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Revered chemist Glenn T. Seaborg - UC Berkeley professor, presidential advisor and Nobel Laureate - has died at 86

By Robert Sanders, Public Affairs

■ BERKELEY-- Nobel Laureate Glenn Theodore Seaborg, one of the great chemists of the 20th century and an influential voice on national science policy as advisor to 10 U.S. presidents, died last night, Feb. 25, at his home in Lafayette, Calif. He was 86.

Seaborg died of complications from a stroke he suffered on August 24 while attending the American Chemical Society meeting in Boston.

A beloved professor of chemistry at the University of California, Berkeley, for nearly 60 years, he also served as chancellor of the UC Berkeley campus and since 1971 was associate director-at-large of the Lawrence Berkeley National Laboratory. (See [obituary](#) at LBNL's web site.)

In 1961, President John F. Kennedy appointed Seaborg chairman of the Atomic Energy Commission, an agency that eventually split into the Nuclear Regulatory Commission and the Department of Energy, and he served in that position for 10 years, under both Lyndon Johnson and Richard Nixon. He was one of the last survivors of the Manhattan Project and the namesake of element 106 of the periodic table - seaborgium.

Seaborg was one of the most revered chemists in the world. His major contributions to the field included co-discovery of plutonium-238 and -239 plus nine other transuranium elements - elements beyond uranium in the periodic table. Among these was element 106, seaborgium. He also led the Manhattan Project group that devised the chemical extraction processes used in plutonium production during World War II. His work with transuranium elements and a revision of the periodic table he proposed to account for them won him in 1951 the Nobel Prize in Chemistry, which he shared with UC Berkeley colleague Edward M. McMillan. (For more detail, check [Seaborg's web site](#). For photos, click [here](#).)

In June 1998, he was named one of the "Top 75 Distinguished Contributors to the Chemical Enterprise" by readers of Chemical & Engineering News magazine.

"The world today has lost a great man of science. At the University of California, Berkeley, we have lost a revered member of our campus family. We cherished Glenn Seaborg, and we will miss him dearly," said UC Berkeley Chancellor Robert M. Berdahl. "He embraced this place as his family, and for more than six decades he loved it as deeply as anyone could. Berkeley, in return, loved him with its whole heart.

"He came here in 1934 as a graduate student enchanted by the possibilities of science, and he leaves us

today a legend in his own right. He advanced the frontiers of scientific discovery in a way that few have, but this son of a machinist never forgot the opportunities the University of California and the citizens of this state provided him, and he never stopped returning the favor. His service to this campus is equaled only by his service to this country."

Seaborg had a long and distinguished career not only in science but in education and public service.

"I consider Glenn Seaborg, among all the faculty of the University of California, to be the most distinguished in all the four areas of excellence in which we judge faculty - research, teaching, university service and service to the country," said Clark Kerr, former president of the University of California and a long-time friend who nominated Seaborg to be UC Berkeley chancellor in 1958. "He was the best balanced, most distinguished faculty member at the most balanced distinguished university in the country."

His career encapsulated the history of nuclear science in this country. From early studies of naturally radioactive elements, he quickly moved to exploit new techniques to create artificially radioactive elements. Principal among these was the cyclotron, invented at UC Berkeley by Ernest Lawrence. Soon, however, he was drawn into an unprecedented national project to turn the tremendous energy of fissioning nuclei into a bomb whose destructive power dwarfed that of any previous weapon.

Although Seaborg was the first to discover and isolate appreciable amounts of plutonium for use in atomic weapons, he became an ardent proponent of nuclear disarmament. As a member of the seven-man Franck Committee, Seaborg wrote to President Harry Truman to deter him from dropping the bomb on Japan, suggesting he first demonstrate the weapon to the world on a barren island. After World War II, he championed efforts to regulate the uses of atomic energy as head of the Atomic Energy Commission. Under President Kennedy, he helped set the stage for the signing of the Limited Test Ban Treaty, which he witnessed in 1963.

Several of the elements he discovered or co-discovered after his return to academia following the war were named in tribute to UC Berkeley, the university he called home for more than 60 years, since his years as a graduate student. Element 97, discovered in 1949, was named berkelium, while element 98, discovered in 1950, was named californium.

In 1974, he was part of the team that discovered element 106. After much wrangling, the element was named seaborgium, in his honor, in 1997. He was the only scientist to have an element named after him while still alive.

"That's a great honor because that lasts forever," he once told a reporter. "One hundred years from now, or a thousand years from now, it'll still be seaborgium when you'd probably have to look in obscure books to find any references to what I had done."

Born April 19, 1912, Seaborg grew up in Ishpeming, Mich., and moved to Los Angeles when he was ten years old. He received his A.B. in chemistry from UCLA in 1934 and his Ph.D. in chemistry from UC Berkeley in 1937. He stayed on as a researcher working under Gilbert N. Lewis, joining the faculty full time in 1939. Much of his work was done at the University of California Radiation Laboratory, now the Lawrence Berkeley National Laboratory.

His work in radiochemistry tackled the pure scientific challenge of isolating new chemical isotopes. In 1941, a mere four years after completing his PhD, he and UC Berkeley colleagues bombarded uranium with deuterons from an atom-smasher and isolated from the product an unstable element with 94 protons in the nucleus. He later proposed to name the new element after the planet Pluto - plutonium.

The site of the discovery of plutonium-238, room 307 in Gilman Hall on the UC Berkeley campus, was declared a National Historic Landmark in 1966.

One isotope of plutonium, plutonium-239, which Seaborg and colleague Emilio Segrè discovered a month later, turned out to split or fission when hit with slow neutrons, and this characteristic attracted the attention of scientists developing an atomic bomb from fissionable uranium. In 1942, at the age of 30, Seaborg was appointed head of the plutonium chemistry group of the Manhattan Project, and he moved to the University of Chicago Metallurgical Laboratory to develop techniques for chemically separating plutonium from the other debris created in a nuclear pile.

The government built a large chemical separation plant in Hanford, Wash., based on the chemistry worked out by Seaborg's group, to isolate large quantities of plutonium. In less than half a year, they accumulated enough plutonium-239 for a bomb - dubbed "Fat Man" - that was dropped on Nagasaki, Japan, Aug. 9, 1945, three days after a uranium bomb destroyed Hiroshima. The war ended with Japan's surrender on Aug. 14.

During his four years in Chicago he continued to collaborate with UC Berkeley colleagues, adding two other elements to his list of discoveries: curium (element 96) in 1944 and americium (element 95) in 1944-45. While there, Seaborg formulated the actinide concept of heavy element electronic structure. Proposed in 1944, it accurately predicted that the heaviest, naturally-occurring elements, together with the synthetic transuranium elements, would form a transition series of "actinide" elements in a manner analogous to the rare earth series of "lanthanide" elements. This concept, one of the most significant changes to the periodic table since Mendeleev's 19th century design, shows how the transuranium elements fit into the periodic table, and thus demonstrates their relationships to other elements. The concept was key to Seaborg's success in chemically isolating many other transuranium elements.

In 1951 he shared the Nobel Prize in chemistry with the late UC Berkeley physicist Edwin McMillan for "their discoveries in the chemistry of the transuranium elements."

Also in 1942, during a brief stop in Nevada on his way to Chicago, he married Helen Lucille Griggs, who worked as a secretary at UC Berkeley.

Back at UC Berkeley in 1946, now a full professor of chemistry, Seaborg returned to pure research. Over the years, he was involved in the discovery of all but one of the man-made elements up to element 102: berkelium (element 97) in 1949, californium in 1950, einsteinium in 1952, fermium in 1953, mendelevium in 1955 and nobelium in 1958. In 1974, he co-discovered element 106, subsequently named seaborgium (Sg). These transuranium elements were created artificially in particle accelerators.

Although retired from teaching since 1979, Seaborg had continued to search for the "superheavy" elements until his illness and, in 1994, was involved in the discovery of the currently unnamed element 110. Seaborg held over 40 patents, including those on elements americium and curium, making him the only person ever to hold a patent on a chemical element.

His co-discoveries include many isotopes which have practical applications in research, medicine and industry. Among these are iodine-131, technetium-99m, cobalt-57, cobalt-60, iron-55, iron-59, zinc-65, cesium-137, manganese-54, antimony-124, californium-252, americium-241, plutonium-238, as well as the fissile isotopes plutonium-239 and uranium-233. Iodine-131, still widely used for diagnosis and treatment of diseases, prolonged the life of Seaborg's own mother.

In addition to teaching at Berkeley since 1939, Seaborg had acted as associate director-at-large of the Lawrence Berkeley National Laboratory from 1954-61 and again since 1971, and he was chairman of

the [Lawrence Hall of Science](#) since 1984. He also served as chancellor of UC Berkeley from 1958 to 1961, when President Kennedy appointed him to chair the Atomic Energy Commission. He was reappointed by both Presidents Johnson and Nixon, serving as chairman until 1971. In all, he served as an advisor to 10 presidents, from Franklin Roosevelt through George Bush. At his death he held the title University Professor Emeritus of the University of California.

"As an educator he inspired thousands of students to become interested in chemistry and its applications, and as a public speaker he helped develop an awareness of the impact of science on daily life and the importance of non-proliferation of nuclear weapons," said Alexis Bell, Dean of the [College of Chemistry](#) at UC Berkeley. "He will be remembered as a brilliant scientist, an inspiring teacher, a devoted public servant, and lastly, as a kind, gentle, and unassuming person. His passing is a great loss to this university and to our country."

Besides the Nobel Prize, Seaborg received the National Medal of Science (1991), the Glenn T. Seaborg Medal (1988) and the American Chemical Society's George C. Pimentel Award for his "outstanding contributions to the education of the world's citizens." He also served as president of both the American Association for the Advancement of Science and the American Chemical Society.

He has stayed close to his Swedish roots and counted among his major awards the Great Swedish Heritage Award from the Swedish Council of America and the John Ericsson Gold Medal from the American Society of Swedish Engineers. He was a fellow in the National Academy of Sciences and the American Academy of Arts and Sciences and was awarded 50 honorary doctoral degrees. Awards from UC Berkeley include the Alumnus of the Year Award (1948) and the Clark Kerr Medal (1984). In 1995, Seaborg also had an asteroid named after him by its discoverers, astronomers Caroline and Eugene Shoemaker.

Seaborg's commitment to science education and public service was demonstrated through his work with the Lawrence Hall of Science as well as through his involvement in science policy. He was a member of the National Commission on Excellence in Education, which published the much-publicized *A Nation at Risk* in 1983, a report that addressed the crisis in mathematics and science education. Seaborg also served as chairman of the board of Science Service, which publishes the magazine *Science News* and conducts the Intel (formerly Westinghouse) national science talent search.

His efforts as a national spokesman on education were honored with the establishment in 1987 of the Glenn T. Seaborg Center for Teaching Science and Mathematics at Northern Michigan University, which prepares educators to teach science in secondary schools. Last year, his efforts in education and chemistry research were recognized by the Glenn T. Seaborg Chair in Physical Chemistry at the UC Berkeley. The chair was created through a generous endowment in tribute to Seaborg and the College of Chemistry.

Seaborg authored over 500 scientific articles and guided the graduate studies of more than 65 successful PhD candidates. His numerous books include "National Service with Ten Presidents of the United States," a memoir of his role as a presidential science advisor (1992); "Chancellor at Berkeley," a memoir about developments at UC Berkeley during his chancellorship (1994); "Modern Alchemy: The Selected Papers of Glenn T. Seaborg" (1994); "The Plutonium Story: The Journals of Professor Glenn T. Seaborg 1939-1946" (1994), which describes his discovery of plutonium and work on the Manhattan Project; "Elements Beyond Uranium" (1990), a comprehensive summary of all aspects of transuranium elements; and a trilogy about his service as chairman of the Atomic Energy Commission: "Kennedy, Khrushchev, and the Test Ban" (1981); "Stemming the Tide: Arms Control in the Johnson Years" (1987); "The Atomic Energy Commission under Nixon: Adjusting to Troubled Times" (1993); and an autobiography entitled "A Chemist in the White House: From the Manhattan Project to the End of the

Cold War" (1998). Soon to be published is a book coauthored by nuclear chemists Darleane Hoffman and Albert Ghiorso entitled "The Transuranium People: The Inside Story."

Before his illness he completed another book with coauthor Ray Colvig, "Roses from the Ashes, Breakup and Rebirth in Pacific Coast Intercollegiate Athletics," to be published by the Institute of Governmental Studies Press at UC Berkeley. It details his involvement in intercollegiate sports while at UC Berkeley and his role in dealing with the recruiting scandals that rocked the Pacific Coast Conference in the early 1950s, led to its fall and gave birth to what became the Pac-10 conference.

"Glenn Seaborg gave his magnificent intellect to the world and his heart and soul to the University of California," said UC President Richard Atkinson. "He once said that everything he had achieved in a lifetime of towering accomplishment he owed to his association with UC. Few universities have been given so much in return. As a Nobel Prize-winning scientist who revolutionized our understanding of matter, and as a superb professor, chancellor, laboratory leader and champion of science education for generations of California's children, Dr. Seaborg has earned a proud and permanent place in the university's history. We will miss him deeply."

He is survived by his wife Helen of Lafayette, Calif., and five of his six children: Lynne Annette Seaborg Cobb of Grand Junction, Colo.; David Seaborg of Walnut Creek, Calif.; Stephen Seaborg of La Mesa, Calif.; John Eric Seaborg of Free Union, Virg.; and Dianne Karole Seaborg of Lafayette. A son, Peter Glenn Seaborg, died in 1997 at the age of 50.

Services for Seaborg are pending. Memorial contributions may be sent to the the College of Chemistry or to the Lawrence Hall of Science at the addresses below (checks made payable to the *UC Regents*):

[College of Chemistry](#)

Office of the Dean
University of California
Berkeley, CA 94720-1460
Attn: Jane Scheiber

Glenn T. Seaborg Endowment
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