

Preface

Intimate Glimpses of the Authors' Early Lives

P.1. Darleane C. Hoffman

The story of how I came to be a “transuranium person” and one of the coauthors of this book is not straightforward and certainly not predictable. If you believe in astrology (I don't), perhaps the only omen is that I was born on November 8, a birthday that I almost share with Marie Curie and Lise Meitner. These two famous women pioneers in nuclear science were both born on November 7, although Meitner's birth date seems not to be entirely certain. Of more importance is that I was born into a family that prized education highly — and I recall my mother giving me little “intelligence” tests at a very early age!

My father, Carl Benjamin Christian, was born on October 7, 1898, to Bessie Ingelena and Albert Gustav Christian on a farm near Decorah, Iowa, a predominantly Norwegian community, and his parents were both of Norwegian ancestry. He had an older brother and two younger sisters. My mother, Emma Elvina, was born on March 2, 1900, to Mary Jane (Taylor) Clute and Eugene Clute on a small farm in Elk Creek Valley near the little town of Colesburg, Iowa. This was a largely German community, although her parents were of English and Dutch descent. She had an older sister, Nellie, born in 1897, and a younger sister, Minnie, born in 1903. The three girls were left orphans when their mother died of “consumption” in 1906. Although Nellie tried to help care for them, their father was unable to cope with the situation and found refuge in alcohol. My

mother, who was an extremely attractive child, was soon adopted in February 1907 by a German couple named Emma Minnie and Henry John Kuhlman, whose only daughter had died as a child. The other sisters were taken into foster homes just before being taken off to the orphanage, but were never formally adopted. The Kuhlman's decided to rename Emma Elvina "Elvina Emma" to avoid confusion with her new mother's name, but somehow in the process of recording it on the adoption papers, it was recorded as "Elverna Emma" — and that is how it stayed! Her life in her new home was a happy one — her new parents adored her and she, now being the only child, was in her own words "spoiled rotten." However, she sometimes found it difficult to fit into the German community, in which German was spoken often at home, at Church, and even at school.

My parents both graduated from Upper Iowa University: my mother with degrees from both the School of Music and the School of Oratory, and my father in Mathematics and Education. They met again later in Chicago, where my mother was working and my father was taking graduate work in education at the University of Chicago. They were married a couple of years later, in June 1925.



Fig. 1. Elverna E. and Carl B. Christian, 1925.

Photos of them at that time are shown in Fig. 1. That August they settled in their new home in the small northwest Iowa town of Terril, where my father at age 27 had been elected to the position of superintendent of the consolidated public school there. I was born at home on November 8, 1926, with my mother's oldest sister, now a registered nurse, and my grandmother Kuhlman in attendance to care for us. I became very close to my grandma, as in subsequent years she stayed with us on many occasions and often took care of me. I also sometimes visited my grandparents Kuhlman in the big city of Waterloo, Iowa, where she would take me to the movies on Saturday afternoon. In the evening we would often sing and they taught me little songs in German.

I was a frequent, extremely young attendee at a variety of school functions in Terril, including sports events, high school plays, musical events, and box socials. Often a couple of the unmarried women teachers "roomed" in our home and would baby-sit me in the evenings when my parents had to go out to "adults"-only functions. It was a special treat for me to be allowed to visit in their rooms and talk with them. My only sibling, my brother Sherril, was not born



Fig. 2. Darleane Christian at five years old with baby brother, Sherril, December 1931.

until September 28, 1931, when I was nearly five years old. A picture of me taken with him just after my fifth birthday is shown in Fig. 2.

I did not start first grade in the Terril Public Schools until the following year, when I was nearly six years old, because my father was a firm believer that *nobody* should start school until they were five years old, and since my birthday was not until November, I had not been allowed to start the previous year. Of course, I could already read and was ready to start, but he surely could not make an exception for his daughter! I remember my first and second grade teachers very well, as they had been among those who had stayed in our home. They were both excellent, “no-nonsense” teachers who kept track of three different levels of reading and arithmetic groups and still found time to help those who needed extra attention or to give me extra work to do to keep me from being bored. In those years our newspaper carried items such as “First Grade — *In a phonics test given this past week five children made no errors. They were Lillian Walton, Darleane Christian, Betty Blum, Wayne Glover and DeLane Anderson.*” (I still correspond with DeLane, who was my best friend.) And “*Our honor roll for this period is: Darleane Christian, 55 points; Mildred Wray, 52 points; Ruth Rouse, 44 points. There were three A’s this period. Darleane Christian and Mildred Wray had A in numbers and Mildred Wray had A in drawing and handwork. Dean Higley and Wayne Glover have been promoted to the A Division.*” Maybe if we still gave frequent public recognition for excelling in academic subjects as well as in sports, our present day students would have more regard for learning! Similarly our poetry was sometimes published. One of my second grade contributions which should have convinced everyone that I was not to be a poet was “*Spring is here at last, / And the winter is long past, / April is here with flowers, / To bring May’s fair flowers. / Birds are singing in the trees, / And back have come the bees.*” A photo of my second grade class together with the first grade class is shown in Fig. 3. I am in the third row from the bottom — the second from the right.

During these years the U.S. was in the middle of the Great Depression. Consequently, my father was not paid during the summer



Fig. 3. First and second grade classes (1933–34) at Terril, Iowa Consolidated Public School.

months, so a couple summers we lived in a cottage at nearby Lake Okoboji, where our family and my father's brother and his family lived in a cottage on the lake and ran the nearby gasoline station. This was a wonderful time for me, as my cousins were the same ages as my brother and I. We played we were "Indians" in the woods and I learned early to swim in the lake and developed my lifelong love of swimming. We learned to play various card games, read — and on special occasions went to a nearby amusement park where we were not allowed to go on the roller coaster! Another summer, several years later when I was about nine, just our family ran a concession stand on the beach, selling snacks, cold drinks, popcorn, and renting out boats. That summer I helped at the stand, baby-sat my little brother, and on occasion rescued toys and even a few toddlers that had floated out to deep water, sometimes being rewarded by their parents with "tips." We often went out in the boat fishing with my parents. My main incentive for this was to help with the rowing and if I would sit quietly for awhile, which I hated, I was then allowed to dive and swim off the boat in the deep water. These were idyllic times, in spite of having very little money to spend. I remember having saved some of my "tip" money and

debating whether to buy a new bathing suit (which I badly needed!) or a large beach towel. I finally chose the beach towel, because it was less expensive, I knew I wouldn't grow out of it, and once in the water no one could see my bathing suit anyway!

We also visited my grandparents Christian on the farm near Decorah, where I found out about farm life — watching the cows follow the lead cow home from the pasture, helping my grandma “milk” them, churning butter, feeding the lambs milk from a bottle, taking lunch out to the men working in the fields at harvest time, sitting atop the huge draft horses, and lying on a blanket on the grass on summer evenings to watch the stars and listen to my father's two sisters tell me about the constellations. Sometimes at Christmas we would drive to visit them and my grandpa Christian would bring the horse-drawn sleigh to pick us up at the main road to take us through the deep snow down the hill to their home — one of my most treasured experiences. In the summer of 1933, I was allowed to accompany my parents and my aunts on the drive to Chicago, where we stayed for several days to attend the World's Fair. What an unbelievable and fabulous experience for me!

In 1934, after my second grade in school, we moved to Coon Rapids, a somewhat larger town (about 1500 people at that time) south of Des Moines, the capitol city of Iowa. Again, my father was school superintendent, but he also took on the job of coaching the girls' basketball team, since no one else could be found to do it. My mother would go to the games and run the popcorn popper and sell popcorn to make money for the sports program and new uniforms for the girls. My father was very successful as coach and soon everyone was attending the girls' games and leaving when the boys' teams came on to play! I played on the girls' junior high team, but it became obvious I would never be a basketball star — at barely five feet tall I simply couldn't compete with the nearly six-foot forwards that were the mainstays of girls' basketball at that time! However, I participated in a wide variety of musical activities, learning to play the piano, playing the saxophone in the school band, and singing in the chorus and small groups. In the summers my friends and I

bicycled, swam at the local pool, played croquet, played the piano and sang, and I read nearly every book in the local library. I attended third through ninth grades in Coon Rapids and had many close friends and was president of the freshman class. So it was a great shock to me when my father accepted a position as Superintendent of the Public Schools in West Union in northeast Iowa at the end of my freshman year in high school. I'm sure this was partly because both my parents had grown up in that area and we would be closer to my father's aging parents, who lived only 30 miles away and not far from my mother's parents in Waterloo. We moved there in the summer of 1941 and I began my sophomore year in high school.

Mathematics was my father's teaching specialty and was always a favorite subject in our home. We were entertained on long drives by doing the squares of the numbers up to 20 in our heads and calculating square roots with pencil and paper. (My brother later went on to major in Mathematics as an undergraduate, but switched to Physical Chemistry as a Ph.D. student at Iowa State University.) I took all the mathematics courses our schools offered. I even took advanced algebra, although that meant I had my father as a teacher, which I considered a very difficult situation as I was afraid the other students would think I was being favored! Not only that, I didn't even dare ask for help with my homework. (I took a trigonometry course one summer by correspondence, since it was not offered in our school.) I continued my interest in music and art, learning to play the flute and oboe in addition to the saxophone, and became a member of several choral and instrumental groups which won prizes at high school music competitions. I also took private art lessons. At my mother's insistence, I participated in dramatics and oratory groups and although this training was no doubt good for me, it was not my favorite extracurricular activity.

By February 1941, Glenn Seaborg had already become a "trans-uranium person" when he, together with his colleague Joseph Kennedy and his graduate student Arthur C. Wahl, made the first chemical separation and unequivocal identification of the new element plutonium. But I was still in high school and oblivious to all

those developments. However, I vividly remember the bombing of Pearl Harbor on December 7, 1941, which was announced while I was at a Sunday afternoon Community Chorus rehearsal of the *Messiah* at the local high school. The subsequent two years of high school were darkened by the pressures of a global conflict as we watched all the men teachers and many senior students go off to war while at home we coped with rationing of food, gasoline, and a variety of shortages, and waited for the lists of war casualties. I corresponded with several young men throughout the war — fortunately, they all came home safely. My father tried desperately to enlist but was repeatedly turned down because of his age and position.

I graduated from high school in 1944. A young man and I were coaledictorians with the highest grade averages ever recorded in the high school there. I decided to enter Iowa State University at Ames, Iowa, but had difficulty trying to decide whether to major in Applied Art or Mathematics, but finally settled on Applied Art. In those days Applied Art was in the College of Home Economics, and fortunately for me, I was required to take Home Economics Chemistry. (I had never studied Chemistry as it was not offered in our high school, but I did take Physics from a substitute teacher and perhaps because of that found it less than exciting.) The beginning Home Economics Chemistry at Iowa State was taught by Prof. Nellie Naylor, and largely due to her outstanding teaching I found myself more interested in Chemistry than anything I had ever studied. She had a way of making it all seem so beautifully logical as well as relevant to a host of everyday problems. Consequently, I decided by the second quarter that I would switch my major to Chemistry. This somewhat unconventional choice caused my Applied Art Counselor to ask me, “Do you really think chemistry is a suitable profession for a woman?”! I replied that I was quite sure it was. After all my excellent Freshman Chemistry teacher was a woman. However, both these women were what we used to call “spinsters,” and I vowed that I would not necessarily emulate them in this respect but would maintain other interests and continue to date a variety of young



Fig. 4. Darleane Christian, photo for Iowa State College Yearbook, 1945.

men and might even consider marriage as well. So in Spring quarter 1945, I became a Chemistry major in the College of Science. (See my class photo taken in Spring 1945 in Fig. 4.) From that time on I was usually the only woman in most of my classes, but this bothered me not at all, nor did it seem to bother the young men in my classes. After all, during the war years young men were in relatively short supply, although at Iowa State there were a number of officer training programs and the veterans began returning to school on the “GI Bill of Rights” at the end of the war.

By 1945, Seaborg had been leading the effort at the Metallurgical Laboratory in Chicago for several years to develop a process to separate plutonium from the large amounts of fission products and the uranium in which it had been produced by neutron irradiation. The process had been tested in a pilot plant at Oak Ridge and the large processing plants at Hanford Washington had gone into operation in December 1944. Albert Ghiorso joined the “Met” Lab in 1942.

During my first years at Iowa State (1944, 1945), we would often hear all kinds of wild rumors about what might be going on at “Little Ankeny.” This was an installation of some rather drab, temporary-looking buildings on the edge of the campus from which

some rather spectacular flashes of light were seen to originate from time to time that illuminated the night sky. It was not until much later that I learned of the “project” at Iowa State College under the leadership of Frank H. Spedding and Harley A. Wilhelm to solve the problem of reduction of uranium to very pure uranium metal and deduced it had something to do with that (Spedding had come to Ames after receiving his Ph.D. at Berkeley under the direction of G.N. Lewis). For a time, Spedding was also director of the Chemistry Division of the Metallurgical Laboratory at Chicago. He was Director of the Institute for Atomic Research at Ames when I first joined that institute as an undergraduate research assistant in the summer of 1947, after my junior year at Iowa State. During Spring quarter of that year two openings for undergraduates in the Atomic Research Institute were posted and announced in our Chemistry classes. I especially remember this being announced in my advanced inorganic lecture class by Prof. John Wilkinson, a very hard taskmaster indeed, but one who encouraged me to apply, probably because I was one of the few students in his class who could quickly recite all the known acids of sulfur and phosphorus! Although I was somewhat pessimistic about my chances, I did apply because I was increasingly tired of working at odd jobs in the dormitory dining room, the Botany Department, and grading papers in the History Department, and figured I had nothing to lose! (Although I had a tuition scholarship, I still had to help with the expenses of my room and board.) To my amazement, I was called to an interview with Dr. Don Martin, Jr., Professor of Inorganic and Nuclear Chemistry, who had been at Los Alamos during the war. (Rumor was that he had ingested some quantity of separated polonium, although I never asked him if this was true.) He asked if I would be willing to help make and test the Geiger counters that he was building to be used to assay samples for radioactivity. I was thrilled with the idea and recalled the biography of Marie Curie I had read in eighth grade and how fascinated I had been with her studies of radioactivity and her painstaking isolation of the new elements radium and polonium and her use of radium in medicine. When I was offered the position and

found that as a full time employee in the summer I would, in addition to being able to do research in the Institute, earn \$170 per month for something I would have been happy to do for free, I was doubly thrilled. (This also released me from a very dull summer job as a bank teller in my home town for only \$85 per month, a salary I previously had thought was quite good as before that I had been a waitress in the local “best” restaurant in town at \$7 per week!) I still did not know about the discoveries of neptunium and plutonium, the first transuranium elements, but another plus of working at the Institute was that they obtained a Q-clearance for me. After that, I became privy to some of the new information that was coming out. One of the odd quirks that I encountered was that on my classified notebook I had to put three initials and since I had no middle name I chose the letter “X” and told them it stood for Xanthasia, which seemed to satisfy the system. I think it was with this position at the Institute that I really started down the inevitable path that led me to become a “transuranium person.” I continued to work at the Institute part-time during my senior year, splitting mica for windows for the Geiger counters, annealing the copper electrodes, etc., and making measurements of various radioactivities. I also learned micro ion exchange resin column separations for rare earth elements (a research interest of Spedding, who had developed very large-scale column separations for the rare earths), and reduction and separation of certain lanthanides with sodium amalgam. Knowledge of these techniques later became very useful to me in the transuranium field.

It soon became clear to me that I wanted to continue to do research in nuclear and radiochemistry, and Prof. Martin suggested that he would be happy to recommend me for graduate school at his alma mater, the California Institute of Technology, but going to California was too big a step for me to take at that time. Furthermore, by then a new 68-MeV synchrotron was being completed at Ames that opened many exciting research possibilities, and I elected to stay at Iowa State and continue to do research with Martin. During my first year in graduate school I met my husband-to-be, Marvin Hoffman, who had just come to Ames from the Cyclotron

group at the University of Chicago, where he had been working for a year after returning from the Navy. He became a graduate student in nuclear physics of L. Jackson Laslett, then a Professor of Physics at Ames, who had been a student of E.O. Lawrence at Berkeley. Yes, indeed, it is a small world!

My father, although in accord with my decision to go to graduate school, suggested that I might want to get a teaching certificate in order to make sure I could get a job when I finished. This I absolutely refused to do, saying that the last thing in the world I ever wanted to do was teach!! Many times since I have thought how happy he would be to see that finally I recanted and eventually became a Professor of Chemistry at Berkeley, albeit via a most circuitous route. However, my decision to stay at Iowa State turned out to be a good one, as most unexpectedly my father died of a heart attack only two years later, at age 52. I was called at 4 a.m. by my mother, who told me the awful news and that the high school coach would drive to Ames that afternoon to pick up me and my brother, who was by then an undergraduate at Iowa State, and drive us home. I remember going in to ask if I could be excused from my classes and make up a midterm exam I was to have the next day in Quantum Chemistry when I returned. Instead, much to my dismay, my professor in Quantum Chemistry insisted on giving me the exam right then! Needless to say, I had a hard time concentrating on the test and hadn't really studied for it yet. I think he actually believed he was doing me a favor, and I managed to get a B in the test, but I never forgave him for his insensitivity. I went home to northeast Iowa to help my mother with funeral arrangements — she didn't drive, nor had she ever even written a check! My father's services were held in the high school gymnasium and some 1200 people attended. Although we were most appreciative of this indication of the community's respect for him, it was an ordeal I shall never forget as I strove to maintain my composure and never shed a tear. I later wrote a theme in a creative writing course vilifying all funeral services. I then became more or less responsible for my mother and

my brother, who continued his studies as an undergraduate in Mathematics at Iowa State.

My mother and I had to clear out the house quickly, as it belonged to the school district and they needed it for the next superintendent, and so we kept what little we could and had an auction to get rid of the rest. She then came to live with me in Ames for awhile and soon after became house mother at one of the fraternities there. She was later nominated by her fraternity “boys” and named Ames “Mother of the Year.” I continued my graduate studies (see Fig. 5) on photonuclear-induced Szilard–Chalmers reactions at the Synchrotron. My friendship with Marvin Hoffman was furthered by the fact that he was working at the Synchrotron and able to run it for me in the evenings so I could get irradiations almost anytime I needed them! I used a variety of complexes of cobalt and platinum which I synthesized to enable me to obtain very high specific activities and discover several new isotopes of cobalt, platinum, and iridium. For me, the discovery of new isotopes which nobody had ever seen before was an exhilarating experience, and to this day I still find the discovery of new isotopes — or, even better, new chemical elements — the most exciting part of nuclear chemistry research, although it is getting to be more and more difficult to do!



Fig. 5. Darleane Christian, Spring 1950 photo at Ames Laboratory, with remote apparatus for pipetting radioactive solutions.

I finished my Ph.D. in December 1951, in just over three years, and Marvin and I were married on December 26, 1951, in Waterloo, Iowa, the home of my grandmother Kuhlman. In January 1952, I left Marvin behind to finish his Ph.D. in Physics and I went to Oak Ridge to begin my new position there on the Aircraft Nuclear Propulsion Project, which involved uranium, but still not transuranium isotopes. I found out later that Prof. Laslett had told Marvin it was a terrible mistake for us to get married and that the marriage would never last under such unconventional circumstances! Some 20 years later, I had the pleasure of entertaining him in our home in Los Alamos, and again in Berkeley in the 1980s, which I think convinced him otherwise. (In spite of that erroneous prediction, we both thought he was one of the most intelligent men we ever met!) Marvin finished his Ph.D. near the end of 1952, and he decided to take a position in the Test Division at the Los Alamos Scientific Laboratory, where he had worked as a summer graduate student assistant in 1950. He was told that I would be offered a position in the Radiochemistry Group of the Test Division, so I quit my job at Oak Ridge and we went to Los Alamos after Christmas in 1952. Although I spent only a year at Oak Ridge, I made many close friends there. Once in Los Alamos, I immediately started calling the personnel department to ask about my job in the Radiochemistry Group of the Test Division and they told me, "There must be some misunderstanding, we don't hire women in that Division." Having never before run into such discrimination, I was totally taken aback and asked them to please try to circulate my application and find out where my job was supposed to be, but to no avail. Finally, in January 1953, Marvin and I went to a cocktail party for new hires and their spouses hosted by Director Norris Bradbury and I met Dr. Roderick Spence, group leader of the Radiochemistry Group. We talked and I told him my story and he said, "Where have you been — I've been looking for you. We need you for plutonium chemistry." Mike, the first thermonuclear test, had been fired in November 1952, in Eniwetok, and they were busy analyzing its unexpected and exciting results and badly needed more radiochemists, especially someone to

devise new separation procedures for plutonium. So he hired me the next week, greatly relieved to know that I had a clearance and could start work immediately. Nuclear chemist Charles I. Browne, Ph.D., 1952, University of California, Berkeley, had joined the group as a military staff member in September 1952 and H. Louise Smith, M.S., 1952, University of Kansas, Lawrence, Kansas, had been in the group only about a week before the Mike test samples began to arrive! Rod Spence himself had been in the Pacific when the test was conducted and was there for the collection of air samples of the debris on filter papers held in special samplers attached to the wing tanks of airplanes which flew through the resulting cloud of debris. Little did we know that it would be mid-March 1953 before I would actually be allowed to get started. It seems my clearance was “lost” between Oak Ridge and Los Alamos. Since I originally got my clearance at Ames, it went back to the originating office rather than to the office which handled the Oak Ridge clearances. So they couldn’t find it for three months — finally, after calls from everyone to Personnel, they asked the FBI to start a new clearance and they found it in the Chicago office in about three days. So that is how I missed being a discoverer of einsteinium ($Z=99$) and fermium ($Z=100$), which were identified in the debris from the Mike test while I was sitting in a small apartment in Los Alamos raging at the system. I will never again trust personnel offices, not just for saying “we don’t hire women in that Division,” which was untrue, but for their general insensitivity, incompetence, and bias — qualities which were not generally shared by the male scientists with whom I have worked!

Anyway, I finally did join the Radiochemistry Group at Los Alamos, on March 13, 1953. My first project was to find better and faster methods for the separation and analysis of plutonium in debris recovered from tests in the Pacific and later from above ground tests at the Nevada Test Site. Rod Spence was a wonderful mentor for me and taught me a great deal. I admired him greatly not only for his scientific ability but because he was one of the fairest and least egocentric individuals I have ever known. At last I had become a genuine “transuranium” person. The whole story of the

discovery of elements 99 and 100 in the debris from the first thermonuclear device tested in November 1952, is given later (Chapter 6) in the book. The story of how I eventually became a “transplutonium” and even a “transactinide” person will unfold as the book progresses.

I should not fail to mention that during the days in Los Alamos Marvin and I produced two children. Our daughter, Maureane, was born on Easter Sunday, 1957, and our son, Daryl, was born on September 2, 1959. Los Alamos was a wonderful place to raise children. In both cases, I was able to continue my work until a day or two before each of my children was born and then quickly go back to work afterwards. I was privileged to have a wonderful woman to take care of them during the day. Then in 1964 my mother came to live near us after her mother passed away and she was instrumental in making it possible for me not only to pursue my career, but to travel as necessary. However, both Marvin and I spent as much time with our children as possible. A 1974 photo of one of our leisure activities is shown in Fig. 6. Although Marvin was not musical, he was a great listener and critic! Both of our children went to the Los Alamos schools and graduated from high school there.



Fig. 6. Darleane, Marvin, Daryl, and Maureane Hoffman around the piano in their home in Pajarito Acres, Los Alamos, NM, 1974.

Maureane received her B.S. from New Mexico State University in 1976 and an M.D. in pathology and a Ph.D. in Toxicology from the University of Iowa in 1981. She is now a tenured professor in the medical school at Duke University, in Durham, North Carolina. Daryl received his B.S. in 1981 from the University of California, Los Angeles, an M.D. from the University of New Mexico in 1984, completed a six-year residency in plastic surgery at Stanford University in 1990, and is now in private practice in the Palo Alto, California, area.

Two singular events which proved to be career-shaping should also be pointed out. The first is that in 1964 I was awarded an NSF Senior Postdoctoral Fellowship and Marvin was awarded a Fulbright Fellowship to Norway, so we took our two children and my mother and went to live in Oslo for a year. I found this a personally very liberating experience, as in Norway women were treated equally, but they were also expected to take their share of the responsibility as well. It was quite safe to go places by oneself and also not unusual for women to go out alone, while at that time in the U.S. women usually didn't dine out at restaurants alone or go on business trips with male colleagues. I performed research on short-lived fission products at the reactor at the Institute for Atomic Research at Kjeller, near Oslo, and learned new rapid separation techniques. We made many long-time friends there and were able to visit the farm at Havaas on Hardangerfjord, where my grandmother Christian's parents came from, and the area in Gubrandsdalen, where my grandfather's parents came from. Our daughter attended second grade in the neighborhood school and became fluent in Norwegian. We returned to Los Alamos a year later — all feeling greatly enriched by the experience.

Much later, I was awarded a Guggenheim Fellowship for the year 1978–79 for the study of the mechanisms of nuclear fission, and I spent this sabbatical year with Glenn Seaborg's group at Berkeley and Marvin had a research position at SRI International in Menlo Park, California. I had already become well acquainted with Glenn Seaborg after my successful search for ^{244}Pu in nature in 1971, and

my appointment in 1974 to the first IUPAC/IUPAP *ad hoc* committee to consider claims of priority of discovery of elements 104 and 105. I also worked closely with him (mostly by telephone, since I was still in Los Alamos) in the final honing and careful wording of the 1976 Science “Criteria” article [9-3]. During this time I had the opportunity to work with Al Ghiorso and Diana Lee, both so important to my future career. During this time also, Al Ghiorso designed and we built and tested the Merry-Go-Around (MGA) rotating wheel system (Fig. 7) which we used to study the spontaneous fission (SF) properties of the isotopes, fermium-246 and -248, which had half-lives of only a second and 36 seconds, respectively. The MG was later upgraded to study α -decay and used in a special “mother–daughter” stepping mode devised by Ken Gregorich for the 1993 seaborgium confirmation studies (Chapter 10). During the year 1978–79 I also became involved in some of the searches for superheavy elements (SHE) and attended the brown bag lunches of the “Super Heavy Element Isotope Kjemikers” (or SHEIKS) held in Seaborg’s office every Wednesday noon. When I left Berkeley in July 1979 to return to Los Alamos to become Division Leader of the Chemistry–Nuclear Chemistry Division, the SHEIKS group had a wonderful party for



Fig. 7. Darleane Hoffman and Diana Lee with the MGA at the LBL 88-Inch Cyclotron, 1979.



Fig. 8. Darleane Hoffman cutting a cake at her going-away party, July 1979. Matti Nurmia is at the right.

me with a cake on which was written, “It was SHEer pleasure knowing you, Darleane”. My picture with this lovely cake is shown in Fig. 8. I think that this pun was probably the brainchild of either Matti Nurmia or Al Ghiorso, who were our resident experts at devising clever acronyms, puns, etc.

I reluctantly cut my sabbatical year a few months short in order to return to Los Alamos in the late summer of 1979 to become the Division Leader of the Chemistry–Nuclear Chemistry Division — the first woman to fill such a position at LASL. This was a great challenge and honor for me and although I hated to leave Berkeley, I was eager to take up my new position. I had many ideas about things I wished to implement in chemistry and nuclear chemistry — not just in heavy elements, although certainly I had been seriously inoculated with that virus. When I could, I took time off from my administrative duties at Los Alamos to go to Berkeley (and even GSI) to participate in fission studies of the fermium isotopes and searches for SHE. It was a very busy time for me, but also very productive.

My Los Alamos colleagues and others nominated me for the 1983 ACS Award for Nuclear Chemistry “for her contributions to the understanding of the forces that govern nuclear behavior through

studies of the fission process and of the production and characterization of heavy elements, both man-made and in nature.” And, indeed, I was chosen for this award, the first woman selected for an ACS scientific award, other than the Garvan Medal, which is specifically designated for a woman chemist. (I was also very pleased to receive the Garvan Medal in 1991, but I was especially pleased that I was first honored by my colleagues for my ability as a nuclear chemist rather than because I was a “woman” chemist, prestigious though that award is.) As fate would have it, much to my pleasure, I learned that Glenn T. Seaborg was to present this award on March 21, 1983, in Seattle, Washington, during the National ACS meeting there. The picture of us taken on the occasion of this Banquet and Award ceremony is shown in Fig. 9. A color version of this hung in Glenn’s office at LBL for several years until, much to my regret, he replaced me with a picture of himself and the movie star Ann-Margret!



Fig. 9. Glenn T. Seaborg presenting the ACS Award in Nuclear Chemistry to Darleane Hoffman, March 21, 1983, at the ACS National Meeting in Seattle, Washington.

Probably largely as a consequence of my 1978–79 sabbatical year at Berkeley and my subsequent close association with the heavy element group, in 1984 I was invited to return as a Professor in the Department of Chemistry of the University of California, Berkeley,

with an appointment at LBL as Faculty Senior Scientist and Leader of the Heavy Element Nuclear and Radiochemistry Group. It was in some ways a difficult decision for me, as I was very devoted to my Division at Los Alamos, but I felt they were in good shape and that it was time for me to help educate the next generation of students in nuclear and radiochemistry. And I also wanted to pursue my interest in the chemical and nuclear properties of the heaviest elements and maybe even help search for new elements. Berkeley was the ideal place for that. So I accepted and then Marvin and I began the difficult process of moving away from Los Alamos after more than 31 years there. So I came to Berkeley in August 1984 and I started my next career as Professor of Nuclear Chemistry. I continued my close association with those giants and pioneers of nuclear science, Glenn T. Seaborg and Albert Ghiorso, with whom I am now privileged to coauthor this book.

P.2. Albert Ghiorso

I was born on July 15, 1915, in Vallejo, California, as the fifth of the seven children that my mother would have. Two died in infancy, leaving our family with three girls and two boys to grow up together in Alameda just across the bay from San Francisco. My father, John, had emigrated from Genoa, Italy, with his family when he was two years old. The family, my grandmother and grandfather with four sons and two daughters, settled on a very small farm in the hills above St. Helena and there they eked out a modest living. Thirty years later I would spend most of my summer vacations at this ranch. My father left the ranch when he grew up and became a jack-of-all-trades, making his living at various times as a taxi-driver, riveter, welder, cook, handyman, etc. Although he never attended school beyond the fourth grade, he knew a lot of lore and respected education. Like most working men of that time, he was a strong union supporter and a political radical and wanted his children to amount to something in their lives. In particular, he wanted me to become a lawyer — an *honest* lawyer, he emphasized!