Many people inside and outside of Mayo Clinic know about Philip Showalter Hench (1896-1965) and Edward Calvin Kendall (1866-1972)—fortune-favored Mayo investigators who shared the 1950 Nobel prize in physiology or medicine with Polish chemist Tadeus Reichstein (1897-1996) for adrenal corticosteroid research. Mayo Clinic is justifiably proud of Hench and Kendall. The institution where they spent all (Hench) or almost all (Kendall) of their professional carees, and where Hench also did part of his training, has honored them with commissioned portraits, a large named lecture hall, special Nobel anniversary conferences, and other kudos. Some are also aware that Albert von Szent-Györgyi (1893-1986), a Hungarian biochemist who won the Nobel prize in physiology or medicine in 1937 for his work with vitamin C, spent a year in the Mayo Clinic. Some are also aware that this Nobel prize winner has received no local public recognition. Few people realize that a fourth Nobel laureate had an important Mayo Clinic connection, and, as far as I am aware, this Nobel prize winner has received no local public recognition.

This individual was the brilliant physicist Luis Walter Alvarez, PhD (1911-1988) (Figure 1), who received a rare solo Nobel prize in his discipline in 1968, “for his decisive contributions to elementary particle physics, in particular the discovery of a large number of resonance states, made possible through his development of the technique of using hydrogen bubble chamber and data analysis.” In addition to discovering K-electron absorption, observing tritium’s (³H) radioactivity, constructing the first proton linear accelerator, and performing other groundbreaking particle physics work with Ernest Lawrence (a 1939 Nobel laureate) at the University of California, Berkeley, Alvarez played a key role in the wartime Manhattan Project.

During World War II, Alvarez collaborated closely with Enrico Fermi at the University of Chicago’s Metallurgical Laboratory in Argonne, Ill (later to become the US Department of Energy’s first national laboratory); at Los Alamos, NM, he worked with J. Robert Oppenheimer. Alvarez and a student assistant designed the implosion detonator for the Fat Man plutonium bomb dropped on Nagasaki, Japan, on August 9, 1945. Alvarez was aboard a B-29 bomber in the skies over Alamogordo, NM, when his detonator was first tested on July 16, 1945 (Figure 2). He also flew over Japan behind the atomic bomb–carrying airplane Enola Gay on August 6th, monitoring the energy output of the Hiroshima uranium weapon. Later, his long experience with elementary particle trajectories in the bubble chambers of Berkeley’s cyclotron secured him an influential position as an advisor to the Warren Commission. In this role, he helped analyze the famous Abraham Zapruder film of the 1963 assassination of John F. Kennedy and offered expert testimony on whether the president’s movements were compatible with a single bullet impact to the rear of the head. After a special request from the White House, Alvarez had earlier applied his projectile skills toward a less weighty patriotic duty: helping Dwight D. Eisenhower improve his golf game by making it more “scientific.”

In 1980, Luis Alvarez was in the international spotlight again. He collaborated with his son Walter (a Berkeley geologist) and formulated the extraterrestrial-impact hypothesis of dinosaur extinction, based on high concentrations of iridium detected at the K-T boundary strata and other data. (The K-T boundary strata are rock layers deposited at the time of the transition between the Cretaceous (K) Period and the Tertiary (T) Period, dated to 65 million years ago, and coinciding with the disappearance of dinosaurs and the subsequent rise of mammals.) The Alvarez hypothesis is now the most popular theory to explain the end of the Reptilian Age.

Luis Alvarez’ connections with Mayo Clinic and with Rochester, Minn, were through his father, Walter Clement Alvarez (1884-1978). Walter Alvarez (Figure 3) was an energetic clinician and gastrointestinal motility researcher who was once part of Leonard Rowntree’s research group at Mayo Clinic, and he later became head of the Section of Gastroenterology. Walter joined the Mayo consulting staff in February 1926, after an invitation engineered by urologist William Braasch (1878-1975), an early Mayo partner and member of Mayo Clinic’s Board of Governors. Before he came to Rochester, Walter had been a popular San Francisco practitioner, and as a young man he trained in physiology at Harvard with the famed Walter B. Cannon. Braasch heard Walter speak during a tour of Salt Lake City and Pocatello and spoke glow-
ingly about him to William J. Mayo, resulting in a job offer.9

Unlike Rowntree, who became disgruntled and left Mayo Clinic in 1932 when money got tight and his laboratory space was taken away,7 Walter (who also lost his laboratory space and protected research time during the Great Depression) stayed at Mayo and happily resumed seeing patients full-time. He was an extremely popular specialist for those with “digestive neuroses” and was known for his practical wisdom and skill in dealing with patients with difficult, chronic illnesses.6,10 On his retirement from Mayo in 1950, Walter became a syndicated newspaper columnist, known affectionately as “America’s Family Doctor.”11 Despite his inherent iconoclasm and his frustration over endless committees that seemed to plague Mayo Clinic as early as the 1920s, which he thought often impeded needed progress (“A man will surely have trouble as I did if, when something urgently needs to be done, he does it without waiting until 2 or 3 committees have discussed it at length and decided to block it”9(p86)), Walter became a close confidant of William J. Mayo, who evidently appreciated the younger man’s discretion, honesty, energy, and dedication to patients.9

Luis was 14 years old when his father and family moved to Rochester, and the move was influential: “If I had remained in San Francisco, I think I would have been a different person. In Rochester I came out of my shell.”3(p13) He did not find Rochester High School science classes particularly interesting, probably because they came so easily for him. Schoolboy compatriots reported that Luis often did his mathematical calculations with a fountain pen, even on examinations, while everyone else used a pencil and a thick eraser.12 Nonetheless, Luis was turned-on by his first exposure to physics, in the form of a lecture at Mayo Clinic by an expert in ophthalmic optics.3 Noting his son’s new interest in physics and science, Walter showed Luis the many copiously annotated physics books in the library of the family’s home (Figure 4) (the structure is still standing, lately occupied by a Mayo Clinic coagulationist) and also hired a Mayo Clinic machinist to give Luis private lessons on weekends.

As a teenager, Luis worked in the Mayo Clinic instrument shop during the summers after his junior and senior years at Rochester High School. This was perhaps an unusual Mayo-based education track for a future national scientific leader, but Luis and the machinists respected each other, and under their guidance Luis built a good foundation of mechanical skills.3(p14) In the busy machine

![FIGURE 1. Luis Walter Alvarez (1968 Nobel laureate in physics) as depicted on a postage stamp from Equatorial Guinea in 2001, part of a series celebrating the 100th anniversary of the first Nobel prizes (author’s collection).](image1)

![FIGURE 2. A sketch made by Luis W. Alvarez in the predawn hours of July 16, 1945, illustrating his impressions of the world’s first detonation of a nuclear weapon at Alamogordo, NM (the Trinity Site). Alvarez, who had designed the detonator for this and the later Nagasaki plutonium devices, drew the mushroom cloud while flying at an altitude of 30,000 feet approximately 15 miles away from the blast epicenter. His signature is at the lower left. From Documents Folder, Research Materials File, Lansing Lamont Papers, Harry S. Truman Library, with permission.](image2)
shop, Luis learned how to cut gears, wire circuits, and perform numerous tricks of the trade that would serve him well in his later work with nuclear weaponry, particle accelerators, and other devices and instruments.3(p14)

Like many adolescents, Luis experimented with what he termed “controlled disrespect for authority”3(p14) while he lived in Rochester. It was a trait he viewed as critically important for doing innovative science. Living out this philosophy of controlled disrespect meant regularly sneaking past building-site guards in the middle of the night to explore. Luis’ crowning achievements along these lines included illegally climbing to the summit of the Plummer Building when it was “only a skeleton of steel beams”3(p14) (probably in May 1927, when the framework had been completed and the Indiana limestone brickwork had not yet been laid34) and scaling the inside of the 200-foot brick tower of the Franklin Heating Station. The controlled part of this disrespect for authority meant that Luis recognized that there were limits to what he should try and could get away with; there is no evidence that he did anything that might harm another person (at least not until 1945), and he was apparently never arrested. Being careful also mandated paying strict attention to high voltage, radiation, and other practical warning signs. Disclaiming the mad scientist stereotype, Luis once pointed out that most scientists he knew personally paid close attention to such cues—so much so that he claimed he was aware of “only 6” fellow physicists who had been killed while in the laboratory.3(p14)

After leaving town in 1928 to attend the University of Chicago, Luis returned to Rochester and to Mayo Clinic for an extended period only once: In the spring of 1941, while working at the Massachusetts Institute of Technology on a critical wartime radar system, he developed cholelithiasis. He was advised to have gall bladder surgery before embarking on a secret mission to Britain because British hospitals were burdened by wartime casualties.3(p94) The operation was performed at Mayo Clinic by Waltman Walters (1895-1988; William J. Mayo’s son-in-law), and the postoperative course was difficult. Because of severe postoperative nausea, Luis was profoundly sedated and kept bed-bound for 2 weeks. Not surprisingly, he developed a venous thrombosis. Hugh Butt reported on

![Image](https://example.com/image1)

**FIGURE 4.** The Alvarez family inside their Rochester, Minn, home in December 1935. Luis W. Alvarez, a student at the University of Chicago from 1928-1932, wears a letterman’s “C” jersey; he was about to join Ernest Lawrence at the University of California, Berkeley. His father, Mayo consultant Dr Walter C. Alvarez, frequently invited interesting patients to this home for lunch, including a young John F. Kennedy in 1950 during his month-long evaluation for Addison disease.3 From right to left: Luis, Walter, Mrs Harriet Skidmore Smythe Alvarez (Luis’ mother), and Bernice Alvarez (photograph courtesy of William J. Nichols, MD, Division of Hematology, Mayo Clinic, Rochester, Minn).
the first clinical use of dicoumarol at a Mayo staff meeting that same year, but it is unclear whether Luis received this drug.

Luis had to spend the entire summer of 1941 in Rochester recuperating from the clot, but he tried to make good use of his time. Using his skills as a physicist and collaborating with an unnamed Mayo physician, he developed a more sensitive method for detecting gallstones radiographically, based on a critical absorption method he had once used to discover K-electron capture. The technique worked, but, as some have said about his much more famous wartime handiwork, it turned out to be a great deal more trouble than it was worth.

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