Application Story for Lois Jacobs, MD, PhD submitted March 18, 2025

Curiosity, the desire to help others, and the commitment to always do my best with my God-given gifts have taken me on a totally unexpected life's journey far exceeding the dreams of a little girl who grew up on a dairy farm near the eastern edge of Adams County. On that journey I have lived in a realm of science where I worked with some of the most brilliant and accomplished researchers in the world. I earned a PhD in Genetics having had the privilege of studying under extraordinary geneticists, including two Nobel Prize winners – and later earned an MD before transitioning to the quieter world of community medicine as a physician in private practice.

My journey began under the guidance of my hard-working, community-oriented, and loving parents, Henry and Eugenia Jacobs. They taught me life-long principles of honesty, integrity, and character and the value of a strong work ethic while I helped with all aspects of daily activity on the farm - milking cows, harvesting our crops, and preserving the abundance from the garden. They also saw that I was involved off the farm in the local and state community - participating in 4-H, our church youth group, the American Legion, Farm Bureau, and exhibiting cattle at the Junior Livestock Exposition. Underpinning all of those activities was their emphasis on the importance of my education and using one's talents to the best of one's ability. Mother endured endless questions every day from the time I could talk because I wanted her to tell me about plants, bugs, farm animals, wild animals, the weather, rocks, and space. She patiently put up with my never-ending menagerie of collected and rescued flora and fauna. She also took me to the county library where I gathered a pile of books to read every week that allowed me to travel across the country and around the world.

Both Dad and Mom made special efforts to complete their own high school educations. Dad and his brother, William, were "home schooled" in the late 1920's for their first two years at AF high school due to lack of transportation. They went to the high school once a week to take their tests and quizzes on the previous week's material and get their assignments for the next week. Dad was a member of the AF area Board of Education for 24 years. My Mom boarded in Friendship for high school and then in Wautoma where she obtained her 2-year teaching certification from the Waushara County Normal. My Grandmother, Lois McFarlin Jacobs, was of the generation when excelling young women were encouraged to complete their own educations in the spring and then go directly to teaching the following fall. She completed her own schooling when she was 17 and taught for at least 15 years in the one-room schools of Adams County before marrying and starting her own family. Their examples of dedication to education were deeply instilled in me before I even started school.

Along the way I had some extraordinary teachers:

- My 4th through 8th grade teacher, <u>Mrs. Etta Klusmeyer</u>, let me work ahead at my own pace in subjects such as math. She strategically placed scientific objects on display that she probably knew would pique my curiosity. Remarkably, she let me pursue independent projects during school hours over a wide range of topics every year, whether it be six weeks of predicting the weather, gathering and identifying wildflowers growing around our country school, or reading Greek Mythology.
- <u>Mr. Angelo LaValle</u> for band, where he taught me to excel for four years as a member of the first-rate class A band and as an individual in Solo and Ensemble Competitions. As Senior Band President I learned how to run an organization with a mini-constitution making some difficult decisions on more than one occasion with the other band officers.
- <u>Mrs. Bouri Flesch</u> for freshman English, who was also our Forensics coach; under her, I learned to stand up in front of a group and speak, a skill that I have used ever since.

- <u>Mr. Duane Olson</u> for four years of math, somehow making math fun to learn while maintaining a rigorous curriculum and teaching the principles of problem solving, which I have used in every level of my life's experiences, both professionally and personally.
- <u>Mr. Hennesey</u> taught sophomore history at college level, with essay exams that matched.
- <u>Mr. Thomas Hake</u> taught the sophomore Biology course and he started to answer some of my "how does life work" questions at a higher level.
- <u>Mrs. Maxine Loken</u> as the high school librarian deftly guided my extracurricular reading to biographies and novels of successful, independent women and encouraged me to take the courses required for college entrance.

During grade school and high school, I assumed that I would have some kind of working career after graduation, but I had nothing specific in mind, nor did I have any particular commitment to going on to college. I did not strive to be on the Honor Roll or be at the top of my class; I was, however, strongly committed to using the gifts God had given me to the best of my ability and I took all of the college prep courses "just in case."

During high school, several of the first major surprises of my journey away from the farm occurred. I went to State Competitions yearly and won Firsts in Music and in Forensics. In the spring of my Senior year, it became clear that I would graduate as the Valedictorian of the Class of 1965. None of these accomplishments had been a designated goal, but were the natural outcomes of the principles my parents had taught.

As we prepared to graduate, I was asked by teachers and fellow students what my future plans were and where I had applied to college. Although it seemed reasonable to pursue further education, I was greatly concerned about leaving the farm. Our farm activities centered around four capable people working as a team. The summer harvest season was where this was the most evident. A good example would be putting up hay. Typically, my father and I worked in the field where I drove the bailer and he loaded the wagons. My brother and mother worked on the storage end; she unloaded the wagon and he stacked the bales in the barn hayloft. My departure would end this arrangement. After considerable thought, I realized that in the long-term farming with my parents would involve my brother and not me; I needed to take the next step for myself and they needed to decide how they would manage at home. After I left, they took in area boys who came from large families with limited incomes. Ron Forster was one of these boys in the Special Ed program in high school. Although he was very limited in his ability to read and write, he became the strong fourth hand that was needed on the farm. He remained with my parents throughout their lives, becoming an unofficial foster son and my "younger brother."

After looking into college and university options, I decided that the UW-Madison would provide the kind of academic environment that best suited me. Unfortunately, my father was strongly opposed to my attending such a large university. We only had one discussion about this disagreement. The conversation ended when I said something I had never thought about previously and afterward wondered where it had come from. I told my dad I understood that when a parent provides the means for someone to go to college, they have the right to say a lot about the institution chosen; consequently, I would be paying my expenses myself and I would be going to Madison. It's important to understand this was not an argument with raised voices, just a strong discussion between a determined parent and a determined daughter. When the daughter woke up the next day, she was very uncertain about what she had just created for herself, but it was clear there could be no backing out. So it was that I accepted no money from my parents for any of the many years of education that followed. We never spoke of it again.

The only place I knew of nearby to earn money that summer was Wisconsin Dells. And I needed to make good money. Ultimately, I took a job in a very large family restaurant. The hourly wage was non-existent, but the tips were excellent. It also taught me about details of organization that I continued to use throughout my life and career. On a busy day we could seat 300 people and have a large team of waitresses that had to have a way to work together to keep everything running smoothly. The first summer I made enough money to pay for most of my freshman year and the rest was covered by scholarships. I worked in the same restaurant for five summers, including as the manager during the last year. In midsummer of 1965 I went down to Madison for one day, where we took placement exams and were counseled regarding course options and a few tidbits about college life. I knew no one where I was going to stay and knew no one who had recently been to college. I headed off to a dorm in Madison feeling like I was being launched into a total abyss, possibly making a huge mistake.

My freshman roommate was a sophomore. She immediately terrified me with her stories of having come from a much larger high school (where she assured me, I would not have been the valedictorian) and she had struggled to survive her first year academically at the UW. She strongly hinted that I was not likely to stay afloat in this more rigorous academic environment. I have always been thankful for her input, because it made it clear to me from the start that I needed to be 100% focused on my coursework that year and not extracurricular activities. Given my AF record, I had been guided into honors math and English classes. There were only a small handful of students in each group; all the others were from large schools and had much more advanced classes behind them. I was completely out of my depth and quite certain that I would be failing both courses. As the semester went on, I was discouraged and beginning to feel that I should do my best to complete the semester and then look into transferring to a smaller school. My two cousins who were already on smaller campuses could detail the fun they were having on the social scene while also maintaining good grades with relative ease. It was a very dark time in my young life. I shared none of this with anyone. I was responsible for putting myself in this situation, so it was up to me to deal with it.

By Christmas break when I should have been looking to transfer, I had grades back for six and twelve-week exams. I was not failing. I decided to study over the break as much as I could for the finals the week after Christmas and thought maybe it would be better to tough it out for the second semester and transfer then. Having done my due-diligence, I received two As and two Bs. Second semester I did even better and was inducted into the Freshman Honor Society Sigma Epsilon Sigma that I had not known even existed. I never thought of transferring again.

Something else happened in the second semester of my first year. I took Zoology from Seymour Abrahamson; I did not know it at the time, but he was one of the few geneticists who studied the radiation effects of the bombing of Hiroshima and Nagasaki on the survivors. After he introduced himself to the 300 eager Zoology students in the large lecture hall, he told us to take a good look at the students on either side of us. He predicted that one of the three would not make it to the end of the semester. Another shot in the arm for me to buckle down. Perhaps of greater importance, when I started to study anatomy in the Zoology lab that accompanied his course, I knew I was hooked. There would be no French or History major for me – it would be science or math. This was not a casual decision because in the 1960's most women did not go into those fields, except possibly as teachers, and those who did often were not easily accepted.

The die had been cast and the direction set. I took engineering math and more biology classes during the regular academic year and worked in Wisconsin Dells each summer. Meanwhile, to assure my parents that I would be employable, I both worked and went to school one summer to put my major together with a Secondary Education Teaching Certification. I tutored both minority students and the profoundly deaf through organizations at the UW. I also had a steady stream of peers coming to my dorm room for help in their required science and math classes.

The next pivotal events for my future occurred during my senior year. I was elected into the Honor Societies Phi Kappa Phi and Phi Beta Kappa. It had never occurred to me that I might achieve those honors. That year I also took an advanced Genetics course taught by Professor James Crow, who in addition to his well-known research was also an excellent teacher. His Genetics course that semester coincided with Gobind Khorana winning the Nobel Prize in Medicine for work done at the UW discovering how DNA directs the formation of all living things by translating it's code into RNA and then proteins. The day I sat in class and heard Dr. Crow explain how this worked was another stunning moment in my education. That was it! That was the explanation for so many questions I had asking throughout my young life. I wasn't sure how this might impact my own decisions and future; when I shared this uncertainty with Dr. Crow, he suggested that I apply to the Department of Genetics (he assured me that they would accept me) where I would be able to interact with many other graduate students and learn first-hand of the numerous opportunities I might want to consider.

So, I did exactly that. The application for the Genetics Department contained many of the usual details including its own variation on what I would later refer to as the "What do you want to be when you grow up?" question that I would see again and again at different steps of my varied career. My response was in two simple sentences: "I want to impact the quality of people's daily lives." When asked how genetics work might accomplish my goal, I responded "Genetics is the future of medicine." At the time I had no knowledge of whether anyone else thought that way or if it might ever turn out to be true, but it was what I personally felt. In retrospect, it could not have been more true. One of two labs in the United States that developed and succeeded in the first bone marrow transplants was only a few steps down the hall from where I did my thesis research. In between that lab and ours, research into how to modify genes in mice in ways that could benefit medical therapies was taking place, for which the lead researcher, Oliver Smithies, would win the Nobel Prize in Medicine in 2007.

I officially started grad school in Genetics in the fall of 1969. In addition to course work, we were given the opportunity to spend six-week "round robin" sessions in various genetics labs under different members of the department to get a feeling for their research and hone in on what area we wanted to work as PhD candidates. After ruling out several as not closely enough related to research that would impact people, and ruling out others under the direction of male researchers who suggested that as a woman I might want to consider something less rigorous and more suitable for a woman, I chose to work with Robert DeMars who was very accomplished in using normal human cells in tissue culture to study mutations.

After the four rather grueling undergraduate years of study and the first year of graduate school, I needed to recharge my academic batteries. I had initially saved money in high school by raising, showing, and then selling beef steers at the Junior Livestock Exposition held at the Adams County Fairgrounds every fall. I jokingly called my savings account my "Fund for France." I fully expected to spend it to cover my undergraduate tuition and expenses, but I had made enough money in Wisconsin Dells and earned sufficient academic scholarships to cover my undergrad education. I determined during that first year in Genetics to take the following summer off before seriously settling into my PhD work.

A girlfriend and I spent the entire summer on a self-determined educational tour of most all of the European countries. We explored museums, cathedrals, castles, cuisine, and countryside soaking up art, music, and culture. We spent very little time with other students, many of whom had come to Europe to party with other students. We stayed in bed and breakfasts where we had more rewarding interactions with local residents who guided us to many of the hidden gems not on tourist's lists. As time for our return to the United States came closer in the fall, I started to pick up scientific journals to read on trains, feeling my curiosity and academic interests being rekindled.

It was the fall of 1970. As I sat eating a continental breakfast on the last day before I was to board the 727 to return to New York, another guest said, "You're an American, aren't you?" After I confirmed that I was, he asked if I had heard the news about the University of Wisconsin. An uneasy feeling hit my stomach as I told him that I had not. This was how I learned that the Physics building, Sterling Hall, only a short distance away from the Genetics building on the UW campus, had been bombed during the night killing a graduate student who was working in the building at the time. During my junior and senior undergrad years and the previous year in Genetics, we had been in the midst of continuous Vietnam war demonstrations with sit-ins, arrests, disrupted classes, smoke bombs, city busses overturned by massive crowds, and the National Guard being on campus to escort students who wished to attend classes rather than demonstrate. I wondered what chaos I might find when I returned to my apartment on the edge of campus.

The bombing turned out to be a wake-up call for the dangers of continued campus upheaval; the student body slowly returned to a more typical university environment and it was now time for me to declare the direction of my graduate research. I chose to focus on more precisely predicting the human risk of cancer by studying the effects of chemicals on the development of mutations in normal human cells rather than using either modified human cells or animal cells as had been done up until that time. Experiments that I performed often contained 100s and sometimes 1000s of petri dishes growing the cell populations and searching for those with genetic alterations after chemical or radiation exposures. Dr. DeMars referred to the maintenance and growth of these populations as "farming," and he often teased that I was good at it because of having spent my childhood on the farm.

I also assisted Dr. DeMars as he taught the advanced genetics course that pre-meds and others were required to take. He embarrassed me in front of the auditorium during one lecture on the fundamentals of hybridization and the impact genetics had had over the past few decades on modern farming with improved crops like alfalfa and corn. He advised the students to talk to me about it further as I was an "expert" on the subject. He then explained that I had worked my first job as a 16-year-old in fields a mile away from our farm supervising a crew of six others as I drove equipment that allowed them to detassel the rows destined to be the females in the genetic cross to create hybrid seed corn. Why would that have embarrassed me? Because almost all of the students in that auditorium were city-born and most thought of farmers as being akin to the Beverly Hillbillies. I had not quite arrived at the point where I wore my "farmer" badge as proudly as I do now.

The pathway to completing the PhD in Genetics had some interesting developments. One of the most memorable was during a half-day oral exam with the members of my PhD Committee. My PhD committee was made up four distinguished scientists: Dr. Howard Temin and Dr. Oliver Smithies, two professors who would go on to win separate Nobel prizes; Dr. Seymour Abrahamson, my freshman Zoology professor who was heavily involved in research both in Madison and Japan investigating the long-term effects of radiation on the Japanese people near the two bombing sites; and Dr. Henry Pitot the head of McArdle Labs (later known as the Carbone Cancer Center) which was the primary location of cancer research of all kinds on campus.

During the exam, one of the two future Nobel winners asked me a question about the sequence of events and "what was known by whom" leading up to the discovery of the DNA double helix, laying the groundwork for all subsequent modern genetic research. I don't recall what I initially gave as the answer, but one of the two agreed with me, while the other one disagreed. This resulted in a heated argument between the two of them regarding where they had been and who they had been talking to at meetings around that time. One would tell me to write my answer on the board as correct and the other one would tell me to erase it. Essentially an exam intended to determine if my research proposal was worthy of scholarly pursuit at a major university descended into a kindergarten argument between two of the most accomplished and intellectually outstanding minds of the 1970's. I remember very little else about the exam, except that in the end, I was given approval to proceed with my proposed PhD research.

The second grad school event was in 1975 when Dr. Howard Temin was awarded the Nobel prize for his discovery of a significant piece in the puzzle of how some organisms translate their DNA codes into protein. A public reception was being held in the top floor conference room of the nearby Molecular Biology building. I felt very uncomfortable about attending; I had always felt like a speck on the floor when around his extraordinary intellect. Finally, I decided that I must go for the obvious reason that he was one of my PhD committee members. It was late in the afternoon when I arrived and there was a lull in the flow of people. Much to my chagrin, when I walked into the room there was no one between me and the honored professor, making it impossible for me to gravitate to the refreshments table and gather up my courage before greeting him. He had seen me the minute I came in and did not break eye contact, so I had no alternative but to walk directly over to him extending my hand in congratulations and hoping some intelligent comments would come out of the dim recesses of my brain. Much to my relief and surprise, before I had a chance to say a word, he clasped my hand and did not let go, saying "Lois, I am so glad to see a friendly face. I hate these things. Please stand here for a while and protect me from more of this." I learned an important lesson that day that has been helpful throughout my life as I have interacted with scientist nationally and internationally, or anyone in any walk of life, for that matter. 'Never assume that the other person, regardless of how accomplished or powerful, is other than another human being; make it your assignment to set them at ease around you, rather than waiting for them to put you at ease.

After years of long days and nights, attending meetings to present my research, publishing papers, and writing/rewriting a final thesis, I finished graduate school in 1977 with a PhD in Medical Genetics. The previous six months had been filled with trips from the West coast to the East coast and in between, presenting my work as part of the process of applying for faculty positions. I settled on a position in New Jersey affiliated with Rutgers University near Philadelphia. While there, I ran a lab that continued my research, published additional papers, contributed chapters to scholarly books, traveled across the country to present my research findings at seminars, and applied for and was awarded a grant which today would be equivalent to \$1,000,000 to support my lab. I also met and married Leonard Capobianco, a creative native of Philadelphia who is Italian.

Using the grant funds, I returned to the University of Wisconsin Department of Genetics as research faculty with my lab and assistants adjacent to Dr. DeMars' lab, allowing us to collaborate further on research into the genetics of cellular changes leading to cancer. Presenting research results at national meetings, publishing papers, applying for more grants, and serving on National Institutes of Health Committees in Washington DC followed.

Outside of the lab, another constellation of events was converging that would change the course of my career. The first, again, involved AFHS. I stopped by one day to visit Mr. LaValle and the band during the hour I knew they would be rehearsing. The discussions I had with students that hour about my research led to invitations to speak to classes that afternoon and the following day. While explaining my work, student comments included "You have done all that and you came from HERE?" and "How is your work applied to medicine?" In response to the second question, I talked about the impact I hoped my work would eventually have on preventing cancer and improving its treatment. I heard myself saying "But I suppose if I really wanted to have an impact, I would counsel people on life-style choices because we already know how to prevent 50% of cancers." (At that time, smoking was much more widespread than it is today and it was one of the leading causes of cancer, especially in men.)

The second event was actually spread out over time. It was often assumed that as "Dr. Jacobs" in cancer research, I must be well versed in the specifics of cancer diagnosis and treatment. I frequently was asked to render opinions on how a person should proceed to get further cancer evaluations or how to pursue the best cancer treatment. After spending hours in the library (no computers then), I would give them a more understandable version of what they had been told, but then I could only recommend what questions they should ask and where they could get a second opinion to make more informed decisions. Not really being able to help further was very frustrating.

Finally, the third event was a conversation with a graduate student who was in a newer program where she would graduate with both a PhD in Genetics and an MD simultaneously. I supported her wise decision for the dual degree and commented that if I had to do it over again, I might follow a similar path. She immediately replied "You are still young enough; why don't you do it?" Later that evening, in casual conversation, I mentioned her left-field comment to my husband, who immediately said, "I think that's a great idea!"

After a year of evenings and week-ends studying to take the MCAT entrance exam for medical school, I was accepted and returned to the rigors of course work at the UW Med School in the summer of 1983. I was 36 years old, one of only two students in the class that old. After graduating in 1987, I stayed another year at the UW to complete an internship and then transferring to the Massachusetts Tufts University system to finish years two and three of residency training. I finished in the summer of 1990.

When I was offered the prestigious Chief Residency position for a fourth year supervising junior residents at the Tufts – Bay State program in Massachusetts, I felt I had to decline in order to start working. While I had completed both my undergrad and Genetics degrees debt free, that was definitely not the case for medical school. I took out student loans at 12% interest rates that required immediate monthly repayment plans while only starting to actually spend the money. My husband and I now wanted to settle in Wisconsin permanently. He wanted the calmer way of life away from the hectic pace of Philadelphia and I was more than happy to be closer to my parents and the area I always thought of as "home." We chose Oshkosh where there was an opportunity for me to buy a private practice.

We were only an hour away from my parents and the farm, where we visited as frequently as our work schedules would allow. Len came to love my family and the country as much as I did. When my mother died in early January of 1997, I spent even more time at the farm, helping my father with the many things that had always been my mom's share of their partnership. This was especially important regarding the bookwork for the farm business, because years before, my brother and father had determined to run their farms independently.

Three years later when Dad had a debilitating stroke just as the fields were being prepared to plant, I continued to run the farm. My staff soon adjusted to the phone calls coming into the office about fertilizer orders and deliveries, cattle feed deliveries, bred-heifers that that were ready to ship internationally, and questions from the men I had hired to plant and harvest the crops. Ron was still on the farm and his intuition and knowledge about machinery, gardening, and animal husbandry were a wonderful help to me; we became very close as "brother and sister." Once all the cattle were sold and my parent's estate settled, I continued to provide a home for Ron on the farm, helping him get a nearby job working to raise dairy heifers. The acres that I still owned were rented out. I still enjoyed coming "home" where Mother's flowers and garden flourished under Ron's care with a little help from me. He and I took down buildings that were in poor repair and removed the accumulation of things that Dad "might want to use some day." We updated the house so Ron would have a place of his own for as long as he lived and the remaining buildings were repaired.

Originally planning to practice Internal Medicine in Oshkosh, it became evident very early on that there was a great need for bringing the latest available treatment and management options to patients who had severe asthma. I suspect my interest in this area came from watching my mom struggle most of her adult life with one of the worst versions of asthma that I was to ever see. She had been told by a Madison specialist when in her 40's that she needed to leave the farm. She confided in me later as we drove back to the farm from her consultation that she "would rather die" than leave farming. She found ways to manage, but some of the treatments would have severe long-term side effects that could have been avoided if the new treatment options available when I started to practice had been available decades before. As word spread from the first patients who told others that our office "had changed my life" or "given me a life back" there were times when I had so many patients that new patients stayed on a waiting list for a year. It was a very rewarding time for me. I never regretted leaving research behind and focusing on the quality of patient's everyday life – it was just in a different way than I had originally imagined.

Len and I spent 30 years in Oshkosh but after we retired, we decided in 2019 just before the start of the pandemic to build a house in the "north pasture" of the farm and move there permanently. This would let us be closer to help Ron and both of us looked forward to the absolute peace and tranquility of the country. After the challenges of house building during 2020, we moved in the end of December.

While still in the midst of our getting settled on the farm, Ron's elderly mother rather quickly needed the support of a long-term care environment. Her absence left his developmentally disabled sister needing Ron and me to invoke our successor guardianship that had been established with her mother years before. His sister moved to the farm to stay with him and I became immersed in seeing that she got settled, supported in her grief over being separated from her mother, and tending to her medical needs. In the course of a few months their mother's condition deteriorated and it was time to help the family with funeral arrangements. The decision was made for her to stay permanently on the farm. Two summers later, Ron went to the ER for what seemed like pneumonia, and the following day he died of acute cardiogenic shock. Since then, I have been his sister's sole guardian. The world we envisioned in retirement literally changed overnight.

Len, as a retired pastor, has returned to ministry now at the South Burr Oak Church where I grew up. I volunteer to create the bulletins, maintain the prayer list, provide a weekly updated newsletter and group email, and help in other ways within the church family. Since the death of my parents, I have followed their example and have been involved in the management and maintenance of our local community cemetery, serving as President for the past decade.

I hope you can see that the AF school district's teachers and students provided a thread of influence throughout my life – from feeding my curiosity with projects in grade school and high school, all the way to playing a part in my decision to go to Medical School. Now that I am back in Adams County, I have had the opportunity of reconnecting that thread. Last spring I had the privilege of participating as a judge for the AFHS TEMA program led by Mr. Krystian Weglarz. I was greatly impressed by the high-quality presentations of many of the participating students and hope to have more of these connections in the future.

It continues to be very rewarding to encourage AFHS students to put their best efforts into whatever they do because, then, they too may have unexpected surprises in life that they could never have imagined. Even if they come from Adams county!