POOR LITTLE FARM BOY—STORIES I TELL: AN INTELLECTUAL TRAJECTORY

Gary L. Haller

At a recent Koerner Center event, a woman asked about my area of scholarship. I said that I studied heterogeneous catalysis, and she responded, "You must have other interests?" It will be disappointing to some of you, as I believe it was to my new friend, that if you insist on talking about my research, that is about it. But I do have other interests if we can talk about those to which I make no scholarly contributions. These include theater, dance, opera, and art, and although I often have trouble simply articulating what I like and why, these interests have come to occupy a large part in my life and, as my wife, Sondra, continues to remind me, of our household budget. So to complete this personal trajectory, we are going to have to return to both heterogeneous catalysis and these other interests. However, I am going to begin with a chronological account of my early education and farm life in Nebraska.

My farm upbringing shaped both my education and my perspective on life and culture, not necessarily in a good way. I was literally born on a farm. My mother was attended by a local doctor who did house calls for such events. My birth certificate gives my birthplace as Loup City, Nebraska, the county seat of Sherman County, but our farm was closer to Litchfield. Litchfield, Nebraska, was probably named after Litchfield, Connecticut, a factoid suggested by Wikipedia. It was established when the railroad came through in 1886, although early settlers had arrived by 1874. Both Sondra's and my families came to Nebraska for free land offered by the federal government under the Homestead Act of 1862. Litchfield is truly mid-America, by which I mean geographically, because it lies about 1,733 miles from New York and 1,733 miles from Los Angeles; politically, it is even further right than middle America. Litchfield's population apparently peaked at about 500 in 1920; the 2000 census reports 280 persons, and the 2010 census drops to 262 and reports a racial makeup of the village that is 99.6 percent white and 0.4 percent Native American. This sounds about right, and by the time I was old enough to comprehend my surroundings, I was already planning my escape.

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A family picture, in front of our home in about 1944, is viewed through a barbed wire fence with a taped, broken window as a backdrop. Both of those attributes of the photograph seem appropriate to the farm aesthetic that I remember. I am the guy sucking his thumb and standing between my older brother, Dean (about four), and Dale (about one). I was about three years old at the time this picture was taken. My mother used to dress up for any occasion, as seen in this picture, but my father is in bib overalls, his standard attire for work and almost everything else. Note his right hand. He was disabled in the sense that he was born with a club hand with two single, unjointed stub fingers. In fact, he could do about anything on the farm, and because he was either not hired or fired from every non-farm job he tried, he stayed on the farm. I have a particular memory of him telling a story of having worked for the railroad for several months when a new foreman fired him because of his disability. The story I tell about my father's hand and myself has to do with cows. Because his two stub fingers did not work so well for milking cows, he had purchased a milking machine when we three boys were very young. It was powered by a gas engine dynamo (we didn't get electricity until I was eleven or twelve years old). When I was about five, my father put the milking machine into storage because he saw me and my older brother as old enough to milk, and hand milking was "better for the cows." The arrival of electric power on our farm was a big deal for us. Electricity was slow coming to Nebraska because we had to wait for the New Deal's Rural Electrification Administration to get around to us. My father had purchased a refrigerator and toaster about two years before we had power to use these appliances. He couldn't wait to replace the icebox with a refrigerator, but I was thinking we would take the milking machine out of storage. It did not happen.

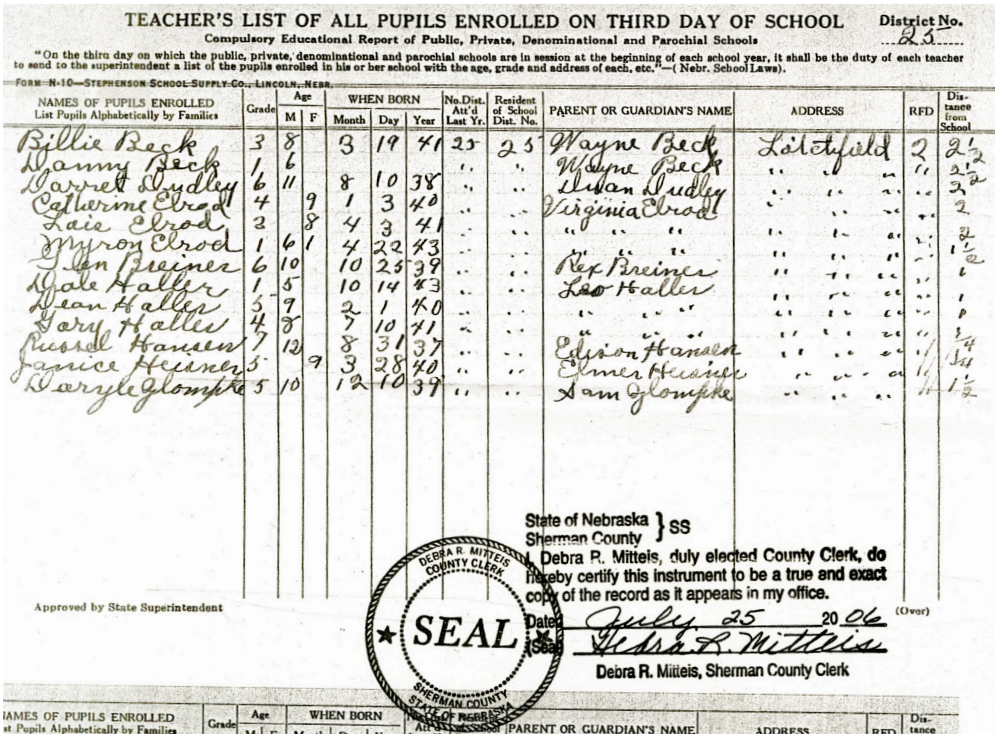
Leo Edward Haller, 1912–1991; Carrie Dorothy (Obermiller) Haller, 1919–1989; Dean Edward Haller, 1940–1987; Gary Lee Haller, b. 1941; Dale William Haller, b. 1943

At the time that I started school, our farm (we lived on four different farms during my childhood) was three or four miles from the schoolhouse, and our father decided that my brother Dean and I needed a horse to ride to school. I have two vivid memories of the horse we called "Pet." The first occurred the day the horse was delivered to our farm by truck. We were excited and had climbed onto the roof of a grain storage shed to look down the road for the delivery truck, but we very soon grew bored and started a competitive game. We would slide headfirst down the shingled roof and arrest our forward motion at the last minute by grabbing the edge of the roof, getting points for how far we hung over the edge. I won this game by falling a couple of stories onto frozen ground, resulting in a compound fracture just above the wrist of my right arm. Riding the horse to school turned out to be almost as much fun as falling off the grain shed. Our father would not let us ride with a saddle, which might have provided some traction between us and the horse. I would be seated behind my brother and holding on to him. Inevitably, somewhere along our road to school a pheasant would fly up or the mailman would come roaring over the hill in his

jeep, causing the horse to jump and shy to one side, and causing me to fall in the other direction – dragging my brother with me. The horse would then run on to school, and we would fight all the way over who pulled whom off the horse.

Clear Creek school district no. 25 dated back to 1880 and was originally one room, but it had a couple of small additions in my time, and there remained a freestanding barn dating from the 1920s, the place where the horse spent his day. In Clear Creek's heyday the number of pupils peaked at about forty, but still with only a single teacher. I have a 1949 registry for Clear Creek school, obtained by my younger brother to get a passport. That is the year he started school, and that year there were thirteen students, three of them Hallers. At that time, I still had a classmate in the fourth grade, Catherine Elrod. In the fall of 1949 her father was killed in a tractor accident; she moved away and I did not have a classmate again until I started high school. All of my teachers were older women until 1950. I only have a clear memory of one teacher, Harold Bennett, who taught us that year. He stands out because he was a young male and because we had a lot of recess that year, probably what makes it a memorable one.

High school was a somewhat bigger deal. The school itself included all twelve grades plus kindergarten and was staffed with nine teachers, so there was a nine-to-thirteen teacher-to-class ratio, an improvement over the one-to-eight I had in elementary school. Also, it was in town (Litchfield) and I had classmates, but not too many; the class of 1958 numbered twenty along the way, and fifteen graduated (two of my classmates were killed in a car accident, and the others either dropped out or moved away before our senior year). My first memory of high school was a parting from my



TEACHER'S LIST OF ALL PUPILS ENROLLED ON THIRD DAY OF SCHOOL

District No. 25

Compulsory Educational Report of Public, Private, Denominational and Parochial Schools

"On the third day on which the public, private, denominational and parochial schools are in session at the beginning of each school year, it shall be the duty of each teacher to send to the superintendent a list of the pupils enrolled in his or her school with the age, grade and address of each, etc."—(Nebr. School Laws).

FORM N-10—STEPHENSON SCHOOL SUPPLY CO., LINCOLN, NEBR.

NAMES OF PUPILS ENROLLED List Pupils Alphabetically by Families	Grade	Age M	Age F	WHEN BORN Month	Day	Year	No. Dist. Att'd Last Yr.	Resident of School Dist. No.	PARENT OR GUARDIAN'S NAME	ADDRESS	RFD	Distance from School
Billie Beck	3	8		3	19	41	25	25	Wayne Beck	Litchfield	2	2½
Danny Beck	1	6							Wayne Beck			2½
Garrett Dudley	6	11		8	10	38			Susan Dudley			3
Catherine Elrod	4		9	1	3	40			Virginia Elrod			2
Lois Elrod	2		8	4	3	41						
Myron Elrod	1	6	1	4	22	43						½
Ken Breiner	6	10		10	25	39			Rex Breiner		1	½
Dale Haller	1	5		10	14	43			Leo Haller			1
Dean Haller	5	9		2	1	40						1
Gary Haller	4	8		7	10	41						1
Russell Hansen	7	12		8	31	37			Edison Hansen			1¼
Janice Heiner	5		9	3	28	40			Elmer Heiner			1¼
Darryle Glompke	5	10		12	10	39			Sam Glompke			1½

Approved by State Superintendent

State of Nebraska } SS
Sherman County }
I, Debra R. Mitteis, duly elected County Clerk, do hereby certify this instrument to be a true and exact copy of the record as it appears in my office.

Dated July 25 20 06

Seal

Debra R. Mitteis, Sherman County Clerk

(Over)

DEBRA R. MITTEIS COUNTY CLERK ★ SEAL ★ SHERMAN COUNTY STATE OF NEBRASKA

NAMES OF PUPILS ENROLLED ... Grade ... Age ... WHEN BORN ... PARENT OR GUARDIAN'S NAME ... ADDRESS ... RFD ... Distance

peer group. This happened in an agriculture class, somehow related to the Future Farmers of America, and I felt pressured to join both. The class started with a field trip. As we were walking across the cattle yard, a cow defecated; our teacher walked over, scooped a handful of steaming feces, and rubbed his hand clean on his jeans. He turned to us and said, "If you want to be a farmer, that won't bother you." It did bother me. I thought I had seen enough of farming and that the point of high school was to get off the farm. So I dropped that class and joined the high school band and learned to play clarinet. In fact, not participating in everything was unusual in my high school because you couldn't have a band or team unless everyone participated. So I was on the basketball, football, and track teams. Only in the latter did I have any success, and I truly hated football practice. But dropping out of agriculture class was one thing—dropping out of football was something even I could not imagine.

While I have no memory of teachers or learning anything in particular from elementary school, I did have a couple of excellent teachers in Litchfield High School. One I identified with because of her outsider status more than anything else—I cannot even remember what kind of science she taught. She was Japanese, named Kiyo Fukasawa. She had no family or connection to the community. Perhaps she was placed in Nebraska during World War II by the U.S. government program of internment of Japanese Americans, although the nearest relocation camps were in Wyoming and Kansas.[1] She often lost control of her classes and then lost her temper, but I was always very sympathetic to her cause. Juanita Lang was just her opposite. She was a very tall woman, with her hair piled on top of her head to make her look even taller. She dressed very well, often with a scarf around her neck, and spoke very slowly with what might have been an English accent; whatever her accent was, it was foreign to Nebraska, which, of course, was part of the attraction for me. She taught English, was very demanding, and no one dared cross her, but I liked everything about her and believe she was the first person who convinced me that there was another life one could have from reading. Here I might mention that the only two reading materials regularly found in my home were the *Nebraska Farmer,* a magazine that was essentially a listing of farm prices, supported by ads for the sale of farm equipment, and comic books that I collected until I entered high school. A third teacher who made a difference in my life was Lucile Diefenderfer, who taught me math. I was good at math and enjoyed classes in geometry and algebra, and I was surely one of her favorite students. Perhaps she was the first teacher to tell me that there was education beyond high school, that I could be a teacher, and that I should go to college.

My father had not completed high school, but my mother had. College was never mentioned at home, and I cannot say that I ever thought seriously about the possibility or had a plan for college. I sort of got there by accident. By the time I was twelve, my father had worked out that I was not ever going to be of much use to him on the farm. If I could not get out of the farm work any other way, I would volunteer to my mother to care for our sister, who was eight years younger than I. Thus, the summer before I started high school, my father arranged a summer job for me on a neighbor's farm.

This was a good experience for me because I lived with another farm family who had a very different family life from ours. My family was both irreligious and apolitical, but the Cherry family was very religious and had a modest library. They had two daughters, one five years younger than I and one five years older, but no boys, probably the reason I was hired. Lois Jane was either back from her first year in college or headed for college; I cannot remember which, but she did provide me several kinds of life lessons over that summer. I was treated as one of the family, taken along to church on Sunday, was eventually baptized, and became the only member of my immediate family who was a church member. Even though I had a very pleasant summer working on the Cherry farm, I arranged my own summer employment after that, and none of it was on a farm.

I graduated from high school when I was sixteen going on seventeen, and I joined forces with a classmate, Donald Elsworth, and another boy, Ronald Michalek, closer to my age but two years behind me in school. We had the idea that we would seek employment not only off the farm but also outside of Nebraska. I believe the original plan belonged to the other two boys, who shared a keen interest in basketball as well as a certain amount of talent for the game that I did not have; I don't recall how I got in on the deal, but I would have had an interest in any idea leading out of Nebraska and away from the farm. In fact, the original plan wasn't very good because it took us to the oil fields of Oklahoma, where we expected employment; but apparently having graduated from high school and farming did not in and of itself qualify us for the oil business. Plan B was to move on to Idaho to work in the orchards of the Emmett Valley. This plan would not have had any more probability of success than the oil fields of Oklahoma if not for Donald's uncle, who lived and worked in the Emmett Valley.

There was a certain amount of adventure, or misadventure, on the road trip to Idaho. Most of it is long forgotten, except for one incident. I Google-mapped this trip last night and found that it is a twenty-two-hour drive from Oklahoma City to Boise, Idaho. I have no memory of stopping much longer than it took to eat or change drivers, but this trip would have surely taken much longer then because we did it before many of the interstate highways were complete. Let me describe one of those stops, which took place somewhere in Wyoming. The car we were driving belonged to Donald, and one of its faults was that the speedometer cable was broken (this was in the days when the speedometer was mechanically coupled to the drive shaft). We were driving a long night across Wyoming and worried that we would be stopped and fined for speeding. No garage was open, and even if there were, we would not have had the cash for a car repair. Our corporate decision was to buy a replacement cable and install it ourselves. Where did we buy it, where did we get the tools to do the replacement, how were we going to do this in the dark night of Wyoming? I have no recollection about any of this, but I have a vivid picture of what happened when we made our attempt. The first part of the operation was to remove the old broken speedometer cable. I believe we did this, but one of us accidentally dropped the replacement cable during the process, and it landed exactly across the exposed posts of the battery. On today's car, this would be no

problem because these posts are now covered by insulators so they cannot be accidentally shorted by placing a conductor across the poles. But in our case, the speedometer cable did short the battery, which went unnoticed until it started to glow bright red in the dark. I made the mistake of retrieving it, grabbing it somewhat removed from where it was red-hot, but not far enough away to avoid severe burns on my fingers. By the time I successfully removed the cable from the battery, it was in two parts. So the outcome of this repair was that we drove on, still in the dark as to how much we were exceeding the speed limit, suffered a loss of a fair amount of our cash reserves, and one of us was whimpering in pain in the back seat as we continued our journey through the night.

We did arrive in the Emmett Valley and find said uncle, who kindly found places to sleep for three unannounced guests and then proceeded to find us employment in the orchards. I suspect that we, unknowingly, displaced some illegal transients who counted on this employment to support their families, but this was a simpler time when that would not be known or a concern. The generosity of Don's uncle exceeded mere housing and employment. When I complained of a toothache, he took me to a dental student who, I presume, practiced without a license, although this never occurred to me. I was sixteen years old and this was my first visit to a dentist. He not only repaired my aching tooth but over the summer on several evening visits to Boise also filled a mouth full of cavities at so modest a cost that I could pay for it out of my summer earnings. These were all mercury amalgam fillings, and thirty years later they all began to fail and were replaced by ceramic composites before I reached fifty, but I have been forever grateful that essentially all of my teeth were saved by an uncle whose name I cannot remember and a dental student who needed some practice.

The main reason for this story is to tell you how it got me to college, but let me tell you about the nature of our work before I move on to college. Our late-summer work involved picking fruit and was pretty routine, but our initial job assignment was not so pleasant: peach tree thinning. This can be done mechanically by thinning the branches in the fall or thinning the buds in the spring; but the orchards that employed us went for method three, hand-thinning the small fruit after onset. The downside of this approach is that even these very small fruits have a well-developed peach fuzz, and no matter how you bind yourself up against it, after a day of this activity, you will have peach fuzz in every crevice of your body, and your whole body will be itching and on fire. This is not the worst summer job I have ever endured, but I have a very lasting memory of daily agony in those few weeks in June of 1958.

There were a lot of new experiences growing up and learning to survive on my own that summer, but it was what happened at the end of summer that changed my life and set me on my way to Yale. I became depressed and physically ill, but there were no physiological symptoms and I did not recognize it for what it was, homesickness. But that was what my stand-in mother, i.e., Don's aunt, diagnosed, and I accepted it. The problem was what to tell my parents. I hadn't exactly run away from home; they did not approve of my leaving home, but they didn't make any real effort to stop me.

Still, calling my parents to say I was returning home because I was homesick was never an option. I remembered that as the valedictorian of my class, I was guaranteed by Nebraska law a tuition scholarship to any state college, and one of these colleges—the Nebraska State College at Kearney—was only thirty miles from home. So I called my parents and explained that I had decided to use my scholarship and go to college in Kearney. I returned home for a couple of weeks and immediately realized why I had left. My parents gave me $40 and I headed for college. That turned out to be their only monetary contribution to my college education, but my grandmother did arrange housing for me with her brother, my father's uncle, who lived in Kearney, and that is where I lived until I earned enough to move into a rented room the following spring.

Since my homesickness had evaporated the minute I arrived home, I had little desire to return home after I started college. However, the first week at school, I did send my laundry home with a friend, and it came back washed and pressed with a jar of soup. When I tried this a second time, my laundry was returned, just as I had sent it, with a note from Mother that read: "If you don't come home, don't bother to send your laundry." So we struck a bargain: I learned to do laundry and almost never returned home except at Christmas sometimes from that point forward, even though home was only thirty miles away. At the same time, I might mention that in my four years at college, I was never visited by a member of my family, and that has sort of set a pattern for life.

I worked my way through college primarily in the college dining hall, as a server, dishwasher, or whatever initially, but graduated as the assistant manager and bookkeeper. Since there was a summer school (which I sometimes attended), this became a year-round job. It is also where I met Sondra, although she prefers another version of our first meeting, having to do with grade competition. I also worked as a grader in math with another teacher/mentor, Theodora Nelson. While my major was in math and my minor in German, another teacher who turned out to be critically important to my career was Donald Fox, who taught me freshman chemistry. Nebraska State College's distribution requirements were not as demanding as Yale's but did result in my taking one term each of swimming, speech, and art appreciation. That one term of art was my first exposure to the subject and probably predated my ever having been in a museum; and since I already knew how to swim and still am not good at giving a speech, only the art course had a lasting effect on my life, I suppose.

I was initially enrolled in a program that was supposed to turn me into a high school math teacher, the same program that Sondra graduated from with majors in political science and Spanish. In my case, my chemistry teacher suggested I consider becoming a professor instead of a high school teacher and counseled me on how to apply to graduate school and certainly wrote one of my letters of recommendation. Probably because Don Fox was being so helpful with the graduate school process, I applied for admission in both mathematics and chemistry, even though I had no high school chemistry and had only completed a year of introductory chemistry and a year of organic chemistry. However, this did result in admission to the University

of California at Berkeley, the University of Illinois, and Northwestern University. I wanted to go to Berkeley, because it was farther away from Nebraska and on a coast and I had yet to travel farther west than Idaho, or east to Chicago; but Fox said I would be lost at Berkeley and should go to Northwestern, where they would "take care of me."

I have some regret that I did not act on my desire to go to Berkeley, but Northwestern did take care of me. To make good on my admission to both the math and chemistry programs, I took remedial physical chemistry, i.e., regular junior undergraduate physical chemistry, a graduate course in organic chemistry, a graduate course in projective geometry, and probably a fourth class in math, but I don't remember for certain. I found that physical chemistry course more enlightening than any course I had as an undergraduate, and I loved the professor who taught it, but my first year in graduate school was not easy. I was in particular trouble with my graduate organic chemistry course and felt threatened when one of my classmates moaned about the textbook being the same one he had used at Harvard as an undergraduate. At the end of the first year, the department administered a comprehensive set of exams in five areas of chemistry (analytical, inorganic, organic, physical, and biological); the requirement was that we take any four of the five exams, each of which took the better part of a day. I earned the top assessment among my classmates, and the Harvard student who had been so confident at the beginning of the year was asked to leave.

By May of 1963 I had the option of continuing a Ph.D. in either math or chemistry, but had to make a choice. I had observed that mathematics degrees took longer and that employment was less certain in math than in chemistry, so I decided to seek a Ph.D. in chemistry. I also had to choose a subfield of chemistry, but that choice was sort of made for me when I chose the professor I wanted to work with—Robert L. Burwell, Jr., who had taught me physical chemistry. Because his research was in heterogeneous catalysis, a subfield of physical chemistry, that became my research field. My career in mathematics was not quite over, however. Another professor, Edward Schlag, was having trouble with group theory; he learned from Burwell that I had studied group theory both as an undergraduate and graduate student, so one day he showed up to ask me some questions. That led to a yearlong collaboration that resulted in my first and last publication in theory: "Symmetry Numbers and Reaction Rates. II. The Computation of the Reaction-Path Degeneracy for Bimolecular Reactions," *The Journal of Chemical Physics* (1965), coauthored with Edward W. Schlag.

Robert Burwell was a graduate of St. John's College and earned a Ph.D. in chemistry from Princeton. While he certainly continued to teach me about physical chemistry, he was eager to fill in the gaps in my education. Honestly, it was probably the other way around. I came to meet with him on a daily basis, and we could quickly deal with any chemistry questions I had but would continue with any other random topic in current events, history, politics, etc. He was the person who introduced me to the *New York Times,* who gave me my first lessons in the wines of Bordeaux and the geography of Europe, and he was always correcting my English. I believe the only thing he gave up on was my spelling: that was and is hopeless, but now I am mostly rescued by

spell-check. It was only after I arrived at Yale and had my own graduate students that I realized what a burden I must have been to him—nobody needs or wants to meet with a graduate student every day! Still, our teacher-student relationship continued long after I left Northwestern. Of course, I consulted with him on research matters and career moves; we often met for lunch or dinner at professional meetings, and it would not be unusual to be invited to browse a museum in whatever city we might find ourselves in. Sometimes this was a little heavy going for me because he always wanted to tell me more about a given wine or painting than I was able to absorb at one sitting. We mostly communicated by phone or in writing, even after e-mail had become the norm. He died in 2003, and I very much miss my interactions with Robert Burwell.

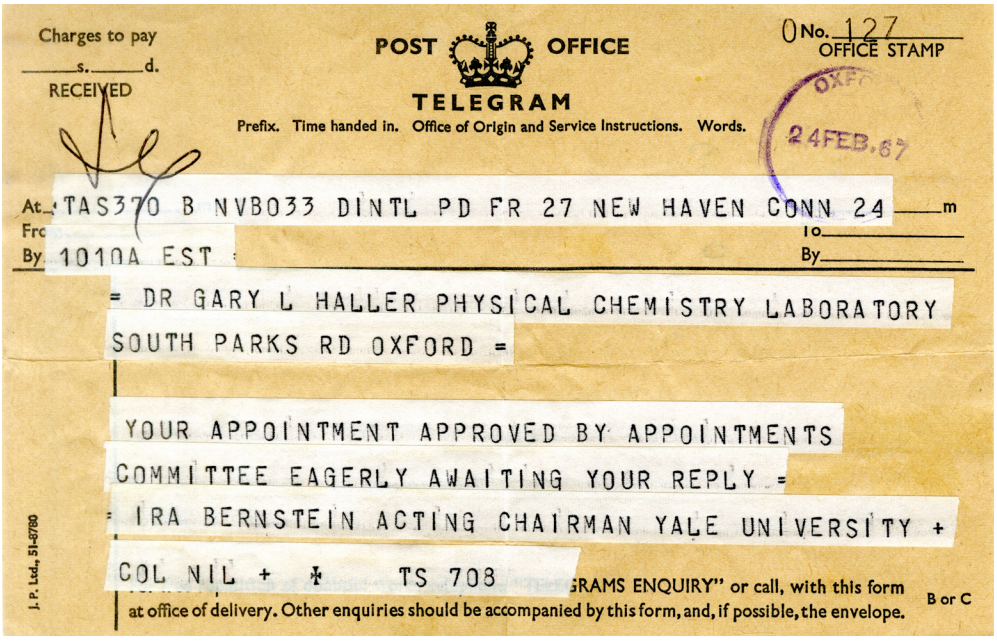
I planned to complete my graduate study in the spring of 1966, and in anticipation I had applied for an NSF postdoc fellowship at Caltech and a NATO postdoc fellowship at Oxford. I was granted the NATO fellowship first and accepted it immediately. It was at about this time that Yale first came into my life in the person of John Butt. John was an associate professor from Yale who visited Northwestern to present a seminar. Presumably it was on heterogeneous catalysis, but because he presented it in the Chemical Engineering department, I was not aware and did not attend. After his seminar, John came down to talk with me about a faculty opening at Yale. Burwell, who had attended his seminar, had apparently said nice things about my work, and John wanted to encourage me to apply: in fact, he invited me to visit Yale, give a talk, and, as it were, apply in person. I thought about it only briefly and explained that I would be departing for England in the near future and would not be able to visit Yale. I did not reveal my real hesitation, which concerned the fact that the position he was offering was in engineering, not chemistry. The effort required to switch from math to chemistry was still fresh in my mind, and the mere thought that I would now switch to chemical engineering in the fall, and presumably be asked to teach courses I had never taken, didn't seem all that attractive. Moreover, I had yet to begin a search for a job that would come after Oxford and thought maybe Caltech or Berkeley might be interested in me and I might yet make it to the West Coast.

Shortly after accepting the NATO fellowship, I heard from my Nebraska draft board, and a date was set for a medical exam. I had a deferment to complete my Ph.D. and apparently they were carefully tracking it. I was certain I would be drafted. I was not that excited about a trip to Vietnam, so I considered enlisting in a navy program for persons with a Ph.D. in science that would give me a commission as a lieutenant and, I assume, a job in a laboratory. Just before I signed on the dotted line, Sondra returned from a visit to her gynecologist and announced that (1) she was pregnant and (2) she had obtained a letter for my draft board that might continue my deferment. It turned out that she was right, that you could still get a deferment as a new father, which I did in April 1966. Within a year that kind of deferment was removed. I was just very fortunate in the timing in many ways. In August of 1966 we traveled by train, one of the final trips of the 20th Century Limited overnight trains, Chicago to New York. We played tourist in New York for five days and then sailed to Southampton on the *SS*

France. I shipped everything we owned, including an MG 1100 sports sedan, except for Sondra's piano, to England.

I never did quite get around to that job search because I was busy communicating with my draft board, completing my degree, and organizing a departure to England. After I started work at Oxford, I received a letter inviting me to apply for a faculty position at Case Western Reserve University, again in heterogeneous catalysis and in the Chemical Engineering department. This prompted a little research, and I quickly realized that Northwestern was almost unique in having a heterogeneous catalysis research program in chemistry, but that almost every chemical engineering department had a research program in heterogeneous catalysis. It was at that point that I decided that if I were to remain focused on heterogeneous catalysis as my research area, I was probably going to have to do it in chemical engineering. So I wrote one of those letters along the lines of, "if you are still interested, I now think I can find the time to visit."

My Yale faculty interview was scheduled for early December 1966, or as Sondra will comment, on the date that our firstborn was scheduled for delivery. Fortunately Jared was cooperative and arrived a month early, so I was able to keep my appointment at Yale. I visited for a week and was a guest in Berkeley College, where the master then was Charles Walker, who was also professor of chemical engineering. Apparently that interview was well received, and in February 1967 a little man on a bike delivered a telegram telling me that my appointment had been approved. This was a five-year appointment as assistant professor in the Department of Engineering and Applied Science. At that point in the history of engineering at Yale, there were no separate departments but groups in research and teaching in chemical, electrical, and mechanical engineering, as well as applied physics. The School of Engineering had been dissolved



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in 1961, so the chair of the Department of Engineering and Applied Science was the de facto dean of engineering.

However, my fear of teaching engineering was exaggerated, at least initially, because the only course I taught that first year was a graduate course in heterogeneous catalysis, and five of my students were my older faculty colleagues: Charles Walker, Harding Bliss, John Butt, Reiji Mezaki, and Larry Shendalman. My first undergraduate course was, in fact, in the Chemistry department. It was a section of physical chemistry for freshmen. It was essentially the course I had taken from Burwell at Northwestern, and I used the same text. However, I told the students a story dating back to Nebraska State and my introduction to chemistry by Don Fox. I remembered him stating that we were going to get the same chemistry as students got at Yale, it was just going to cost us less. After I told them that story, I explained that they were going to get the same chemistry I got at Nebraska State, it was just going to cost them more. Nobody laughed. This was a yearlong course in 1969–70. Some of you will remember May Day 1970 and the Black Panther murder trial, and perhaps you will remember that in the spring of 1970 the Yale College faculty suspended the normal expectation for grades; you could choose to forgo the final exam and just accept a grade of "Pass" on your transcript. My class of twenty-five were mostly premed and all chose to take the exam except one—and he certainly made the right decision because he could not have otherwise passed the course.

Shortly after I arrived in New Haven, I was hired by the City of New Haven to help initiate air pollution monitoring in the city. That experience and the interest of undergraduates in environmental issues resulted in my being approached by a group of undergraduates to teach a residential college seminar on environmental pollution, specifically on air, water, and solid waste. I organized this seminar in Jonathan Edwards College and offered it a second time, after which it was moved into the chemical engineering curriculum as the first environmental engineering course at Yale, simply titled "Air Pollution." This was in the early 1970s. After that I did begin to teach core courses in chemical engineering and have most often taught the introduction to chemical engineering and a course on reactor design and kinetics. I ended my teaching career at Yale by teaching the introduction to chemical engineering over that last three years, although it had become a very different course from the one with which I started my Yale teaching career.

My graduate teaching has usually been close to my research, with course titles such as "Principles and Practice of Heterogeneous Catalysis," "Materials Chemistry," or "Surface Characterization by Spectroscopy." I coauthored a text on the last subject, now long out of print. Perhaps this is the moment to say a word about catalysis. By definition, a catalyst is a substance that increases the rate of a chemical reaction, without being consumed or permanently altered. Catalysts come in three flavors: enzymatic (the basis of all life), homogeneous, and heterogeneous. Homogeneous catalysis involves a uniform distribution of the catalytic substance throughout the

reaction mixture. Heterogeneous simply means that the catalyst is in a different phase than the reactants and products of the chemical reaction. Usually a heterogeneous catalyst is a solid on which a fluid phase, gas or liquid, reacts. This makes heterogeneous catalysis the most important kind for industry: the catalyst usually needs to be separated from the reactants/products after the reaction is over, because it would be a contaminant in the product or because the catalyst, due to cost, must be recovered and recycled. The beauty of a heterogeneous catalyst is that you can simply make a packed bed of solid particles and pass the fluid reactant through this bed. Separation of the fluid and the solid is accomplished by the mere fact that the fluid flows into the bed—where it is, in a sense, "mixed" with the catalyst—and then out, leaving the solid catalyst behind. This makes my research very applied: for example, one-third of all manufactured goods require one catalytic step based on a heterogeneous catalyst. The nonacademic advantage is that I have often been offered consulting jobs by most of the large energy and chemical companies: Exxon, Mobil, American Oil, Union Oil, Sun Oil, Monsanto, DuPont, Union Carbide, Dow, to name a few. I am currently consulting for a small energy start-up, Primus Green Energy, and a large German chemical company called BASF. Some of these jobs have been very long-term. For example, I have been a consultant continuously for about thirty years for Engelhard Corporation, now a part of BASF.

Perhaps I should say a few words about my participation in administration or activities outside the classroom at Yale. I was first drawn into this aspect of Yale faculty life in 1971 when I was designated the engineering representative at the last national Association of Yale Alumni meeting to be held off campus, in Seattle, Washington. At the time, I didn't understand the dynamics of the choice, that is, why was engineering being represented by a new assistant professor instead of the chair of the department or at least a senior engineering faculty member? After I agreed to do this, I came to understand that no senior professor would do it because the engineering alumni were still very upset with the dissolution of the School of Engineering ten years earlier, and the faculty expected the representative to be attacked. Thus, I was primed for some discontent, but opened my remarks explaining that I was the perfect representative of engineering at Yale because I had neither an engineering degree nor a Yale degree and could therefore give them an objective appraisal of current Yale engineering. In fact, it went quite well; the alumni who were upset apparently were too disenchanted to attend an alumni meeting, and those who did attend were interested in the new direction that engineering at Yale was taking.

Other administrative duties have included director of undergraduate studies in chemical engineering, chair of the department, and chair of the Council of Engineering. The last position, which I held twice, used to be the administrative head over all of engineering. Between the two terms as chair of the Council of Engineering, I was deputy provost for physical science and engineering for two years, one under Provost Bill Nordhaus, who hired me, and one under Frank Turner, who inherited me. I believe

he found my skills very useful for modeling budgets, for which his quantitative skills were not nearly as good as those of Nordhaus. At the end of my second year as deputy provost, I had two offers of endowed chairs at other institutions, the University of Pittsburgh and the University of Colorado. I spoke to then President Benno Schmidt, suggesting that those institutions apparently valued me for my research and that if Yale didn't, perhaps I should leave. I was allowed to resign from the deputy provost position a year earlier than planned, given a year of academic leave and a modest salary increase, and chose to stay at Yale. At the end of that year off, I was again head of engineering, and that was when Provost Frank Turner initiated his restructuring program, and engineering was one of the areas proposed to be restructured out of existence. Now Frank, with whom I had a close relationship as deputy provost, and I were on different sides. Ultimately engineering survived, but our friendship did not. A decade later when Frank became director of the Beinecke Rare Book and Manuscript Library, he reached out to me, appointed me a member of his Beinecke Faculty Advisory Committee, and we made peace.

I had been appointed a fellow of Jonathan Edwards in 1968 and was very active in the college from the beginning, but my first involvement in residential college administration occurred in 1975. That was the first and last real summer term, by which I mean taught by Yale faculty to Yale undergraduates in a program that Yale College had originally embarked on to make better use of our facilities by requiring all Yale undergraduates to take one of their eight terms over the summer. To make it a real Yale experience, the colleges were to be operated as they were during the regular academic year, except that only three were open and placement was based on academic interests — there were colleges for humanities, social science, and science. The science college was Silliman, which I served as summer master. This was sort of convenient for us because we had sold our small house on Hill Street in Hamden and purchased the home we now live in on Whitney Avenue in Hamden. We moved into Silliman for the summer of 1975, Sondra very much pregnant with our third child, Joshua, being the reason we needed a larger house. While this was my first experience as master of a college, it would not be my last. I was acting master of Jonathan Edwards College for the spring term of 1981 and then returned to a longer term as master from the fall of 1997 through December 2008. Of all the administrative jobs I have had at Yale, I view the mastership of JE as the most rewarding, because it involved the most student interaction in all aspects of their Yale engagement. It also gave me an opportunity to indulge in my interests in theater, ballet, opera, and art that might never have happened otherwise.

I had begun to collect art, in a modest way, about a decade earlier. The first real artworks, meaning beyond the poster of the real thing, that I purchased were a drawing and a print by Paul Cadmus. In the decade before I was appointed master in the spring of 1997, I had come to know Paul in a casual way, mostly at exhibition openings, but I was invited to and attended his ninetieth birthday party as well. I had researched the Yale Art Gallery holdings on Cadmus, which included several drawings and prints,

none of which had ever been exhibited. So as I planned the move into the master's house, I also worked on parallel exhibitions of Cadmus's art in the Art Gallery and in the JE master's house. Jonathan Weinberg, then a member of the History of Art faculty, was helpful because he had pursued research on Cadmus and agreed to book three small teaching exhibit spaces in the Art Gallery for his course, with the understanding that I would place a Cadmus exhibition there. Daphne Deeds, then curator of education at the Art Gallery, was very helpful in expanding the gallery exhibition by borrowing some Cadmus paintings. Paul Cadmus himself helped put together the JE master's house exhibition by providing a list of collectors and encouraging them to lend to our exhibit. I initially thought of this as a one-off exhibition, but I enjoyed it and continued to mount exhibitions in the master's house, averaging about three per year for almost twelve years. Another person who was very instrumental in several exhibitions was Richard (Chip) Benson, then dean of the School of Art. He suggested or mounted four exhibitions of photography and encouraged a fifth on design. In the case of a Walker Evans exhibition, he was determined to have a celebration of Evans on the occasion of the one hundredth anniversary of Evans's birth. When I initially hesitated, he got Jock Reynolds, director of the Yale Art Gallery, and John Hill, executor of the Walker Evans Estate, to lobby and offer help. This included loans from the Art Gallery and the design and essay for the catalogue by John Hill.

Finally, I end with New York culture. In the first twenty years I lived in New Haven, I went into New York about once a year, usually for professional reasons. In the early 1980s my daughter, Sarah, was living and working in New York, and I would try to find reasons to meet her for dinner. Sarah had been very involved in theater in high school and thought she would perform professionally. She was admitted to the Theater Studies Program of the State University of New York at Purchase, where she studied for a year and a half before moving into New York, so she always wanted to couple dinner with theater, particularly if I was paying for those Broadway shows.

Perhaps I should give my children credit for introducing me to opera even earlier. Jared and Sarah had language teachers who were a married couple (teaching French and Spanish, as I recall), and they had organized an opera club at Hamden High School. They occasionally needed parents to go along as chaperones, so my first visit to the Metropolitan Opera was a dress rehearsal attended by the Hamden High School Opera Club. Sarah moved to England about twenty years ago, but I just kept going to New York theater and added ballet and opera to my selections. I was well into my New York period by the time I became master of Jonathan Edwards College, but being master allowed me to develop what I called the New York Culture Draw. I would choose a program of plays, ballet, and opera each semester and purchase five seats. Four of these would be offered to students on a first-come basis from a random drawing of names. By the end of my term as master I would typically have two or three events every weekend during the term, each preceded by lunch or dinner—and I never missed one of these in the 11.5 years I was master of JE. Now I continue my personal New

York culture program, but I also enjoy New York events with the Koerner Center, most recently last Saturday when we attended the American Ballet Theatre performance of *The Nutcracker* at the Brooklyn Academy of Music.

Notes

1 Some basic facts (spelling of her name, math teacher) about Kiyo Fukasawa at Litchfield High School have been confirmed by my friend Doris (Diefenbaugh) McAuliff (member of Litchfield High School class of 1959 and a teacher of mathematics and French at Litchfield High School). An Internet search by our editor, Lesley Baier, has provided the following brief history. Miss Fukasawa was born in California, October 16, 1913, and was an undergraduate from Santa Monica at the University of California at Berkeley in 1933–34. She was interned in the Manzanar War Relocation Center in 1943, had a bachelor's degree in social sciences/math at that time, and worked as a student teacher in the internment camp. Miss Fukasawa was one of 104 Nisei students enrolled at the University of Nebraska at Lincoln between 1942 and 1945. She died in July 1981 in Ojai, California; see U.S. Social Security Death Index (SSDI). See also http://www.japaneserelocation.org/index.php?page=directory&rec=40871 and http://unlhistory.unl.edu/exhibits/show/nisei.