Obituary

Glenn T. Seaborg (1912–99)

Prophet of the nuclear age, who co-discovered ten new elements including plutonium

Glenn T. Seaborg, who died on 25 February 1999, will be remembered not only for his many accomplishments in science but also for his participation in the associated political structures. He was truly a giant of science, who enjoyed the adventures that were a hallmark of the research of his time. I think it is fair to say that he was the first nuclear chemist, for he went well beyond being a radiochemist. He and his dozens of students applied the tools of radiochemistry to fundamental research in nuclear physics that lay beyond the reach of the physicists of his day. By the time he and his colleagues had discovered plutonium and proved that it was fissionable with slow neutrons, he was no longer simply a chemist. The top-secret Manhattan Project had been started with the aim of producing plutonium for nuclear weapons purposes and his life would be changed forever.

Seaborg was a very intense person who always 'kept his eye on the ball' and seemed to have the knack of doing the right thing at the right time. He was an excellent judge of the abilities of other people, which became crucial when, between 1942 and 1946 he headed a large crew of PhD chemists working on the Manhattan Project at the University of Chicago. Their job was to determine a suitable chemical procedure for isolating the plutonium from uranium that had been highly irradiated by the huge Hanford neutron reactors in Washington state. This was an awesome assignment and he followed the work in every detail, so much so that he suffered nervous exhaustion part of the way through and had to take several weeks off to recover. During the war most of the scientists worked about 60 hours per week (meetings were always held at night), so to relieve the stress Seaborg began playing golf at the nearby Jackson Park golf course. Although his tortured swing was something to behold, it was not unusual for him to get on the green in three strokes and beat his opponents with his short game.

His first love was the expansion of the periodic table, and as soon as he felt that the chemical separation of plutonium was under control he decided that the next step was to look for new elements beyond plutonium. He had two options: one was to use the newly built Hanford reactors to add neutrons to the plutonium until it β-

decayed to a new element with the atomic number 95; the other was to use helium ions from the cyclotron in Berkeley to make a new element with the atomic number 96. He used both methods and eventually succeeded in both endeavours. But there were two big problems. One was that the instruments were relatively primitive, so their sensitivity was limited. The other was that, although the chemistry of plutonium was well-known by this time, the chemistry of the new elements was a complete mystery. These factors meant that little progress was made during many months of effort.

Seaborg finally made a breakthrough when he formulated his actinide theory, which required a major realignment of the periodic table. For many years Seaborg's idea that these new elements were part of a transition series like the lanthanides was opposed by other chemists, but in the end his insight enabled the chemical identification of elements up through lawrencium-103. I was a member of the team that worked on these elements and can testify to the dedication that he applied to this research.

His work in the transuranium field led inevitably to the Nobel prize in 1951 and then to public service outside Berkeley. In 1961 President Kennedy asked him to be chairman of the US Atomic Energy Commission, launching his career into the international arena. The position was a very responsible one, both for science and

for world politics, and he diligently applied himself to it for ten years under three presidents: Kennedy, Johnson and Nixon. One of his most far-reaching actions was his espousal, while chairman and afterwards, of the Comprehensive Test Ban Treaty. Although that job was a very demanding one, he always had time to talk about the science that was dearest to his heart, the transuranium elements, and I found that I always had access to him and his assistants. It was because of him that the 'transplutonium' programme in the US was launched and carried through to the point where the heaviest elements would become available for various kinds of chemical and physical research; it is thanks to this programme that today we have an extensive knowledge of these rare elements. Part of his legacy is the production of large quantities of pure plutonium-244. This was the target material used recently at the Joint Institute for Nuclear Research in Dubna, Russia, during the production of element 114, the first truly superheavy element.

Seaborg had the valuable habit, starting when he was only eight years old, of keeping a journal that he maintained throughout his entire life. The journal enabled him to keep track of people, events and data to complement his fabulous memory. In 1963 I was one of ten scientists who, under his leadership, spent two weeks touring the laboratories of the Soviet Union. I found the trip exhausting, and was amazed that at the end, when Seaborg gathered us all together at the United States embassy in Moscow to discuss the writing of our report, he had the best grasp of the detailed information that would go into it.

When Seaborg returned to Berkeley, after a long stint in the 'jungle' of Washington D.C., it would not have been surprising if he had settled down to a less hectic existence, but that was not to be. He immediately applied himself to converting what he had learned in those early years into his published journals, which are a marvel of detail. He also became an advocate for nuclear power, a very unpopular position to take. He felt very strongly that the most significant achievement of his tenure at the Atomic Energy Commission was the growth of the civilian nuclear-power programme, and he argued that such a programme would be best for the world in the long run. He could still be right.

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