with the giants, including Harold Urey, Edward Teller, Henry Taube, Maria Goeppert Mayer, Enrico Fermi, and his mentor and thesis chairman Willard Libby, who invented natural carbon-14 dating of archaeolog-

ical artifacts. Urey and Fermi had already been awarded Nobel Prizes; Libby, Mayer, and Taube would receive theirs later.

Sherry's work for his thesis, which concerned the chemical state of cyclotron-produced radioactive bromine atoms, was supported by a national fellowship from the Atomic Energy Commission. The AEC, which was eventually absorbed into the Department of Energy, supported his research from 1956 through 1994. It is fortuitous that skeptics of ozone depletion did not influence the AEC, as they did other funding sources.

After Sherry completed his doctorate at the University of Chicago, he became an instructor in chemistry at Princeton University in 1952. He then took an assistant professorship at the University of Kansas from 1956 to 1964, and he was a professor and chair of chemistry at the University of California, Irvine, from 1964 to 2012.

One of us (Andersen) got to know Sherry beginning with a 1970s assessment of the impact of the supersonic transport on ozone and climate. He was an inspiration because of his intellect, his conviction, his perseverance, and his powers of scientific persuasion. Not



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long after the Montreal Protocol entered into force, the National Academy of Engineering sponsored a workshop in which Sherry presented the science of ozone depletion to influential and respected stakeholders. Over several days, the experts were persuaded, mostly by the facts but also by Sherry's sincerity, patience, and depth of answers. Rarely has there been such a transformation of business confidence in science.

The other of us (Gonzalez) admired Sherry for his ability to persuade even the most skeptical diplomats not to just abide by the Montreal Protocol but often to go further and faster than it required. Sherry did that by providing, without exaggerating or sensationalizing, clear science delivered sincerely and with conviction.

The lessons for young scientists from the life of Sherwood Rowland are to study hard, pursue topics that matter to society, be confident, and be brave in putting forward the scientific founda-

tion for policymaking. Now a new generation must carry on to make the world safe for future ones.

**Stephen O. Andersen**

*Montreal Protocol Technology and  
Economic Assessment Panel  
Barnard, Vermont*

**Marco Gonzalez**

*Montreal Protocol Ozone Secretariat  
Nairobi, Kenya*

## Sallie Ann Watkins

Educator, mentor, and influential conscience for many communities, Sallie Ann Watkins was our beloved teacher, colleague, and friend. Born on 27 June 1922 in Jacksonville, Florida, she passed quietly away on 21 December 2011 in Pueblo, Colorado. Her love of physics helped us and the subject find one another. To her, physics was a means to interpersonal relationships. She was a steadfast source of wise, uplifting encouragement.

From childhood, Sallie wanted to spend her life in service to others, so she joined the Sisters of Notre Dame and became Sister Mary Howard. She graduated with honors in 1945 from Notre Dame College (NDC)—at the time an all-women's school—in Cleveland, Ohio, with a degree in chemistry, and then taught high school chemistry at Notre Dame Academy. In 1950 she joined the NDC faculty. Drafted to teach physics, she attended the Catholic University of America in Washington, DC, from 1954 to 1958 and earned master's and PhD degrees in the subject. Her dissertation was entitled "Ultrasonic absorption and velocity in liquid monochloroethane." She continued her work at NDC from 1957 to 1966, during which she served as physics department chairperson and as dean of students.

Sallie's actions expressed her passion for social justice, education, women's equality, and environmental responsibility. The 1962 reforms of Vatican II informed her activism. She and 10 other sisters exchanged their habits for street clothes, reclaimed their original names, and in 1966 migrated to Pueblo to form the Community of Christian Service. Sallie joined the physics faculty at Southern Colorado State College (later the University of Southern Colorado [USC] and now Colorado State University-Pueblo). Her roles included being chair of the physics department, dean of the College of Science and Mathematics, and assistant vice president for research. Her activism included protest-



PUEBLO CHIEFTAIN

**Sallie Ann Watkins**

ing the Vietnam War and being the first Colorado member of the National Organization for Women.

Sallie was cheerfully optimistic, but she was also tough and realistic. From tracking education legislation to developing curricula, she did her homework thoroughly and made her point firmly with a disarming smile. One alumna wrote, "Sallie exemplifies inspiration and teamwork, and thrives in an environment of doubt."

Sallie was a principal investigator on nine major grants, a sought-after colloquium speaker and consultant, and an influential member of nine professional societies. She wrote dozens of papers on ultrasonics, nuclear reactors, x-ray fluorescence, and innovative education, and many of her physics history essays focused on the work of Lise Meitner.

After retiring from USC as professor emerita in 1988, Sallie launched another career, overseeing elementary school programs that emphasize hands-on science, community involvement, research-based curricula, and proactive responses to the underrepresentation of girls and minorities in science. Those NSF-funded programs featured teachers working in cooperative learning teams. The first program started in 1988 with the University City Schools near Saint Louis, Missouri, followed by a 1993 collaboration between USC and Pueblo School District 60. Noting a steep rise in test scores, John Rigden, then with the American Institute of Physics and a coinvestigator with Sallie in St. Louis, said, "Sallie had a way of reducing ten-

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