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Cape Canaveral

Autobiography
of
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Introduction:

The hardest part of writing anything, is getting started. It has always been that way for me and I've been a fairly prolific writer. Once you get started it gets easier because presumably you have put in the time to have organized your thoughts as to why you are writing it, what is important (at least to you), and who might be interested in reading it. My principal reason for writing it is because I believe my life has been very interesting, (certainly to me), and reasonably productive. I was born before the "great depression", grew up during the depression, lived through World War II, and subsequent wars, (eg. the Korean War, the Viet Nam War, etc.). I have the good fortune to have been born into a family, who although not highly educated themselves, believed in education, and helped me to the extent they could. In addition, I have been fortunate in the timing of my entry into this world, which has allowed me to experience a wide variety of major changes in the world and the way people live and think, and to participate in a formative way in, from the very beginning, in the process of space exploration, which I will discuss later. Another reason for writing this is that I have a strong sense of history, especially since I am now engrossed in the geneology of my family, which I have found especially fascinating. Both my mothers' family and my fathers' family, came to this country before its establishment, and were true pioneers. Both families came from England, in my mothers' case as pilgrims to the Massachusetts Colony in the early 1600's and in my fathers' case to the Rhode Island and Connecticut Colonies in the early 1700's. Again I am fortunate in that family records are to an extent available (especially in the Young family), which I have been able to supplement through library research and personal interactions. My final reason for this activity is that I find that family members are interested in their own origins once they have been made aware that there is data out there.

In any case, that is what this is all about. I have chosen to start with myself, leading to as comprehensive a history of the family as I can produce in whatever time is left to me. I have the fond hope that one of the younger members of the family may choose to pursue this further in the future. My job as a geneologist is far from complete, since the age of the computer has made information infinitely more accessible. While it is a time consuming and sometimes difficult enterprise, it is nonetheless fascinating and rewarding once one gets into it.

Early Years: (1927-1939)

I was born on March 6, 1927, in Southampton, New York, on the southeastern coast of Long Island. My father worked for the Long Island Railroad, as did his father and two of his brothers. My father was a telegrapher, and therefore worked in the station - in Southampton, and we lived in Hampton Bays. Southampton is now and has been the home of the wealthy. We were not in that category!

I have no memory of this period. Photographs of our house show it to be a new small bungalow. There are also photographs of me in a large field of daisies. During this period of time (probably not much more than a year) my mother entered my photograph in a beauty contest in the Brooklyn Journal newspaper. There is a certificate indicating that I received honorable mention. My mother always said that I won first prize. My father had worked in other railroad stations on Long Island including Port Jefferson and Kings Park. His father Ray P. Young had been station master at the Stony Brook Station since 1912, when they moved to Long Island. He held that position until the mid-1950's when he retired. There will be more about my grandfather in the family geneological material, but suffice it to say that the Young family came to Long Island in 1912. They had for several generations lived in Rathbone, New York, a tiny town in south central New York State (still there, but virtually a ghost town), on the Canisteo river, a few miles from Addison, N.Y. and before moving to Long Island, they spent a year on a small farm in Mobile, Alabama. apparently something my grandfather had always wanted to do. They had migrated to New York from Connecticut-Rhode Island after the Revolution (in the early 1800's). It was here that my grandfather began a lifetime of association with railroads.

Kings Park and surroundings:

My earliest childhood memories begin in Kings Park, on the north shore of Long Island, not far from Long Island Sound. The town was made noteworthy by the presence of a large state mental institution (large enough to have its own railroad spur, so that family and friends of patients could visit easily from New York - 50 miles west). I had relatives, also from upstate New York, who had migrated there because of the job opportunities provided by the hospital. There was a large immigrant population, also attracted by jobs. The largest of these immigrant groups was probably from Ireland, where the disastrous potato famine had wreaked havoc. These people lived in town and were the people I grew up with. They were hard working, often hard drinking and very Catholic. The local Catholic Church was very influential in defining the social mores of the town. The Protestants and Jews were the town minorities, and endured the prejudices usually encountered by minorities. On the other hand, these minorities (particularly the protestants) provided the town with older established families, who became the merchants, bankers and other professionals of the town. It was this opportunity that brought my father and his brother from the railroad to the world of small business. In 1927 they established "Young Brothers", a shop selling

and repairing electrical appliances on Main Street. Of course, the depression began almost immediately, which did not help the two young entrepreneurs. On the other hand, the state hospital provided a degree of job stability, so that things were not quite as bad as they might have been. People could still buy, and pay most of their debts, which required both husband and wife to work, one on the night shift and the other on the day shift. Children were often left to their own devices with the expected consequences in terms of delinquency. Things were not easy in the depression years.

The other distinctive feature of the time was the fact that Long Island was primarily farm country - Potatos, other vegetables (carrots, peas, cabbage, beans, cauliflower, celery, turnips, etc.) , as well as fruits and berries (apples, pears, peaches, and strawberries, raspberries, blackberries, grapes, mullberries, cherries, etc.) The major crop was potato, Long Island then being the third largest producer in the United States, behind only Maine and Idaho. As a youngster, I worked on one of those farms, belonging to the family of a schoolmate of mine (Walter Nowick). We were picked up in town around dawn and taken by truck to whatever potato acreage was being dug on that day. We thought we were in heaven, being paid for picking potatos. On the other hand, it was long and hard work - dawn to dusk. We picked with the old women - large strong ladies who had spent a lifetime, first in Poland and then on Long Island, doing this kind of labor. They were wonderful people and very nice to us, although there was a language problem. The way it worked was we would move down the rows picking potatos into a large wicker basket, designed to hold one bushel. Then the basket had to be picked up and dumped into a bushel bag, which was left in the row to be counted and in the late afternoon loaded onto a flatbed truck for transport back to the sorting shed. This was fine except that for most of us, the baskets were too heavy, and the ladies had to help us - very embarassing. Later, loading the truck was equally embarassing. The 60 year and older women thought this very amusing, since most of them could pick up the sack of potatos and load it with two fingers. If we cheated, and put rocks in with the potatos Mr. Nowick made us stay late and pick out the rocks as they went by on the sorting machine. We learned. We were paid a penny a bushel for picking potatos, and were very happy to get it - at that rate we could make \$1.00 a day for a hundred bushels. That was great for a kid during the depression. The old ladies could pick 200 bushels and I think they were paid more than us. By the time of WWII we were paid two cents per bushel. During these years milk (unpasteurized) was still delivered to the house every morning by Mr. Pfeffer in his horse and buggy. In the winter, you had to bring it into the house early or the cream would separate, and push the paper cap off the bottle. Pasteurized and homogenized milk was not yet around.

A word about Walter Nowick, the farmers' son and my friend. He was a genius of sorts - with the distinction of graduating from High School on one day and the famous Julliard School of Music in New York City the next. He was a wonderful pianist. During World War II, he played for the troops in Japan. During that time he became a devoted Buddhist, and gave up the piano. The world is indeed a strange place. There was also at that time a rather large and profitable duck industry on eastern Long Island. In other words, up until World War II, Long Island was "country"

and a very pleasant place to live, certainly for a child. I loved it. It wasn't crowded, had a moderate climate, beautiful beaches, a very good education system, low crime rate, friendly people, etc. As anyone who lives there today knows, that is not the way it is now, although, as public education goes today, New York is pretty good.

School - Depression Years

My mother used to read to me and by the time I was five I discovered that I could recognize many of the words she was reading. This was a wonderful discovery - I could read! I quickly became an avid reader, and am to this day. I actually started school (Kindergarten) when I was five, and when they discovered that I could read they sent me to the first grade. That meant that I was now in the same class as my cousin and best buddy Larry, who was a year older than me. I thought I was "hot stuff". School was easy for me, although I wasn't a particularly outstanding student. The Principal (Mr. Mack) was an alcoholic and a bit sadistic. The classrooms had small windows in the doors, through which he would periodically peek as he wandered up and down the hall. If he felt he saw any misbehavior or inattention in the classroom, he would come in and take the culprits down to "The Office"). There he applied one or the other of two forms of punishment - the whipping of the open palms of the hands with a heavily applied yardstick, or the use of a two foot section of rubber hose on the rump. Either was cruel and unusual punishment, and was considered so by the school board when they learned of it and fired Mr. Mack. In general, teachers were well respected and well treated by the public. Corporal punishment was used, sparingly, but it was used. We got free milk delivered to the classroom every morning, and we brought our own lunch to school, until the school cafeteria was built. We went to school from labor day almost to the end of June. We got 2 weeks off at Christmas, and the major holidays. That was it - no spring break. Nobody had any money to do anything on a spring break and most of us worked at least part time in the summer. The only problem I recall was that my age was one or two years younger than my classmates, so that I was socially immature through high school and into college. My school was a "Central" school which meant that we had students from the surrounding farms and smaller communities, who were bussed in. Bussing didn't begin in the 60's with the Civil Rights Act. Even so, we were a small school, probably not more than 25 or 30 students per classroom. There were few school activities, but plenty of sports at the high school level. We had baseball and basketball teams (I played both) , and we had intramural track and wrestling competition. We were not big enough to have a football team. After school, we played sandlot baseball or football, and a multitude of childhood games - "Cowboys and Indians", "Kick the Can", "Horseshoes", etc. There were plenty of open spaces, empty lots and woods surrounding us, and we knew how to improvise for any shortages of equipment.

Families

I had relatives on both sides of the family, within 20 miles, my mothers' family lived mostly in Port Jefferson and environs, and my fathers' family in Stony Brook - both towns predating the Revolution. My mothers' family (see genealogy) had seven children, Hazel, Ernest, Myrtle (mother), Ethel, Albert, Donald, and Lorraine (who was, and is only a year or so older than me). We visited the Grandma and Grandpa Terrell in Port Jefferson. This included the whole family, usually on Sunday for dinner (the main meal in those days was around noon, with a light meal in the evening). Since Stony Brook is on the way to Port Jefferson, we sometimes stopped off to visit my Grandma and Grandpa Young, and My Aunt Frances and Uncle Gus (and Gus' daughter Lillian), or at the home of my grandfathers' sisters (Aunt Anna and Aunt Katie, both unmarried at the time, although Katie had been married in upstate New York (Rathbone) to a man named Miller, who disappeared. Katie had a son, my cousin Charles, who we saw on occasion. They owned and operated a "Cottage", named "Wopowog" actually an Inn, which took in guests in the summer. There were five children in my fathers' family - Laurence, Frances, Halsey, Theodore, and Stuart (my father). None of them lived at home, although Theodore and Frances lived nearby, (see genealogy).

In Kings Park, (population between 3,000 and 4,000) my father and his brother Halsey, opened an electrical appliance store in 1927 just before the depression. We lived within a block of each other and less than a mile from the village and the store. As I recall, my mother and I didn't move to Kings Park immediately, and when we did, we lived in rented quarters in private residences for a short time until we were able to build the house I grew up in on Dawson St. I lived in this house until I was 16 and left home for Gettysburg College. It was a small bungalow, with a kitchen, dining room, living room, two bedrooms and a bath. All the rooms were very small by today's standards. The house had a full basement used primarily for storage and a coal furnace with coal bin. The furnace was eventually converted to oil and the space occupied by the coal bin was turned over to me as a play/workshop area. Ten years later (1937) when my sister was born, a tiny bedroom was added to the rear. My sister got my bedroom and I was relegated to Siberia (at least that was the way I saw it). Actually it was a pleasant enough room with a window on two sides into the back and side yards and in the summer, smelling of lilac, (my favorite to this day), Hydrangea, and whatever else was blooming in the flower garden. There was a detached garage in the back yard, a pretty maple tree, forsythia, and across the rear fence line, our vegetable garden. We could grow just about anything on Long Island, but in the limited space we had, we focused on beans (green, waxed, and pole beans), corn, radishes, and carrots, and some years we would try things like brussel sprouts, (which I hated). We had rhubarb along the fence and in one corner a large and productive patch of wonderful raspberries. We also had an apple tree, usually infested with "tent caterpillars" which would denude the tree and ruin the crop if unchecked. The principal defense, (this was before the day of really effective pesticides), was to light a torch soaked in kerosene, and burn out the nests. Although this did little damage to the tree,

it also failed to eradicate the worms. It seemed to me that we always lost about 20% to worms and fungus and I remember spending endless valuable (for play)hours picking bugs off the beans.

The street we lived on had many children mostly my age so that, although I was an only child for the first ten years of my life, I had plenty of playmates including my cousin Larry (who was like a brother to me). We played throughout the neighborhood and beyond - almost no one had fenced yards. Our neighbor across the street (McDowell), had a yard we loved because it had a big sprawling apple tree - great for climbing, and playing Tarzan, swinging from limb to limb. I had the distinction of breaking both arms falling out of that tree - one one summer and the other the following summer. You would think I would learn but apparently not. My sister Janet was born in 1937 so we really didn't grow up together. All through the depression years, we all had very little in terms of money, possessions, and facilities, but we were wealthy in terms of friendships, solid families, and a willingness to help one another. I can remember being hungry on rare occasions but not in any serious way. We had very few toys by todays standards. Christmas presents were usually neckties,socks, handkerchiefs, underwear, etc. I wore neckties virtually everyday to school and elsewhere. While we had little, we didn't know we had little and were quite content. I think there was much less real poverty then than now in our affluent society. Our clothing was inexpensive and durable. Small children wore shorts but only for a few years. Once we started school we graduated to "knickers" but our goal was long pants which most of us didn't get until high school. Knickers were usually made of heavy corduroy which went "zip", "zip",when we walked. They went to below the knee, where they had either elastic or a buckle. Sneakers were worn a lot, but they were not like todays sneakers - they were ankle high and they were all the same - for sports or outside wear. Bathing suits were wool, one piece, and had shoulder straps. Girls wore dresses, or skirts and blouses. Boys all wanted the shoe-boots that went from foot to knee, laced all the way, and required endless waterproofing so they could be worn in the snow. We didn't have to wear galoshes, or even rubbers. Our coats were "Macintoshes", heavy and made of wool and usually plaid. Girls wouldn't be caught dead in any of this. Woolen pull on hats were the rule until high school when "fedoras" (felt hats with brims which looked like adult mens hats) were given to us for wear to church or more formal occasions. We hated fedoras.

People had their disagreements, some serious and some not, but they were usually resolved. I don't remember lawyers in town, although there must have been one or two. The town had one main commercial street. At one end was a bar and the firehouse, then the bank, a hotel (I'm not sure anyone ever stayed there) but it had a busy bar. There were two clothing stores (Goldbergs', and Patickys'), an insurance office (Flynn's), two drug stores (Klein's, where I worked as the soda jerk for a couple of summers, and Cermack's), a United Cigar Store (Okst's, where the son Sherman and I produced a local gossip column for the newspaper in the next town - Smithtown). There were two barber shops (Savatt, and O'lita), another bar - very popular, a delicatessin (Klepper), a grocery store-butcher store, (Bohack's); a garage with gas

pumps (Dowling's), an Electrical Appliance store (Young Bros.), a Diner (MacWilliams), a hardware store (Paticky) with gas pumps. There was also a movie theater (which might seat a hundred screaming kids for a Saturday afternoon matinee, to see the double feature, serial, cartoon, and coming attractions, all for a dime in the '30s'. Popcorn or candy was \$.05 and the candy bars were at least three times as large as today. The pet dogs, including mine, waited patiently outside on the sidewalk for the duration of the show. Larger towns, with larger theaters, in addition to the above would also have a full vaudeville (live stage performance), usually including music, a comedian, juggler, magician, singer, dancer, etc. They might charge as much as \$.25. Kings Park also had a Railroad Station, part of the North Shore branch of the Long Island Railroad, a Post Office, two funeral homes and I'm sure, a few shops which elude my memory. There were two churches - Roman Catholic (by far the largest), and Methodist Episcopal. There may have been a Synagogue, but not that I can remember as a separate building.

One of the more notorious features of Kings Park was the fact that it was written in "Believe it or not - Ripley" we were cited for having the greatest number of bars per capita of any town in the United States and the highest consumption of alcohol of any town in the United States. I believe it! There were several bars on the outskirts of town which would serve anyone tall enough to get his head over the top of the bar. Draft beer was \$.10 a 10 ounce glass and every 3rd or 4th glass on the house. All the bars served some kind of food - and very cheap. Whisky was also cheap (\$.25 an ounce). Drunkenness, at least among the younger people, was not a serious problem, although we had our share of older "town drunks" some of whom lived in cardboard boxes or wooden crates in vacant fields or woods.

We also lived within a few miles of Long Island Sound which in those days was clean and lovely. We had a town beach (Callahans), and a beautiful State Park, built by Robert Moses who built a number of State Parks throughout the state during the depression years. It was at this time that the great system of Parkways were also built. There were good beaches all over Long Island, and we used them, particularly Sunken Meadow State Park, the one nearest to us. It had a beautiful beach, dressing facilities, showers, and all kinds of recreational facilities. If we had to we could walk to it, although we usually got a ride with someone from town or rode our bicycles. The beach had parking for hundreds of cars, mostly people out from New York City. It had an extensive system of boardwalks and a large concession stand which served food, ice cream, soda, candy, etc. As young kids we would crawl under the boardwalk and search for coins people had dropped through the cracks. We usually found enough to buy food and drink. Later, in our high school years, many of us worked at the concession stand (it was air conditioned), or as Life Guards on the beach. The beaches were covered with wild Beach Plum, which ripened in the late summer-fall. We used to pick them for making jam, just as we had picked wild blueberries in the spring.

We usually had a vacation in the summer which consisted of renting a cottage at West Meadow beach, a lovely stretch of beach near Stony Brook harbour where local people had built cottages (shacks), which they rented for all or part of the

summer. These places had been there for many years and were crude to say the least. Most had no electricity, or water - just a shack with 3 or 4 tiny rooms and a kitchen. Cooking was done on a kerosene stove but that wasn't unusual since many homes were still cooking on kerosene stoves, including us. I remember the traditional remedy for what was called "croup" (probably any respiratory infection with chest congestion), was a teaspoon of kerosene with sugar in it. I don't know how any of us survived. The kerosene came right out of the stove, tasted horrible, and was terribly toxic. It certainly would not be used today. We also had mustard plasters (a cloth saturated with a hot mustard paste placed on the chest to treat chest congestion (bronchitis). This was murderous stuff, and if left on too long, would burn the skin.

We kids thought this was a wonderful vacation spot. I doubt that my father did, since he and my uncle didn't take vacations. They worked in the store for 6 or even seven days a week, 12 to 14 hour days. That's how you made a living in those days. My father would take weekends off 3 or 4 times a year, at which time we would pile into the car and go "upstate" or to New England for a couple of days and every few years we would drive upstate to Addison and Rathbone. On one such occasion I remember Grandpa Young and Aunt Katie and Aunt Anna going with us. I remember visiting Aunt Mate in Addison where she and Uncle Frank (Crawford) lived. They had some cows and made their own butter and buttermilk. My father loved buttermilk which I thought was poisonous. The butter was always rancid (no refrigeration). On such trips we stayed in "tourist homes" where people rented whatever spare rooms they had to people traveling through on a short term basis. This was long before motels and we always enjoyed it. They were always clean, quiet and comfortable as well as affordable. While we were at the beach my father would usually spend one weekend with us. In addition, he would come over most evenings, eat with us and spend the night, since we weren't more than 12-14 miles from the store. Often, if the cottages had enough room, we would share it with one of my mother's sisters (Ethel) and her family. The kids slept on cots wherever there was room, including the porch. The windows all had heavy wooden shutters held open with wooden poles. If it rained at night everyone had to get up and let the shutters down - then it became stifling. We had ice boxes and the iceman came daily. We were very careful with water since we had to walk about a mile to the only fresh water in the entire area - a spring down the road - and carry it back to the cottage - hard work for us kids. This was our only drinking water. There was an outside brackish water shower, and that water, could also be used for dish washing. Baths for most people then were a Saturday night exercise. We spent most of the time in our itchy woolen bathing suits, covered with sand and salt - who cared! The water of Long Island Sound was clear and clean. At low tide, we could walk out 100 yards or more on the sand flats and dig as many clams as we wanted for the day. Most were used for chowder (which I hated). There were also many crabs which we considered a nuisance since we didn't eat many of them. The fishing was good. We spent hours in the water and on the beach and loved every minute of it.

Young Brothers, during this time was doing O.K., considering these were depression years. Although there was never any pressure, I'm sure that my father and

uncle had always hoped and perhaps assumed that one or more of the sons (Russell, Larry, or I would eventually take over the business. The oldest son, (brother of Russ and Larry), Donald, had been born a "blue baby" and was severely retarded. He lived with his mother for his entire life - a very tough proposition for her. His mother, my Aunt Edna was one of the nicest people I have known. I took piano lessons from her and after about 3 years I could play "Old Black Joe" and "Juanita". We decided that I was talent free as an instrumentalist, so I stopped. I could sing however, and was in great demand in school for school plays, speaking contests, etc. I had a more or less photographic memory which came in handy in the classroom as well as preparing for exams. New York State had, and I think still has, a system whereby every student in the state takes the same exam in every academic subject, every year in the spring - according to grade. Except for Math I usually did well on these Exams, sometimes scoring the highest in the State in subjects like spelling and geography, (where memorization can help a lot). Today, I have trouble remembering my name, so it didn't last forever. I could learn my lines for a school play in a couple of hours and I could memorize a short story for a speaking contest after a couple of readings.

To come back to Young Brothers, my cousins and I, having seen the problems of the business world and the verbal abuse our parents had to endure from an unthinking public, decided very early that we wanted nothing to do with the business world as we knew it. I was surprised when years later Larry, with my mother's brother Donald, decided to take over the business when my Uncle Halsey died (heart attack) and my father retired. My mother's oldest brother, Ernest, who had earlier delivered ice in the area, including the Gary estate in Westbury, had met Martha, the upstairs maid, and they married and were living with his parents, Grandma and Grandpa Terrell in Port Jefferson. Ernest, as a young man had once gotten on a freighter in New York, I believe as a stoker (coal shoveler and furnace tender). He used to tell me about his travels to Europe and the Mediterranean. He was an adventurous soul. When refrigerators became more common (during the 30's) he was essentially out of the ice business. He and Aunt Martha (who was Swedish) moved to Kings Park, where I believe Lynn was born. Ernie worked for Young Brothers for many years and in summers I often worked with him, doing whatever jobs the store needed done. We dug huge holes for 500 gallon oil tanks, which in those days were buried underground. We did old coal furnace conversions and turned them into oil burning furnaces by lining them with fire brick. We then pounded, by hand, holes through solid concrete cellar walls and a trench across the cellar floor to the oil burner, also by hand, with a star drill and sledge, so that we could run a line from the oil tank to the oil burner inside. We installed everything, television (which then required huge antenna), since the only transmission stations were in New York, New Jersey, or Hartford, Conn. We had television, of poor quality and on tiny screens, as early as 1939, years ahead of most of the country. We installed refrigerators, stoves, anything. Everything was carried by hand. Sometimes we carried refrigerators up three or four flights of stairs (no elevators). Ernest or my father would carry it on their back, holding it in place with a strap around the forehead, and start up the stairs. I would follow, lifting from underneath to take as much weight off of them as possible. Ernest was small and wiry

and very strong and well coordinated. He could easily work rings around me but I got better as I got older and stronger. He taught me to bowl although I'm afraid I didn't enjoy it as much as he did, but would go occasionally. He also took me golfing once in a while - he was quite good although he only had 3 or 4 clubs. He drove a 1927 Plymouth coupe with a rumble seat which we kids loved and he seldom drove it more than 30mph. It lasted for many years. At work, the store had a pick up truck which we used. You had to watch out for Ernie though because he had the habit of stopping along the road (he always had his axe with him), to cut down and chop up for firewood any tree he thought needed it - even if it was still alive or in somebodys' yard. No tree was safe. Ernie sounded like a bigot. He was critical of all ethnic groups - some more than others. At the same time, some of his good friends were from ethnic minorities and he would do anything for them. He was a strange and wonderful person to me. Ernie had the distinction of being in the army during WWI, stationed at Camp Upton on Long Island. I'm sure he enlisted. He was also drafted and sent to Camp Upton at the beginning of WWII - a ridiculous mistake since he was in his 40's with a wife and child. He was soon released from the military. During the depression he was in the CCC (Civilian Conservation Corps), which was one of the many work projects started by the Roosevelt administration to help with the unemployment problem. I'm sure that's where he learned to love cutting down trees. Another of my mothers' brothers, Albert (Ocky), also worked for Young Brothers and lived with us for a short time. I liked all my mothers' brothers but I got to know Ernie best of all.

I was a Boy Scout, although, not a very dedicated one. I went because my friends went. One summer our troop leader (Dr. Campbell from the State Hospital), arranged for us to go to Camp Baiting Hollow - the only time I ever remember going to camp. It must have been very inexpensive or even free, because there were a number of us who got to go from Kings Park. It was a beautiful place, out in the woods on the north shore of eastern Long Island. We lived in small log cabins or tents. There were all kinds of activities, swimming (in a lake), canoeing, arts and crafts, campfires, etc. We had a wonderful time, never to be forgotten.

Money:

Money was a scarce item for everyone in those days, especially for us kids. At some point in time my father started to give me an allowance of fifteen cents a week. Even then, \$.15 didn't go very far. Clothes and shoes had to last a long time and undergo much repair. Socks were routinely darned, over and over - everything was repeatedly mended. We didn't care, it was cash in the pocket we wanted. There were a number of things we did to take care of this problem. I have already mentioned picking potatoes for a penny a bushel. That, however was very seasonal. I also worked as a soda jerk, when such work was available. In addition, I mowed lawns (with a hand pushed reel mower), for anybody who wanted me. Generally I was paid fifty to seventy five cents, depending on the size of the lawn, and the generosity of the customer. I shoveled snow in the winter, but the competition was great - everybody had a shovel. This was worth twenty five to fifty cents depending on the depth of the

snow and the length of the driveway. Larry and I used to circulate handbills door to door for Young Brothers every now and then. They didn't pay much either. Larry and I used to take my wagon and scour the neighborhood and the town dump for deposit bottles - small bottles worth one or two cents, and some quart bottles as much as five cents - not bad. I had a regular newspaper route, delivering the Brooklyn Eagle. I also had a magazine route - delivering such magazines as Liberty, Ladies Home Journal, Colliers, Saturday Evening Post, and others. The hard part was collecting the money. People knew when I was coming to collect, and as far as I could tell, they disappeared from the face of the Earth at about that time. This, however, was year around money, and I stayed with it for years. These kinds of jobs got us an occasional ice cream cone, coke, or root beer, movie, candy, etc.

High School, World War II, College (1940-1949)

Each grade in the first eight (seven for me) was held in the same room with the same teacher with a few exceptions (music, art, shop, home economics and gym) where we had different teachers and we went to the teachers home room. In High School it was different. We had a homeroom where the day started and ended but went to the teachers room for classes. There was a large room called "Study Hall" where we were expected to go for study and homework if we did not have a scheduled class. School was highly organized, structured and disciplined - totally unlike today. Of course students did not have cars and many did not even have bicycles. I was able to walk to school, weather permitting - if not, my father gave me a ride. Some had to walk several miles to and from school, and thought nothing of it. There were no buses for "local" students. In general, there were two curricula depending on whether or not you planned to go to college. The college entrance curriculum was designed to be preparatory for college and provided the extra courses required by most colleges. The academic curriculum was intended to prepare one for the work world. In those days, very few parents had ever gone to college (in fact, many had not finished high school - including my parents). People had to work at an early age. Education was still considered a luxury, especially for women. My parents had decided early on that they would find a way to send me to college. I was young enough that I really didn't care - I wasn't interested in anything in particular and didn't know anyone who had ever gone to college. I was only 12 years old when I started High School, and very unfocused. I was just 16 in 1943 when I graduated and had not thought much about where I was going and further education. The war had begun and we were in it in two oceans. For my generation that was very exciting and even glamorous. A number of my older classmates were already in the military or were about to go in. Most of us assumed that is where we would all be if the war lasted long enough. We were pretty naive about the war, what it meant, and how long it might last. Since I was only sixteen after graduation I couldn't even enlist. I could, however, begin to think about what I might do in the military. I became aware of the college ROTC Program, and figured that if I had to go to college, I would go to one with an active ROTC Program, and began to look into college catalogs with that in mind. At that time,(1942), there weren't that

many. There was also the question of cost. My parents had saved enough for my first year, but after that things got pretty vague. I also had big ideas about where I might go. I learned that the Military Academies were free. What an incentive that was. All you had to do was take a test for an appointment by your local congressman - easy. At the age of fifteen I took the test in a huge school in New York City - that is, me and about 1,000 others. It took about 5 hours, and was the most difficult and comprehensive I had ever seen, by far. This was going on all over the country. Months later they actually sent the graded test back, much to my embarrassment and humiliation. Actually, in retrospect, that was one of the best things that could have happened to me at the time. I certainly needed the humility. Things had gone pretty easily for me up to then and in addition I think I would have had a horrible time at West Point. Discipline was not my strong point.

Gettysburg College

The following Winter/Spring (1943) I was accepted at Gettysburg College, Gettysburg, Pa., for the Fall Freshmen Class and they had an ROTC Program. I still was not particularly motivated but I was at least curious about this college stuff. I was to be the first male on either side of the family to go to college. My fathers' sister Frances had gone to Elmira College in Elmira in the early 1900s' to become a teacher, and her daughter Lillian had gone to Skidmore in the late 30s' or early 40s'. I find it interesting to note that in my fathers family of four boys and one girl, the girl was the only one to go to college. That must have been extremely unusual in that day. Although I was the first, my two cousins, (Halseys boys), Russell and Larry went to college after the war. In the early 50s' my sister went to college, but did not stay.

For me, at that time, Gettysburg was perfect. It was one of a number of small Liberal Arts Colleges in and around Pennsylvania. It opened a whole new world to me, one which I appreciate to this day. The student body was a little peculiar, in that it was rather heavily weighted on the male side with Pre-Ministerial students. This was because of close proximity the Gettysburg Lutheran Theological Seminary and because pre-ministerial students were draft exempt. The College was also close to the Lutheran Church which had founded it in the middle eighteen hundreds. The ties were still close and all students had to go to Chapel every morning (attendance was taken, and too many cuts produced hours added to graduation), so we attended. My Freshmen year was one of pure enlightenment. The school was then and still is academically excellent, with first rate faculty and very good facilities for a college of under 2000 students. Since males were relatively scarce it was difficult for the fraternity houses to stay open, so that they were largely taken over by the sororities (most of them did not have houses of their own) - a good deal for both - and it stayed that way until 1946, after the war, when we came back and dispossessed them. I lived in a rooming house on Water St., owned by a widow, Mrs. Dixon. She was a very pleasant lady who rented out the rooms (small bedrooms) on the second floor of the house to Freshmen. I believe there were three rooms and a bath up there, so there were six of us. I roomed with Paul H. McFarland, Jr., from Hagerstown, Md. not too far

from Gettysburg. We soon became fast friends and have remained so to this day - 53 years later, keeping in touch over the years. The house was half a block from the campus and the chapel, which was great for us. I have no record of the rent, but I'm sure it was very reasonable. Also, we were only 3 or 4 blocks from the center of town. Gettysburg was a pleasant town then and I don't think it has changed that much. There were two movie theaters, one showing only showing "B" horse operas (Westerns) and the other first line movies. The local hangout was Fabers' Drug Store, for sodas, ice cream, etc. Outside of town on the Lincoln Highway was Lincoln Logs, a bar and college watering spot for many years - maybe even today. The Gettysburg Battlefield was a major resource for us - especially since it was free. Many square miles of well kept land surrounding the town. We all became expert on at least that aspect of the Civil War, either through hiking, picnicing, or beer parties.

It turned out my college courses were not difficult for me and while I was not a standout academically, I did reasonably well. College life agreed with me so I was quite satisfied with the whole arrangement. In the Fall of 1943 Paul and I were invited by the Sigma Chi Fraternity to join. This was very enticing to me but I didn't have any money. I managed to convince my parents that this was a good deal economically since once I moved into the fraternity house I could live more cheaply than I could at Mrs. Dixon's, eating out. I think that was close to being true. Paul and I had similar backgrounds in terms of family and home life. He didn't have any money either so we scrounged together and both pledged Sigma Chi. We were duly initiated, but we couldn't move into the Sigma Chi house since it was occupied by the Chi Omega Sorority. As part of the initiation ceremony, I was instructed to go to an address nearby, knock on the door and ask whoever came to the door for a brassiere. In those days I was quite shy, especially with people I didn't know. I found the house and there were clearly people home, however, I just couldn't make myself go to the front door and ask for a brassiere from perfect strangers. I didn't know that everything had been prearranged by the fraternity brothers - the people in the house knew I was coming, knew I was shy, and planned to give me a hard time for a few minutes, then give me the brassiere. I not only didn't go to the door, I lied about it when I got back and said there was nobody home. Of course, they knew I was lying, etc., etc. I was elected to the fraternity anyway but I always felt badly about the lying.

The war, of course, was still very much under way and most of us wanted to get involved. I was still 16 and too young to enlist. Then I heard about the Navy V-12 program! By 1943 the military had enlarged enormously, and was experiencing a shortage of officers. I had been in ROTC since entering Gettysburg and liked it. V-12 was a program whereby, if you did well on an entrance exam they would send you to college at government expense. Upon graduation, you would be sent to Midshipman School at another University to learn something about the military and then given a commission. Of special interest to me was a particular part of the program aimed at filling a shortage of doctors in the military. By that time I had developed an interest in Biology and was thinking about majoring in Biology and going on to Medical School. Here was a way to do it free. Wow!. In the spring of 1944 just after my 17th birthday a couple of friends and I hitch-hiked to Harrisburg, the nearest place to take the exam.

We took the exam and hitch-hiked back. We got a ride for the first few miles, but then our benefactor turned off the highway to Gettysburg, and dropped us off. It immediately began to rain, and we were stuck out in the middle of nowhere, with no money (our perpetual condition). To make a long story short, since we were soaking wet, no one was about to pick us up, so we plodded and splashed all the way to Gettysburg in a cold rain - I estimate about 15 miles. It was awful. However, I did well enough on the test to be accepted into the V-12 program, starting in the summer of 1944, at Union College, in Schenectady, N.Y. I was ecstatic. My parents were luke warm, since it meant that I would be in the military - during war time. I finished my freshman year at Gettysburg, went home, and soon thereafter was delivered by my parents to Grand Central Station in New York City for the trip to Schenectady. I found the campus and reported in as directed - a whole new phase of my life.

U. S. Navy - WWII

Union was on old campus, in what was then a residential section of the city. I was assigned to a dormitory on the northern edge of the campus, across from what had been a railroad locomotive works, now being used to produce tanks for the army. We were registered and were allowed to declare majors and sign up for courses. There were civilian students there but I don't think there were many, and although we shared classes, we saw little of them. Our day was highly regimented - up before dawn, bathing trunks on and out in the field doing rigorous calisthenics for 45 minutes or so. This was O. K. in the summer, but in winter, dressed only in bathing suits in the snow, it was murder.

During the winter of 1944-45, the pre-meds were called in and told that the Navy had caught up on the shortage of doctors, but if we wanted, they would switch us to Line Officer candidates where we could finish the program. All we had to do was sign up for three years duty after the war. Most of us felt this was grossly unfair and wanted out. For reasons I have never understood, the Navy was reluctant to let us drop out of the program, even threatening to courtmartial those who deliberately tried to flunk out. Since they wouldn't let us leave voluntarily, most of us started cutting classes and getting poor grades. Eventually (spring of 1945) they let us choose a service training program and transfer out to "Boot Camp", in my case the Naval Training Center, at Great Lakes, ILL. Thus, on my 18th birthday I was on a packed train headed to Great Lakes, my dreams of a commission, gone. I had applied for and been accepted into Hospital Corps School, the nearest thing I could find to Biology and Medicine. As I recall, I was there for about three months while the Navy tried to teach us something about being a sailor. It was interesting but incredibly out of date. We were issued clothing and shoes, pretty standard stuff. We were also issued Sea Bags, into which everything had to fit - all clothes, sheets, pillow cases, shoes, toilet articles, etc. They taught us how to do it (primarily by rolling everything into as compact a roll as possible). Incredibly, if you did it just right it worked. The sea bag itself was made out of heavy canvas which had to be scrubbed and scrubbed in order to make the canvas pliable enough to use. The crowning blow, however, was the

hammock (clearly a holdover from the days of the sailing ships - the last time they were probably used). The hammock was made of even heavier canvas than the sea bag. It was supposed to be folded (if you could ever get it soft enough), and then wrapped in a specific way, with its ropes, around the sea bag. This was clearly designed so that all sailors, would fit on board ship, and could carry everything they owned on their shoulder. Eventually everybody sent the hammock home where they got years of good use after the war. We certainly never used them in the Navy. The sea bag turned out to be very useful, once you mastered the art of packing them. In boot camp we slept in triple decker bunks - I had never seen one before. A routine was established of marching, target practice (the only time I ever saw a rifle or marched while in the Navy), airplane and ship silhouette identification, knot tying, and many other archaic practices - and this was in early 1945. It was interesting to see the variety of young men being brought into the service at that time. Some had no difficulty making the transition from civilian to military but a few had a terrible time. I remember a very pleasant young man (around my age), who had the bunk next to mine, sitting with all his white uniforms (we had been issued both blues and whites), and his skivvies (navy for underwear) spread out on his bunk. He had a pair of scissors and was in the process of cutting everything into approximately 8 inch squares. I thought this a little unusual and asked him what he was doing. He said only that he needed more handkerchiefs. He was soon picked up by the medics and we never saw him again. Occasionally we would hear of a youngster hanging himself over a rafter in the barracks. Later when I was a Hospital Corpsman myself, working in Naval Hospitals, I saw equally distressing things - usually among youngsters unable to cope with the abrupt and stressful changes in their lives. It's too bad there wasn't some way to evaluate these people, or at least prepare them for what was coming. During war, I suppose this was impossible and as far as I know the numbers were low.

After the prescribed number of weeks of training, we were given leave to go home before being shipped out to our training school of choice. After being home for a few days I got sick with an inner ear infection (Otitis Media), following measles, not easily treated before antibiotics. I had to notify the Navy of my problem since I was not going to be back to Great Lakes on time, and certainly did not want to be considered AWOL. I was promptly ordered to St. Albans Naval Hospital, on Long Island (the facility nearest to my home). The next afternoon, a Navy ambulance appeared at my house to haul me off to the hospital - hardly necessary, I felt. There were two corpsmen in it and they took me out on a stretcher, entertaining the entire neighborhood in the process. On the way to the hospital, they decided they needed a beer and asked me if I minded if they stopped at a bar for a beer and if I would like for them to bring me one. I wasn't feeling all that bad, so I told them to go ahead but that I didn't want one. They stopped, went in, and I stayed on the stretcher in the ambulance. They stayed for about a half hour and we were on our way. The next day the doctor examined me and decided that the infection was being caused by a sinus infection brought on by the measles. He felt he had to drain my frontal sinuses, and puncture and drain behind my right eardrum. Draining the sinuses was an interesting procedure which consisted of the doctor taking a large spike and pushing it up both my

nostrils, then pushing and banging on it until it punctured the bone and the sinuses could drain. All they gave me was some codeine, so it smarted a bit. The next step was to puncture the ear drum, which he did, so it could drain. Then I was miserable for a couple of weeks, deaf in one ear, while things healed, which they did, including my ear drum so I could hear again. The nice older man in the bed next to mine, borrowed \$10.00. He was released that night and I never saw him again. Was this part of my training?

My stay at St. Albans and subsequent delay in getting back to Great Lakes meant that I had missed my draft to San Diego for Corps School. This probably saved my life, since most of my classmates who had opted for Hospital Corps School and subsequent duty with the fleet marines (the Marine Corps had no medics and used Navy medics, with special Marine training), had ended up in the Pacific island invasions where the casualty rates were very high. Many, perhaps most of my friends never came back. I have said many times that the measles saved my life. It is of interest, at least to me that measles was the only one of the childhood diseases that I ever had, although I had it 3 or 4 times as a young man.

By May or June I was on a troop train to Bainbridge, MD and Hospital Corps School - my first choice for service school. That was an experience! A troop train at that time could be almost anything. The nation was hard pressed to move the millions now in the services around the country. This troop train was enormous, at least when we started. It was composed mostly of cattle cars (literally open slat sided cars with a single pot bellied stove in the center), packed almost solid with sailors. Normally, everything in the Navy was done alphabetically, A-Z. This was no exception - I watched my friends being loaded into these unbelievable cattle cars. However, they ran out of cattle cars before we were all loaded and I ended up in a lovely drawing room with a roommate, two bunks and a toilet. One of the nicest train rides I've ever had. I remember before dawn the next morning, we stopped briefly in Cumberland, Md. I looked out the window and it seemed like half the town must have been out there passing out coffee and doughnuts to as many of us as they could. I thought that was wonderful at the time and still do. Other than that, I do not remember being fed on that train (about 24hours). Eventually we reached Perryville, MD the nearest train stop to Bainbridge (which was on the Susquehanna River). I was assigned to a barracks, and settled in, since classes in Corps School began in a couple of days. Bainbridge also had a large Naval Hospital, and although I didn't think I wanted to stay there to work (I still wanted the Fleet Marines), it was a distinct possibility. The nearest city was Baltimore, and then Washington - the base was pretty isolated. We could hitch-hike to Baltimore and back just about any time of day or night - people were pretty good about picking up uniformed G.I.'s. East Baltimore St. was great fun for us since in those days it was lined with bars and strip shows, long since gone. Once I finished Corps School, (about 6 weeks), I was assigned to the Naval Hospital there. Things were beginning to wind down in the Pacific, and the Marines didn't need any more medics. What did happen, however, was that the stateside military hospitals were being inundated with casualties from the Pacific - thousands of them. These were the severely wounded with

long term hospitalization needs. This was a real eye opener for most of us who had never seen serious combat casualties before. It certainly brought the war home but it made us feel useful. I also spent quite a bit of time working on an "Upper Respiratory" ward. This was mostly asthma, bronchitis, pneumonia and occasionally T.B., although we didn't keep them long. We seemed to have a lot of pneumonia, which was difficult to treat. Before penicillin, which we had by late 1944, our most potent drugs for most infections were the sulfa drugs; sulfanilamide, sulfadiazine, sulfathiazole, etc. These were effective but toxic and had a tendency to crystallize in the kidneys so that sometimes the treatment was worse than the disease. When penicillin became available we really didn't know what it was good for. Early penicillin came in vials in crystalline form and had to be injected with alcohol and water to get it into solution. It came without instructions as to use. I recall that we were told to try it against athlete's foot. We would dump vial after vial of the precious stuff into basins and have people soak their feet in it. What a waste! Eventually, of course, the quality, quantity and solubility of the penicillin improved. Originally it had to be injected every three hours, day and night, but that improved. The important thing was that it was a major life saver. Unfortunately, we have abused it over the years by overusing it, and by people not taking prescribed doses, so that many disease producing organisms are now resistant to penicillin and many other newer antibiotics. In WWII, however, it was the greatest thing that had happened in medicine, and thousands of lives were saved.

During this time, I had a friend (Jack Parlin), also a corpsman. One day he showed me a small black mole on his buttock, which he said had begun to hurt. I told him to go to sick bay and show it to the doctor, which he did. As I suspected, it turned out to be a melanoma, which by that time had invaded the entire buttock, which would have had to be removed entirely. That was an operation the Navy was not prepared to do, at least at Bainbridge, and he was either sent to another hospital, or home - I never knew which. I never heard from Jack again and believe he died from the melanoma, an exceptionally lethal tumor. We had another young fellow (marine), who had recently recovered from rheumatic fever, during which he had lost all his hair. Of course he was kidded about being hairless, and he was convinced it was forever, (which it wasn't). Soon after being sent back to his barracks he hung himself from a rafter. Emotional stress does strange things to us all. I recall a youngster on my respiratory ward, who had come into Bainbridge as a recruit just out of high school. He had been drafted and had no desire whatsoever to be there. He wanted out of the Navy, and he spent most of his time trying to get out. During war time that was just not going to happen. Then he learned that a punctured ear drum was cause for discharge and that was all he needed to know. One day, when I was on penicillin rounds, I happened to look down to the nurses station in the center of the ward. I saw him standing there with a pair of forceps in his hand, which as I yelled, he inserted into his ear and quickly reamed out his ear drum. He got out, but what a price. These kinds of things happened all the time. We frequently heard stories about soldiers, shooting themselves in the foot or whatever, in order to get sent to the hospital, or discharged. I believe these stories were mostly true.

A Naval Hospital ward was a busy place - each ward specializing in a particular

disease, or set of related diseases - respiratory, V.D., surgical, wounds, skin, contagious, etc. The wards were all basically all the same - two or three semi-private rooms and linen room at one end, then a long narrow open ward lined on both sides with beds and an aisle down the center. If things got very busy we could squeeze a row of beds down the aisle in the middle but then things got very crowded. In the center of the open ward was the nurses station, instrument cleaning area (everything was used over and over including syringes and needles). There was a sterilizer there to resterilize everything before use. It would never be acceptable practice today, but our record of contamination was very low, and disposal of waste was handled very much more simply than today. Most wards had a nurse in charge, who were highly dedicated and mostly competent women. Some were easy to work with and some were not. In addition to the nurse there were 3 or 4 corpsmen depending on the workload. A respiratory ward was especially busy because just about everyone was on penicillin, which required injection every 3 or later 4 hours. Since we usually had 60 or 70 patients on a ward this became a major chore in addition to our other duties. We had devised a system for giving so many shots. Patients had to roll over on their stomachs and pull down their pajama bottoms. Two corpsmen would then proceed down the row, the first swabbing the injection site with alcohol and inserting the needle (which we had to continually sharpen), the second would insert the syringe into the needle, administer the required dose and remove the needle. This cut our time down considerably. Generally speaking things went pretty smoothly on the wards. There were three 8 hour shifts. The doctors made their rounds with the nurse and one of us every day. I had been promoted to Pharmacists Mate 3rd Class by then, which was the equivalent of sergeant in the army.

While on the respiratory ward I came down with pneumonia myself and became a patient on my own ward - very embarrassing. I was pretty sick and was very grateful for penicillin and made a fairly quick recovery. My uncle Donald, who was in the Air Force in Texas, stopped by to visit me on his way home on leave. I was on my feet by that time so we were able to walk around, and visit. I was glad he had come.

It began to look as though the war would end before too much longer and as soon as it did (1946), the Navy geared up as quickly as possible to get people discharged and sent home. This was done on the basis of points, which were calculated on the basis of time in the service. I was relieved of ward duty and since I could type I was put to work with many others, typing up discharge papers. Since I had only been in the service for a little over 2 years it took a while to get to me on the discharge list. In July 1946 I was sent to St. Albans Naval Hospital on Long Island where I had been a patient a year or so earlier. After a couple of weeks my paperwork was completed and I was discharged and went home to Kings Park. My plan was to go back to Gettysburg in the fall and complete my degree. I relaxed and worked at the store that summer.

As mentioned earlier, life changed dramatically after the war. Some changes had a direct effect on Young Brothers. During the war virtually everything was geared in one way or another to support the war effort. As a result, although people had money to spend, there was virtually nothing available for sale in the public sector.

Most industries had been converted to war production. Food and gasoline were tightly rationed and generally in tight supply. This meant that they had little merchandise but they certainly didn't want to close the store. There was still a demand for repair work, which they felt they owed their customers, and of course they planned to open as usual as soon as the war ended and the economy normalized. My Uncle Halsey had been in the army briefly toward the end of WWI but was now too old for the military, as was my father. They both had to do something during the war years to keep the families solvent. For my father this was not difficult. Long Island was heavily involved in the aircraft industry (both Republic and Grumman were there). My father was an experienced electrician and was quickly employed at Republic Aviation wiring Thunderbirds for Republic for the duration of the war. Halsey did not have that kind of background and he chose to run for public office. He ran for Town Clerk of Smithtown and was elected. Both of them, in addition, managed to keep the store open, at least in the evenings and often on weekends, doing repairs and selling whatever merchandise they could obtain. After the war, when most industries converted back to civilian production and the aircraft and other industries began to cut back on their production lines, things began to "normalize". However, within a year or two another change took place which had much more negative consequences on the small businessman - the advent of the discount house. People were hungry for all the things they couldn't get during the war. The huge discount stores had it all - electrical appliances, clothing, food, pharmaceuticals, and cheap prices since they sold in enormous volume as compared to the small retailer. People leaped at the opportunity, particularly the cheap prices - they forgot about delivery and installation costs included at Young Brothers, but not included at the discount houses. They forgot about service and the willingness to come out 7 days a week if necessary at Young Brothers but not the discount stores. In any case, it quickly put many small retailers out of business and damaged the businesses of many others. This is still going on today, where huge stores (like Wal-Mart) are destroying small town family businesses by discounting in their huge stores just outside of town. That of course, is the name of the game in the free enterprise system. The public is interested in getting the cheapest price and will ignore the hidden costs. Young Brothers was not immune to this price cutting and over the next few years business began to fall off. They had to learn how to compete under these conditions but over the long haul, they couldn't. Larry and Donald tried later but also failed. Young Brothers was defunct before too much longer.

Gettysburg - Post War

In September I went back to Gettysburg along with hundreds of newly discharged G. I.s'. The campus changed dramatically with the sudden influx of G.I.s. All over the country colleges were being flooded with new students who were both older and "wiser" than the usual freshman and the colleges were not prepared. The biggest problem was probably housing - it just wasn't there. The newcomers were mostly highly motivated and their lifeline was the G. I. Bill, passed by congress, as a way to repay veterans and broaden the base of educated people in the country.

Without the G.I. Bill thousands of young Americans (probably including me) would not have received a college education. It was a wonderful program, and I believe, worth every penny of the considerable cost. Tuition was paid and there was an allowance for books and supplies plus \$75.00 a month for living expenses, as I recall. We got the fraternity house back and most of us could survive on the G.I. Bill, with a part time job on the side. Paul and I got a job making cardboard egg crates at the Adams County Egg Co-op in Gettysburg. It got us through.

The Gettysburg campus population doubled after the war. In some areas whole new campuses were built, some of which became permanent. Virtually all campuses had to at least put up temporary living facilities but there was plenty of surplus military equipment, such as easily installed Quonset Huts. Intended for a few years use, some were still being used after 20 or 30 years.

We were all in a hurry to graduate and get to work on a career. Many were 4 or 5 years behind where they might have been had there been no war. It put me approximately where I should be in terms of age. Since the duration of the G.I. Bill was determined by how long you had been in the service, one could calculate how long you might be able to stay in school. I was still interested in going to Medical School, which cost far more than the G.I. Bill would cover. I had no idea how I might pay for that. On the other hand I had begun to think about the possibility of graduate school as an option and working on a PhD with the idea of university teaching and research. It was in the 40s' and 50s' that the Federal Government began to put serious money into the nations' research establishment, particularly in the Bio-Medical and Physical Sciences. I calculated that the G.I. Bill would carry me into graduate school for about a year or so - not bad. I had decided to major in Biology with a minor in Chemistry. I also minored in German and Spanish. By taking full loads in the summers, Paul and I both finished our undergraduate programs in 3 years instead of the traditional 4, which saved us both some money.

1946 to 1948 at Gettysburg were great fun - meeting new people and making new friends (many of whom are friends to this day). I feel that the education I received was as good or better than any I might have gotten at a larger university. We dated, although there were limitations since this was still the day when men paid dating expenses for both. Most girls would help out, however, particularly if you were going "steady", which we were for the most part. Again I was not an outstanding student - I suppose I was having too much fun to be a really serious student. In retrospect, it seems to have been a normal undergraduate experience for the time. I was not being successful in getting into Medical School for two reasons 1- there was a huge backlog of applicants among the returning G.I.s, and 2- I really didn't have the grades necessary to compete. I went to discuss my problem with my major professor, Dr. Bowen. He was not terribly sympathetic - I'm sure he felt it was mostly my own fault. We began to discuss alternative options, and I said that I suppose if I couldn't get into medical school, I'd settle for graduate school and a PhD. As soon as I'd said it I realized what a stupid remark it was, especially to my major professor, a PhD in Biology from Harvard University. He was furious and let me know it. I don't blame him.

In one respect, it didn't matter since I did not have the resources for medical school. I had to get a job and save some money to continue in any school. I still had a little time left on the G.I. Bill which would get me started in graduate school, but probably not beyond the first year.

My parents picked me up at graduation and we took a brief trip North, up to New York State. We stopped for lunch one day in Ithaca after visiting the Cornell campus. While in the restaurant eating I was approached by a young man who I recognized as a fraternity brother from Gettysburg who had graduated the year before - Roger Pierre. He was of French decent, very handsome, and a great guy. He came over to the table and gave me a big kiss on both cheeks. It took my mother a while to understand that one. I think Roger went to work for the C.I.A. He had been in that line of work in the Army during the war. That trip gave me some quiet time to think about what I was going to do with my life. I clearly had to go to work, at least for a while, and then plan seriously for graduate school. How much would it cost? Where should I go? Could I get in? What did I want to study? What kind of research was I interested in? Could I earn money while in school - teaching undergraduates or doing research? I wasn't prepared to answer any of those questions, and it required some time. When we got home I started looking for a job, hopefully in my field. I had seen an advertisement in to newspaper announcing openings in the Cancer Research Division, of Lederle Laboratories, Pearl River, New York. They were looking for laboratory technicians, and I figured I was qualified. I made an appointment for an interview and drove up there, where I was interviewed by the well known cancer researcher Dr. Y Subarrow, who was then Director of the Cancer Research Division. He hired me on the spot, much to my surprise, and I was to report for work in a week. I would be paid \$52.00 a week, a fortune to me at the time.

Lederle Labs 1948-1950

I went to work in November of 1948 as Research Biologist in the Cancer Research Division. My supervisor was to have been Dr. Subarrow but as fate would have it he had died in the interval between my interview and my arrival for work. His successor was Doris McKenzie, a Psychologist and Subarrows' girl friend. She was not qualified for the job but she was the only one who had any idea what the long term research plan was since Subarrow apparently kept very poor notes. It has always amazed me how even large companies can allow themselves to get into such a situation but it happens. In general our job was to screen new drugs (particularly new antibiotics) for anti-cancer activity. Lederle, at that time had a noteworthy scientist, expert at producing and isolating new antibiotics from thousands of molds he had cultivated over the years. The company had had some success in isolating, testing, and marketing new drugs from this source in recent years (eg. aminopterin). The procedure was to test each new drug for effectiveness against an array of tumors carried in our labs, primarily in mice, but also in rats, rabbits, dogs, and others. We used genetically pure strains of animals bred commercially for the purpose. While these tests in animals were not exactly the same as they might have been in humans,

experience told us they were close enough to establish toxicity and anti-carcinogenic activity. In those days the laws on animal testing and subsequent clinical tests on humans were not as restrictive as today. In fact, at Lederle there was a sense of urgency about our work. Lederle had a fairly close working relationship with Dr. Sidney Farber of Childrens Hospital in Boston. Dr. Farbers own daughter (we were told) had cancer. In any case, once we were reasonably sure of the toxicity levels, at least in animals, and the drug showed some anti-tumor activity, it was shipped off to Boston for human tests. It would never be done that quickly today -- the process would take years, and cost millions!

Each laboratory in the division had responsibility for a specific tumor for testing. I had the Bittner Mouse Mammary Tumor. This meant that I had a specific tumor, discovered by Dr. Bittner (I believe at the University of Wisconsin many years before). I had to continually transplant that tumor into certain mice, so that I always had enough mice on hand to set up the necessary tests when required. A single test could use hundreds of mice since I had to use several levels of the drug in order to find a level that was not toxic. Also, I could be testing several drugs at the same time. It took a week or so to induce tumor growth from the small implant I had placed in each mouse. The drug was then injected into the abdomen of each mouse once or twice each day. The mice were fed, watered, and weighed each day. Tests ran for a week or two, at which time the mice were sacrificed by breaking the neck (a rapid and painless procedure). I then surgically removed the tumors, placed them in individual containers of preservatives (formaldehyde), weighed them (I knew the weight of the original implant) first, and made written observations on the tumor itself (what did it look like?). It was then sent to pathology microscopic study. We were doing in two or three weeks what now takes years.

When I first went to Lederle I rented a room in the home of a young couple - (the Bolanders and their young baby). They had a lovely, small house in residential Pearl River, N. Y. and they couldn't have been nicer to me. I didn't stay there long, however, since I had a co-worker (John Yelnosky) I enjoyed and had a lot in common with and we soon decided to room together. After a search, we found a large basement apartment in what was then South Nyack. This area of Nyack disappeared when the Tappan Zee bridge was built and obliterated it. In those days you crossed the Hudson River by going north to the Bear Mountain Bridge, south to the George Washington Bridge or by taking the ferry across the river to Yonkers. Our apartment was in the cellar of an apartment house. It had one bedroom, bath, a huge living room, and outside entrance. I was always nervous about that place because the hot water heater had a non-functional, safety valve, so that we had to remember to turn it off when we left or risk blowing the place up.

I had bought a 1946 Ford so I could get back and forth to work and out to Long Island occasionally on week-ends, where I pitched in a softball league. It also got John and me around town. Unfortunately, I got careless in that car and destroyed it and almost me in the process. I was headed south on route 9W one Friday night, headed home for the weekend. It was raining lightly and unnoticed by me it was freezing on the bridges - a very dangerous situation. I was thinking about the coming

weekend and not paying adequate attention to driving conditions and as I crossed a bridge, I lost control of the car, which spun and crashed into a stone wall. There were no seat belts in those days so I crashed into the steering wheel, breaking it with my nose, and hit the hand brake with my knee, gashing it badly. I had broken my nose and opened a deep cut over my eye. While I didn't realize it at the time, the car was a total wreck - I ultimately got a few hundred dollars for the junk. Once again, I had no car.

John and I had spent many hours contemplating our futures. It was clear that while we liked what we were doing, and liked making enough money to at least live on for the first time in our lives, there was little future in it. We were both ambitious and saw that we needed to go back to graduate school and work toward a PhD. Again money became a problem, and once I had made up my mind to return to school I began the serious business of saving money. I had another friend at Lederle in similar circumstances and similar goals - George Gass. George was married (Dottie) which was both an advantage and disadvantage. Dottie was very bright, employable, and supportive, etc., which was, of course, a plus. On the other hand it meant two mouths to feed and the potential for more since they wanted children. I had bought the car in the belief that this would be my last chance to get one for years - this proved to be correct. I started to buy clothes since I had practically nothing. I had always bought books since I was an avid reader and felt then as now, that books were an integral part of my life. Other than that my needs were very simple, food and a place to sleep. I started to write to graduate schools. In each application, I asked about possible employment, teaching, either in the classroom or the laboratory. The University of New Mexico, in Albuquerque, sounded best to me when they accepted me as a graduate student and offered me a teaching fellowship - just what I wanted. I decided to go there. Neither John nor George were able to go then and both had to wait another year or two. Eventually, John went to the Univ. of Indiana, where he got a PhD, and George followed me to the Univ. of New Mexico where he also eventually got a PhD.

I was scheduled to start in the summer session of 1950. I had never been west of the Mississippi river, so again this was a whole new experience for me. I was quite excited. I resigned from Lederle in early June in order to get myself organized to move to Albuquerque in time for the summer session. With no car I planned to take a train or bus. First, however, I had to move my belongings from Nyack to Kings Park. I enlisted the aid of my cousin Larry to help me move. I think he was going to New York University at the time and was off for the summer. We were both avid New York Giant baseball fans, and planned to stop off at the old Polo Grounds in upper Manhattan to see a Giants game, (the place has long since disappeared, since the Giants moved to San Francisco). The Dodgers were still in Ebbetts Field in Brooklyn, (we hated the Dodgers), and the Yankees were across the river in the Bronx exactly where they are today. I borrowed my fathers' car and Larry and I drove up to Nyack, loaded the car with all my worldly possessions and headed back to the Polo Grounds. We were in luck and found a parking place on the street right outside the stadium. We left the stadium right after the game and went to the car. Of course, disaster had struck.

Someone had broken into the car and stolen everything I owned except my books which we had loaded into the trunk. All my clothes (mostly new), radio, etc. had been loaded into the back seat, were GONE. I went to the police station and reported it. All they seemed interested in was the distinction between a robbery and a burglary. I had said I had been robbed, and they insisted I had been burgled, since no one had held me up with a gun. They were no help at all and nothing was ever recovered as far as I know. This left me in a mess since I had to leave in about a week. My loss was not covered by insurance and I had no benefactors offering to replace my wardrobe. I had saved a little money but I was going to have to use that for a bus ticket and living expenses, until I got started working.

The University of New Mexico (1950-1951)

I traveled to Albuquerque on a Greyhound bus - non-stop, sitting up for 3 days and 2 nights. My luggage consisted of an old laundry container, which I had used when I first went to Gettysburg to mail my laundry home. Laundry mailers were commonly used in those days to save a little money on commercial laundry. About all I had was a change of underwear, extra shirt, socks, an extra pair of trousers and toiletries, plus what I had on my back. I led a spartan life for quite a while.

The trip was exhausting, primarily because there was no opportunity to lie down and actually sleep. Although the seats reclined a little, you really couldn't really stretch out, so that you were always in an upright position. The bus stopped at regular intervals to let passengers on and off, also so we could get something to eat, and to use the rest rooms. It was a long, long trip. On the other hand bus travel is different than any other kind of travel. You get to see more of the countryside, towns and villages, and it is cheap. We finally reached Albuquerque and my first experience with the desert. I got off the bus but my ankles were so swollen I could hardly walk. I had no idea where the University was and I was in the middle of the city. Before I could do much of anything, I had to get to where I could at least walk. There was a barber shop across the street and I figured that if I could get my feet elevated for a while, things would get better. I didn't need a hair cut but I sure needed a shave, so I went in and got the barber to recline the chair and give me a slow shave. It was wonderful, and by the time he was through I was feeling much better and the swelling had gone down considerably. The main east-west highway through Albuquerque was Route #66 and the barber told me the University was on Route #66, which was only a couple of blocks south of us. I walked over to this famous highway, and asked a passerby where the University was. He pointed east, and said "up yonder". "Up yonder" didn't sound too bad so I started out, up the long slope east. It took me about an hour to an hour and a half to walk up to the university in the hot desert sun, eventually finding the administration building. I liked the campus at first sight. All the buildings were Mexican style adobe, thick walled and handsome. I was assigned to the new Graduate Dormitory, which was on the eastern edge of the campus and backed onto the university golf course. The university itself was within a few blocks of the desert and high mesa which led to the 11,000 ft. Sandia Mountains, a few miles east of the

city. It was very picturesque and pleasant. I found my room, unpacked, took a shower, and lay down on one of the two beds in the room. Heaven! A few hours later, my roommate showed up, with trunks, suitcases, etc. He was young, from New York City where his father was a judge, and his name was Jim Hearn. Within a very short time I was green with envy - he had one of the most extensive wardrobes I had ever seen. It quickly filled the closet and the dresser allotted to him, and obviously needed more space if he was to get unpacked. I gave him three of the four drawers in my dresser which he quickly filled. He must have had 40 starched and ironed all white shirts, along with everything else. As it turned out, he needed them since he changed shirts 4 or 5 times a day. I didn't see much of Jim and I never did find out why he was there in the first place. I never saw him study and it was plain that he had no particular interest except buying white shirts. He was quite personable and friendly but I soon began to look for another roommate with interests and background more in line with my own. I was among the first occupants of the new graduate dorm which was not yet full, so I had the time and opportunity to move.

I found the Biology building and checked in there since I more or less planned to do my graduate program in Biology. I met Dr. Edward Caster, the department chairman, and one or two faculty members. I was not at all sure what specific field of Biology I was going to focus on so I needed to look around. I had heard of a program in Developmental Biology and wanted to find out more about that. Later, back at the dorm, I met Marty Roeder, a New Yorker, who was also a Biology major. He had been there for a semester or so and knew quite a bit about the department and its programs. He invited me to go out to the golf course just outside and play a round with him and another fellow. I had played a very few times with my Uncle Ernest years before but was far from being a golfer. Then he told me that he was meeting Doug Humm on the course and was going to finish a round with. It turned out the Doug Humm was just the person I needed to meet. He was a new professor at New Mexico, having just come from Stanford Univ. and was starting up the program in Developmental Biology, which in those days was also known as Experimental Embryology. He even had a grant from the Damon Runyon Fund, and might hire me as a lab assistant. Of course, I went out on the golf course with Marty, to find Doug Humm. It turned out that Doug was a personable, if somewhat hyper person. I liked him and I guess he liked me because he did offer me a job which I quickly accepted. Humm had been trained at Yale and was a very knowledgeable Developmental Biologist, - just what I was looking for. As it turned out I had talents in the laboratory that he needed.

Meanwhile, I had run into a most interesting fellow named John Jewell from Antigo, Wisconsin. John was not in good physical shape but there were good reasons for it. John had been in the infantry during the war, and starting early in the Pacific campaign, on Guadalcanal, he had gone through many of the Pacific island invasions. He had been wounded in the jungle so many times, the army finally had to send him back home to the hospital, where they tried to patch him up. He had been bayoneted, shot, had his head bashed in with a rifle butt, and left for dead. He had survived but had paid a terrible price. I liked John a lot, especially after I got to know him. He was small and wiry, with a great sense of humor and we quickly decided to room together.

In addition, he was a Biology major although it didn't take long to figure out that he was not a dedicated student. He was there because the Veterans Administration advised him to move to a desert environment for his health, and since he had years of G.I. Bill eligibility - why not. John loved beer (like me) but was not supposed to drink any alcohol. What an irritation.

There was a group of us graduate students who used to enjoy going out in the desert west of Albuquerque and climb around in the lava in the ancient volcanic plugs, looking for turquoise. It may have been a good source of turquoise for the Navaho Indians, but it wasn't for us - we enjoyed it anyway. John, however, got interested in gold in the mountains to the east and started going out to pan gold. He met an old sourdough out there somewhere, and start spending more and more time hunting gold with the old timer. He couldn't have been happier, and soon started camping out. It wasn't too long before John dropped out of school and disappeared. I have no idea what happened to him - he simply never came back. I hope he struck it rich but somehow I doubt it.

Another "character" in our group was Dexter Perkins III, from Rochester, N. Y., where his father was chairman of the History department of the Univ. of Rochester. One of Dexters' claims to fame was his aunt "Fannie Farmer", of Fannie Farmer candy and cooking fame. Dexter was the typical "absent minded professor" type, and an Anthropology major. We all liked Dexter, at least in part because he was the only one of us who had a car and in Albuquerque and the surrounding desert and mountains, you certainly needed a car. Dexter was full of stories about himself and his relatives. He told of Aunt Fannie pulling up to the curb in Rochester and hitting a pedestrian stepping off the curb. She stopped and backed up to see if she had hurt him badly and proceeded to hit him again - oh well! As an Anthropology student Dexter spent a good deal of time out on the reservations in the area, working with the indians. He told of one day going out to the Navajo reservation outside of Gallup, N.M. You couldn't drive on the reservation, you had to take a bus from Gallup, which he did. When he got back to Gallup that afternoon, he found that he had locked himself out of his car. He walked to a nearby gas station and got somebody to come over and open the car for him, then went back to the station to pay his bill. Going back to the car a second time he found again that he had locked himself out and had to repeat the whole performance. We all learned that if we were going out with Dexter in his car, we first had to find it in the Dorm parking lot - he never knew where it was. The last I heard of Dexter, he had become the curator of the Univ. of Pennsylvania Museum. I don't know if that museum is still there or has been lost.

At the lab I was learning a lot about technique, and found that I had a good, steady hand for microsurgery. This was in the days before decent micromanipulators were available so it was a very handy attribute for us at that time. The Damon Runyon Fund was primarily supporting cancer research since that was what Damon Runyon died of. We were interested in a specific line of hybrid fish in which platyfish and swordtails were interbred in the laboratory and the offspring were then interbred with either one or the other of the original platyfish or swordtail lines. The offspring of that mating were 100% melanotic - that is they all developed melanomas - a deadly tumor

in humans. Our interest was primarily in determining where in the developing embryo did the cells capable of producing these tumors come from. We began to devise experiments, using these very special fish, to answer that question. We made fair progress that year (1950-1951), but by the spring of 1951, Doug Humm had decided to move to the University of North Carolina. This decision created a problem for Marty Roeder and me, Humm's two graduate students. If we wanted to continue the work we had started we would have to transfer with him. If we preferred to start over on our graduate research programs we could stay where were. I had an offer to stay and work with C. Clayton Hoff, who was an Entomologist with broad experience in the budding new science of Ecology. This was tempting but both Marty and I opted to transfer and continue what we were doing with Doug Humm. In June we all headed east to the University of North Carolina. Carolina was one of the better universities in the South and it had close ties to the Woods Hole, Marine Biological Laboratory, probably the best facility for a young developmental biologist in the country, if not in the world. It was and is located on the southwest corner of Cape Cod, and students from member universities usually went there for summer work and study. During that year, George Gass and wife Dottie, showed up, having left Lederle and entered graduate school. I was surprised he elected to come to New Mexico. We had not corresponded much at all. He eventually got his PhD there, in physiology, and went to work at the Food and Drug Administration in Washington, in the Pharmacology Division. A few years later, he suggested that I come to Washington and work in the same place, but I'll come to that later. When George left Washington he went to Southern Illinois University, as professor of Physiology and spent the bulk of his career there.

The University of North Carolina (1951-1953)

Chapel Hill, was one of the prettiest college towns I had ever seen. I had made a visit home before going there and had bought a car - a 1949 Ford coupe. It turned out to be a great car and inexpensive to operate. I had reached a point of needing a car - the Univ. of North Carolina was rather isolated in the woods of central North Carolina, one of its charms, but making it rather difficult to get too. There was no public transportation but I suppose the most compelling reason was that I was dying to own a car - even if it took my last cent, which it did. Actually, I never regretted it and kept that car for many years.

When I knew I was actually going to go there I already had a teaching assistantship, teaching undergraduate laboratories in the Biology Department, and Doug Humm and I had been able to renew the Damon Runyon Grant, so essential to our research. In addition, I had applied for and been awarded a position as Dorm Counselor at one of the oldest of the University dormitories (Old South), at the University. When I arrived and registered I checked into my room at Old South. I had expected it to be close to the front door. Wrong - It was on the top (4th) floor. These old dormitories were not air conditioned and there were no elevators and although I

had the room to myself it was pretty miserable. In addition, I really didn't have the time to deal adequately with over 150 undergraduates and after about a month I resigned. This meant that I had to find another place to live. Marty had moved into the graduate dorm - a relatively new building with both air conditioning and an elevator. Much nicer. In the graduate dorm my next door neighbor was an English major named Tom Noble, from Tallahassee, Alabama, who was working on a masters degree on Thomas Donne, an early English poet. Tom was very different than the science majors I was used to and I liked him a lot. He taught me how to play the old English woodwind, the recorder. I eventually got proficient enough that he and I could play duets. I really enjoyed that and thought the sound beautiful. Not everybody in the dorm felt the same way. Tom finished his masters degree and went down to Aiken, South Carolina, to teach at Aiken Prep. This was a school where many of the nations ultra-wealthy sent their young children to be properly educated and prepared for the lives they would lead when they inherited their parents great wealth - a very unusual, but not unique place. Their parents usually had homes in Palm Beach, Newport, Southampton, Saratoga, and other such places. I found it fascinating and used to visit Tom whenever I had the chance. Tom went on to Yale, where he got his PhD, and where he stayed on and taught and eventually retired in New Haven.

In order to make up for the loss of income from my dorm councilors' job, I looked for and found another job. I had heard of a very good restaurant a few miles east of Chapel Hill. A fellow graduate student in the Botany Department (Bob Johns from Texas) where I was taking some courses, had the need of a job for the same reasons as I, suggested that we go out and see the place. It was called the "Ranch House" and it was owned by a German, Teddy Danziger, who also owned the "Rathskeller", a small (by German standards) beer hall in town right across from the campus - a gold mine. The Ranch House was a very good restaurant and a novel one- I had never seen anything like it before or since. Although it was owned by Teddy Danziger it was managed and run by "Pokey" Anderson. Pokey was a local "good old boy", who knew everybody. He was incidently a good manager and Bob and I used to go to his house once in a while after closing and listen to his jazz collection - one of the best I have ever heard.

The "Ranch House" was a one story building, more or less surrounded by unplanted tobacco fields and woods. It had a modest sized kitchen in the back. At the entrance was a display case with samples of the meats served on display. Pokey greeted guests and seated them. The main restaurant was one fairly large "L" shaped room. At the base of the "L" and occupying a large area was a huge old iron bedstead, with bare bed springs on it and a huge tray under the springs. The "Ranch House" was famous for miles around for cooking everything on a bed of coals. The tray held the charcoal and the springs were the cooking surface. If it couldn't be cooked there we didn't serve it. The mainstays, which were excellent, included steaks, chops, kebabs, corn on the cob, baked potato, garlic bread, chicken, etc. A huge, very pleasant black man was the chef. He had been doing it for years and put on a great show - people loved it.

When Bob and I were hired, we were the first and only white waiters in the place

other than the wine steward who was a Belgian passing himself off as a Frenchman. This was O.K. because he was quite knowledgeable about wines (we had a good cellar for North Carolina) and he had the right accent. The chef, kitchen staff, and the rest of the waiters, were all black and paid \$.50 per hour. The waiters did better, of course, because of tips. Two white waiters created a problem because they couldn't, by local convention pay a white waiter the same as a black waiter - so they paid Bob and me \$.51 per hour. We certainly didn't care since it was the tips we were interested in. The restaurant was also known for its coffee and its salad dressing. These were made back in the kitchen by a secret process. Just before the restaurant opened, the black staff would come in through the back door. They were always in a good mood and it was some time before Bob and I figured out why. It turned out that they had a still out in the woods in back of the place and they were selling and especially drinking moonshine. I tasted it once - totally poisonous. The kitchen was not air conditioned so it was hot and humid except in the winter. The first job the kitchen staff had on coming in was to make the salad, salad dressing and the coffee - all the pride and joy of the restaurant. To start, they took a 30 gallon garbage can and put it in the center of the floor. Two of them would then stand over it and with their hands tear whole heads of lettuce, or whatever they were making salad from that day, to shreds into the can. They sweated profusely into the can at the same time, which may have been one of the secret ingredients. The salad dressing, turned out to come from gallon jugs of French's salad dressing which was stored on a shelf until the oil had separated from the rest of the dressing. Then about half the oil was poured off and what remained was our secret formula dressing. The coffee was the A&P 8 O'clock brand, which we bought in bulk. Again, a garbage can was used by placing it up on the huge stove and half filling it with water. Several pounds of the coffee were put in a flour sack and thrown into the boiling water. It boiled all evening - all we did was add water, if necessary. To serve the coffee we had miniature (2 or 4 cup) percolators which we dipped into the G.I. can to fill. The response to the salad and coffee was awesome. People couldn't get enough and we were in hysterics most of the time.

I got to meet a lot of famous people in that restaurant. Actors, politicians, various dignitaries were always brought there when visiting the campus by locals including faculty, because it was the best restaurant in the area. I remember one evening when "John Browns Body" was on tour with Charles Laughton, Judith Anderson, Tyrone Power, and Raymond Massey came in with separate parties. These were certain to be good tips, and I got three of the four tables. Charles Laughton ordered the kebab, and I foolishly offered to take it off of the skewer for him. It was stuck pretty firmly on the skewer, and the whole thing slipped and took off, headed for his lap. I barely caught it, but he was very nice about it and gave me a generous tip for that time - \$4.00 for a table of four. We had great fun at the "Ranch House" and made a little money at the same time.

The University of North Carolina had a beautiful golf course a couple of miles east of town, and students could play for \$.50. There was an apartment complex across the street from the front nine. Tom, Marty and I figured if we lived out there we could sneak across the street and play for nothing, which tells you something about

the value of \$.50 at that time. We did move out there into a two bedroom apartment, plus kitchen, living room, and bath. The only problem it created was it made me the chauffeur since I had the only car until Tom bought a new Pontiac later in the year.

Meanwhile, we were trying to get sufficiently organized in the lab to get started on research. Part of our plan was to have me do single cell transplants, taking neural crest cells from hybrid embryos which were destined to produce melanomas and transplant them into embryos which were not destined to produce melanomas and see if those cells would then induce tumors. This was delicate work, and it was clear that I was going to need large numbers of embryos. The Biology Dept. had made a fairly large, "temporary" building left over from the World War era. We outfitted a small portion of the space as a sterile surgery for me, office and laboratory space for Doug Humm. Marty Roeder was not involved in this work since he was basically a Biochemist and was working on another project. The rest of the space was to be devoted to the breeding of fish. I calculated I would need about 200 aquaria to raise enough platyfish-swordtail hybrids to provide me with a continual source of embryos. To do that I had to build sturdy (10 gallon aquaria are heavy) racks out of two by fours, to hold twelve tanks in three tiers of four tanks each. This took a week or more. I took my lumber out to the department parking lot (where I was subject to a fair amount of ridicule from my friends in the department). I have to admit that building racks seemed like a strange thing for a graduate Biology major to be doing in the parking lot. Eventually, I got the job done and the racks moved into the lab, along with the aquaria, which were filled with conditioned (chlorine free) water, ready for fish. I wanted to avoid the complication of having to set up filters, and aerators for 200 aquaria, so I decided to try to "balance" them. This meant that each aquaria would have plants to remove carbon dioxide and add oxygen, and excess organic matter would be removed by snails and catfish. If an aquarium is properly balanced, it can reduce maintenance almost to zero, which I found very desirable. Ultimately, I succeeded. I was able to do the necessary single cell transplants, and we were able to prove the neural crest origin of the melanophores which later gave rise to melanomas. Later, I developed a technique for the freehand technique of transplanting the nucleus from one cell to another. A few years later good micromanipulators were developed and such work became much easier - but I had all the fun. These results were duly published in the scientific literature - my first publication.

Florida State Univ. (1953 -1955)

During that year Charles Metz, an invertebrate developmental biologist arrived as a visiting professor. Sea Urchin embryology was something I had grown quite interested in and had been introduced to in Woods Hole. So far I had worked only with fish. There was little opportunity at North Carolina to work with marine invertebrates, since they had no marine lab and the coast was 100 or so miles away. Also, North Carolina emphasized "Classical" Biology in its graduate curriculum - something I was not greatly interested in - so when Charlie Metz moved on to Florida State Univ. the next year I asked if I could transfer with him. He said O.K. so I tried to finish up my work

with Doug Humm, spent the summer in Woods Hole and moved to Tallahassee in the fall to work with Charlie Metz, both at the Marine Lab at Alligator Harbor (about 20 miles from the campus) and the campus itself. I remember that trip to Florida, driving by myself, non-stop from New York. It was a miserable trip because the weather was so bad - it rained the whole way. Then, as I crossed the border from Georgia to Florida, the clouds suddenly opened up to a beautiful sunshiny day, from the border to Tallahassee. What a lift that gave me - I thought I'd reached paradise.

Florida State University, had, since its' opening years ago, been a girls school. A few years before I got there, it had been converted to a co-ed University trying to go "big time". The student composition when I arrived in 1953 still had more women than men but the gap was closing rapidly. I moved into a new dormitory on campus, which was expanding rapidly. I had a teaching assistantship and I was helping Charlie Metz to set up his laboratory, so I was very busy. My teaching chores were on the main campus but our laboratory was in one of the expansion areas of the university which it had inherited after the war, when the post war expansion began. There was an old municipal airport several miles west of the city. This had been added to by the military, who had enlarged the airstrip and built quonset style barracks for the troops. These barracks, were in the woods (beautiful huge old live oaks, draped with spanish moss), and quite serviceable. A lot of these buildings had been turned over to the University, for overflow housing, and administrative office space. Charlie got a portion of one for conversion to laboratory space. It was quite spacious and we could do virtually anything we wanted with it. We even inherited a janitor, an old black man who turned out to be very helpful since he knew everything about the place. At lunch time we would go out under one of the magnificent oaks and relax while watching the janitor "hunt". He hunted with a sling shot, and was deadly with it. His targets were squirrels and he seldom missed. The oaks were full of squirrels and he would sit there and watch until he had picked out the one he wanted for lunch. He would aim carefully, shoot, then walk over pick up the squirrel and take it inside the lab. There in a matter of minutes, he would skin it, cut it into pieces, and have it frying in its' own fat. He did that almost every day and never made a dent in the local squirrel population.

Charlie had three graduate students at first - me (his first graduate student), Mike Greenberg (a recent Cornell graduate from Brooklyn) who was living in the same dorm I was and Don Menzies from Hickory, N. C., (Don didn't last very long - he came from a long line of physicians and was hoping to get into Medical School). He was a very nice fellow and soon got accepted into Medical School and became a physician like everyone else in his family for generations. Mike and I decided we would prefer to live in a room in a private residence we had seen advertised. It turned out to be in the cellar of the house of a man who seemed very suspicious - even afraid - of us. I never figured him out but we stayed there until summer (it was very close to the Biology Dept.). When Mike went to New York to get married to Rima - I went to the wedding which was great fun. Rima was great fun also; Mike couldn't have made a better choice I believe. Mike and Rima moved out to West Campus into of the apartments created in the old W.W.II buildings, not far from the Lab. This, of course, meant that I had to find another place to live. It didn't take long to enlist Joe Lang, a graduate

student in the Chemistry Dept. who had been there for years, and seemed to be in no hurry to graduate, and Bernie Benstock, a frustrated actor whose claim to fame was that he had gone to high school with Bernie Schwartz (actor Tony Curtis), in New York. We found an apartment on sorority row, on the main campus up over a three car garage. It was cheap and filthy. It had two bedrooms, a large living room with an old oil stove which was supposed to heat the place, a dining room, and a kitchen. It was not something to brag about but it served our needs very nicely. We got to know many of the girls in the neighboring sorority house and had many a great party there. Across the street, was the Tri Delta sorority house, teeming with beautiful girls. I occasionally double dated with Don Menzies, who introduced me to a lovely young education major from Pensacola, Nancy Mayer. We started dating (mostly movies) and enjoying each others company, Nancy and I fell in love and got engaged later that year. Nancy had to do a term of practice teaching before graduating so she went back to Pensacola to do her teaching - I became a computer for a while. We got married in early June, 1955 in Pensacola. We found a place to live in the same complex the Greenbergs lived in, out on West Campus in a one room apartment in one of the old World War II barracks, not too far from the lab. By that time I was essentially finished with my PhD work but still had to finish writing and typing my dissertation. I had been approached by the President of Athens College, a small antebellum college in Athens (north Alabama). Dr. Perry, the president, was trying to get this small college accredited and to do it he had to have a certain number of PhDs on the faculty, which he didn't have. The school had no money and a small local student body; perhaps a few hundred. It had been able to hire a few PhDs who had retired from northern universities, and were willing to relocate to north Alabama for very little money. Now they were looking for younger people, like me, to further bolster the faculty. The area seemed to have some potential to me. This was just before "Sputnik" but there was already an activity going on in Huntsville, Ala., about 10 miles east of Athens, where the Army Ballistic Missile Agency had moved a key group of German engineers under Werner von Braun, who had been brought from Germany to Texas after WWII, and recently to Alabama to begin work on the development of rockets and space vehicles. It all sounded pretty far out but interesting nevertheless. The other attraction for me was the fact that I was now married and needed a job especially since Nancy was pregnant. I figured I could finish my dissertation as easily in Athens as in Tallahassee and graduate with my PhD in January of 1956. Nancy got pregnant within a few months of the wedding, which was great as far as I was concerned but it did seem to be rushing things a bit. As usual, a major problem for me was the incredibly low salary scale offered by the college. They offered me less than \$4,000 a year, which was very low. It turned out that in order to pay me the minimum salary I was willing to accept (\$4,200), they had to make me the Head of the Biology Dept., (in fact I was the whole Biology Dept.), and give me an Associate Professorship - unheard of for someone just out of school.

Nancy and I moved to Athens in time for the fall term, and rented an apartment in town. I could get to the campus in 5 minutes and the hospital (Nancy was due in April) in less. It was a pleasant, typical small southern town of 2 or 3 thousand people, isolated in the northern part of the state, a couple of miles north of the Tennessee

River, and a few miles south of the Tennessee border. It turned out that I had to teach all the Biology courses offered at the college, since I was the only Biologist. I had to teach both lecture and laboratory. We were on the quarter system and I ended up teaching nine courses that year, some of which I had never taught before, and some of which I had never even taken myself. At the same time, I was finishing my dissertation, which occasionally required a trip to Tallahassee. Of course, it was an impossible year during which I developed the symptoms of an ulcer. Nancy did some substitute teaching, but when the son of the President of Athens College (10 to 12 years old) started delivering her paychecks, she gave it up. In order to offer a reasonable curriculum for potential Biology majors, I had to teach all day and into the night. The day classes were primarily for the local, full time students, and the night classes were for the engineers and other employees from the Army Ballistic Missile Agency in Huntsville. I was busy! There was another young PhD at Athens College - Chuck Lundquist, a PhD from M.I.T. who had been drafted and was stationed as private at the A.B.M.A., working with the Germans to develop our first satellite. Chuck actually lived on campus so we saw a lot of him and his wife Pat, who was an accomplished cellist. We enjoyed them both a lot. Chuck was a one of the launch officials on our first satellite. Chuck was also an experienced and avid spelunker, and he and I spent as much time as possible climbing around the many extensive limestone (this was Limestone county) cave systems in the hills surrounding the Tennessee River - a fascinating if somewhat dangerous hobby. Once you are isolated, far back in a large cave complex, you might as well be on another planet.

Chuck used to talk to me about going to the moon and the planets, saying that we had the ability to do it before too long and I knew that was one of the primary motivations of von Braun. However, I found it hard to believe that we could actually do it. Pretty exciting stuff.

My classroom and laboratory were the same room, in the basement of the Presidents' house. In other words, there were no real facilities for Biology, although they kept promising them to me. Part of the floor was dirt, having never been intended for such use. It was an unforgivable situation on the part of the college but I had to make the best of it. I was in a haze all year that year - trying to keep with two sets of students - the locals and the far more motivated and intelligent students from the Army Ballistic Missile Agency. I had decided to offer three courses each quarter, realizing that I would never be able to do it for more than a year. However, it was the only way I could offer enough courses to give my two different kinds of students a chance to major in Biology. Meanwhile, the accreditation board had awarded the college accreditation in the southeastern region.

I soon discovered that I really was dealing with two very different student bodies, the younger locals and the older and wiser ones from Huntsville - one group, day students, and the other, night students. I recall a student newly graduated from the local high school, who was having a hard time with introductory Biology. She had a malformed back and was physically handicapped. Also, although she was

a pleasant young lady, she didn't seem too bright. She couldn't spell (boan for bone), and I suspected she couldn't read (later confirmed). I finally decided to talk to the registrar about it, wondering how she ever got out of highschool. He said that the local high school had the practice of allowing students like her to go through the graduation ceremony and receive a fake diploma. I assume she never knew she hadn't actually graduated, and no one had told her. I asked the registrar, who had lived in town and been registrar at the college for many years, why the college compounded the problem by admitting her to freshman status at the college. I never did get a straight answer to that one. I told him that it was my intention to give her a failing grade. He tried to talk me out of it, but in good conscience, I had no choice. I spoke to the Dean about it (he had just come that year too), and he was as shocked as I was. The poor girl dropped out of school.

I finished my dissertation and graduated from Florida State University with my PhD in January as planned - a great relief. I don't remember much about it, except that the graduation speaker was Philip Wylie, one of my favorite authors at the time, primarily because of his book "Generation of Vipers", among others.

Food and Drug Administration (Washington 1956-1958)

At the time I was debating my future. I had decided that full time teaching, at least the kind I was doing, was not something I wanted to continue. That spring the Dean announced that there would be no raises - the college didn't have the money. At that point I decided that I really should leave. We had a new baby (born 2 April, 1956) named Dee Ann, who to this day doesn't like to admit she was born in ALABAMA! At about the same time I had a phone call from George Gass who had graduated (PhD) from the University of New Mexico and was now working at the Pharmacology Division of the Food and Drug Administration in Washington D. C. He said they were looking for PhDs, and that I should apply. They were paying \$5400 per year, so of course I applied. I got the job and we were in an apartment in Arlington, Va. by the end of June. I started work at the Food and Drug Adm. doing research in the Pharmacology Div. on the biochemical effects of select anti-cancer agents on cellular metabolism. I was also asked to read and evaluate new drug applications, continually coming in from industry - a task I was in no way qualified for, but I learned my way through it. This led to my being occasionally being assigned to go out with an inspector, to look at laboratories which did most of the animal toxicity testing for the large companies who ultimately developed and marketed the drugs. This was interesting, frustrating and educational - to see how major drug companies avoided their primary responsibility for providing honest data in support of their new drug applications. This way they could say that they weren't responsible for the test data, but company "X" was. I remember visiting one such lab in Philadelphia. The inspector and I finally found the place in a seedy warehouse district in the city. We knocked on the door several times but no one ever came and we went in. In a large open room (no lights), we found a table with an ancient microscope, balance, and some other apparatus (most of which belonged in a museum), and no evidence that any of it had been used in many years. Since much of

the data sent in to us referred to a fairly comprehensive animal test program, we were primarily interested in their animal holding and test facilities. There were certainly none where we were. We noticed a stairway to the second floor, where a faint light could be seen. We went up, and found an office and a man who claimed to be president of the company. We began to question him about their data and how they acquired it. He was very vague and evasive - in fact he was clearly lying. I asked to see their animal facilities, particularly dogs. He said they kept those facilities and the dogs in his basement at home, but he didn't have any there now. I asked to see his animal purchase invoices. He didn't have any, and said that he didn't purchase animals from commercial sources. I asked how he did get his dogs. He said that he had kids pick strays up on the streets and bring them in to him. If true, this was illegal, and would invalidate any data he might get, since he knew nothing about the animals, and they most likely would have been sick to start with making any interpretation of the data impossible. I asked how he disposed of the animals when finished with them, and he said they were released back to the streets. All in all, the data were 100% fraudulent and yet had been used by a major drug company (who I won't name) in support of a new drug application. I don't know what the final disposition of the case was since the legal side of things was handled by government lawyers, who I almost never saw. I would assume that in a case like this the penalty would have been severe, but you never know. This wasn't a unique case! The laws and inspection procedures today are much more rigorous but I'm sure there are still abuses.

Two doors down the hall from my laboratory was a room about the size of my lab, occupied by a huge, fat, old, chimpanzee. He had a big tire to swing on, a place to sleep, and all the food he could eat. He had been there since the Roosevelt administration - the chimp had the distinction of being the president's food taster back in the 1940s and nobody had the heart to put him down in spite of what must have been a substantial sum to support him in the manner to which he had become accustomed.

My lab and the animal facilities and many other labs were in the sub-basement of the South Agriculture Building, at the corner of 14th St. and Independence Av. It was a very large building and was occupied by around 10,000 federal workers. It was a good location for commuting from Virginia because it was only a few blocks from the 14th St. bridge, crossing the Potomac. In the winter, I would get to the lab before dawn, go down to the lab, go up one floor for lunch in the basement cafeteria, and go home as the sun was setting. Thus, in the winter, for two or three months, I would only see the sun on weekends and holidays. Depressing.

Much has been said in recent years about the use of animals for drug and cosmetic testing. There was a day (years ago) when animals were undoubtedly abused in this context. I find today most of the arguments of the animal rightists today to be ridiculous. While it is true that the response of many animals to specific drugs may differ from the response of humans, these animal tests are far from useless. They give us a reasonable and sometimes accurate measure of both the toxicity and efficacy of the drug. We know perfectly well where animal testing makes sense and where it doesn't. Some people seem to think that scientists hang around on street

corners waiting to steal pets to torture in the laboratory and that there are countless numbers of animals killed uselessly in the name of science. Nothing could be further from the truth - first, healthy, genetically controlled animals are expensive. If they are not healthy, they are useless for testing purposes. In addition to drug testing there is the very important use of animals in the training of physicians - for example, would you want your heart surgeon to have been trained on an animal heart or a tomato? Then there is the fallacious argument about the numbers of animals used in laboratory work. While there are many thousands used, quite humanely, in the laboratory, the number is a small fraction of the numbers destroyed annually in pounds and by humane societies, (in the millions), and all because we abandon them. In any case, we used the smallest number of animals (mostly mice and rats) that was statistically significant, and treated them as humanely as possible.

In January, 1958, our second daughter was born - Sandra Lee Young. We had bought a house in Rockville, Md. and Sandy was born in Suburban Hospital in Bethesda, Md.

Army Ballistic Missile Agency (Huntsville 1958-1960)

While I was at Food and Drug, one of the most momentous events in my lifetime took place - the launching of the Soviet "Sputnik". This event not only changed my life, it changed the world, and opened the exploration of the universe to mankind. Soon after the launch of Sputnik, the United States called a large meeting in Washington to discuss what we, as a nation, should do. Many of my friends from Huntsville were there along with scientists from Universities and Industry - virtually anyone who was interested in the potential of space research. There was no NASA yet, but the military (particularly the Army Ballistic Missile Agency) was interested and well represented. In the beginning, the potential for space research was not obvious except for making physical measurement, such as radiation measurements, and possibly for the deployment of weapons - a prospect that most of us found repugnant. At that meeting I met Werner von Braun and his deputy for research Ernst Stuhlinger. Von Braun was an extremely dynamic and impressive person. His people were mostly the Germans who came to this country with him after the war. They were highly motivated and extremely respectful toward him. Stuhlinger was quite different; quiet and low key, and a very pleasant man. It was at the Washington meeting where Stuhlinger took me aside and asked me if I would be interested in coming to Huntsville and flying biological experiments in recoverable nose cones since I was a Biologist. At the time I hadn't thought about it much and said I didn't think so, but I'd think about it. Stuhlinger was a Physicist - a student of Geiger of the Geiger radiation counter fame. What I didn't know until then was that Stuhlinger had an undergraduate degree in Biology, and was actually quite interested in possible biological studies in space. Over the next week or two I thought about what kind of significant basic science might be done in space craft. There were really only two unique features in space that could not be duplicated on Earth. 1- Very high energy radiation, such as cosmic primaries. This was of considerable importance to humans, particularly in flight, since they cannot be

shielded out. This was of little interest to me - it was more of a biomedical problem. 2- Microgravity. Once I started thinking about it, it got more and more interesting. Here was a phenomenon that could not be duplicated on the Earth, and it seemed to me that it could have an effect on biological systems. All life on Earth has evolved in a constant 1G environment. One would think that this fact would have some consequences on the processes of evolution. In microgravity, which in theory can approach zero-gravity, but in the spacecraft, probably it is in the neighborhood of an average of one one thousandth G, we could hope at least to study the problem and perhaps find out what the minimum gravitational field detectable by a living cell is, and what the gravity sensor is at the subcellular level. It would take some pretty sophisticated experiments to unravel such problems. Another limitation was the fact that we didn't have satellites which would allow days, weeks, and months, in which to do experimental work. We had rockets which could give us about 30 seconds of microgravity - virtually useless for experimental purposes, but gave us the opportunity to learn how to design such experiments for the future and more importantly, how to build the hardware and environmental control systems (temperature, atmosphere, water handling, pressure), necessary to maintain any living system in such a hostile environment. This really was a new frontier - no one had ever had the ability to study the effects of less than 1G on living systems before. The advent of the space craft made it possible. I happened to be there at the right time and trained as a developmental biologist. Suppose an egg was fertilized in .001 or .0001 G, and allowed to develop. What would happen? Some predicted that the answer would be - nothing. Others, including me, predicted that the answer would be much more interesting, but only if the gravitational field could be gotten down closer to zero than we were currently able to do in a spacecraft. This is extremely difficult to do. There are always things going on on a space craft that impart very small accelerations (G) to the vehicle - eg. motors starting and stopping, positioning rockets to keep the vehicle stable and not tumbling, valves opening and closing, etc. While we don't know what the threshold of sensitivity of living plant and animal cells actually is, we do know that both plant and animal cells do have gravity sensors, and do respond to gravity. What we want to know is what are those sensors, how sensitive are they to the amount and duration of G input, and how important are these inputs to the functionability and evolution of the organisms? From the point of view of the basic biologist these are fundamental and important questions. I spent a significant part of the next ten years trying to answer those questions along with colleagues with similar interests. It is now about 35 years later, and we still don't have a complete answer.

Army Ballistic Missile Agency, Huntsville-(1958-1960)

Ernst Stuhlinger was also interested, which meant a lot to me in making my decision to move to Huntsville for a year or two and do some experiments in recoverable nose cones, in spite of the limitations imposed by such primitive vehicles. I accepted the job with some misgivings and we moved to Huntsville. We had had a second child (Sandra Lee by that time), so we decided to buy a house in Decatur, not

too far from Redstone Arsenal (now named the Marshall Space Center). I was the only Biologist among a horde of engineers, but I got good support from von Braun on down. They had created a special Branch for the old German rocket pioneer Herman Oberth, who was retiring, and since there was nowhere else to put me they made me the Chief of the Special Fields Branch of the Army Ballistic Missile Agency. It was a one man branch, plus my secretary. It was a great place to be at the time, because that was where the action was and I was surrounded by people who enthusiastically believed that this was the future! We were on the frontier of everything having to do with space. I had decided to fly sea urchin eggs first. I could get them from the gulf and I could get Charlie Metz, my professor from Florida State to help me. Here is an example of Ernst Stuhlingers' enthusiasm - a poem he wrote to von Braun in 1959...

"I doubt that you remember me -
I am an urchin from the sea.
Where once my unlaidd eggs did swell
Is nothing but an empty shell.
These eggs though, and God bless your heart,
In Jupiter they had a part,
Where in their own peculiar ways
They registered some cosmic rays
And had, while on a weightless ride,
Their tiny little cells divide.
They cut, though modest still and frail,
For living man an open trail
To space. This trail, we hope, will grow
And help man's daring goal: to go
Perhaps in ten years or eleven
Directly to the Gates of Heaven!"

Ernst Stuhlinger to Werner von Braun
Huntsville, Ala., 1959

Huntsville was hardly the place to try to do research on marine life forms but I was able to set up a laboratory and bring up sea urchins from the gulf - Pensacola or Tallahassee and design and test hardware and in general get ready for whatever flight opportunity came along. In the beginning, this was restricted to nose cones launched by Redstone Rockets. When there was a flight opportunity I would fly to Cape Canaveral where I had to set up another lab, with the appropriate hardware and fresh sea urchins, and prepare the experiment for flight. Charlie Metz helped me with these chores. Then, I would fly, before launch, to wherever the recovery ship was sailing from (in the early days, San Juan, Puerto Rico), and if I could I would set up a rudimentary laboratory on the recovery ship as well in order to deal with any live material recovered - in this case, fertilized eggs. Obviously, with 20-30 seconds of microgravity, I wasn't going to learn much more than how to handle live material under such adverse conditions and how to build hardware that would work in flight and keep the living material alive and well. This proved to be no easy task. Embryonic material

is very sensitive to any toxic material and any environmental extremes such as temperature, acidity, etc. These flights were really test flights for the engineers to check out their rockets, not for me to do experiments. I was essentially a hitch-hiker.

NASA Headquarters Washington, D. C.
1960 - 1961

During the time I was at Huntsville, NASA was created, with headquarters in Washington, D. C., and within a year or so an office of Life Science Programs was opened, headed by Dr. Clark Randt , an M. D., indicating that the new agency would have manned space flight effort with high priority. Randt requested me to return to Washington as Chief of the new Space Biology Program. I would have preferred to remain in Huntsville and fly experiments but that was not in the cards. I went back with the understanding that I would be allowed to build a N.A.S.A. Life Science Program at one of the N.A.S.A. Field Centers. I was also able to develop a modest Biology Flight Program, using an unmanned, solid- propelled rocket to be launched from a military facility at Point Arguello, near Vandenburg Air Force Base in California. I had pulled together a group of scientists, from universities and other laboratories, and we were designing experiments to fit into a basketball sized space craft, designed and flown to detect and measure cosmic rays. I had enough money to involve the Goddard Space Center and the Space Science Division of the General Electric Company in this effort. We had selected the NASA Ames Research Center at Moffett Field, Calif., as the home of the Life Science Laboratory Facility for the agency. I moved to Ames as the Chief of the Biochemical Evolution Branch and an O.K. to begin the establishment of a NASA Life Science Laboratory.

We had lived in Bethesda, Md. during this stay in Washington, not far from the National Institutes of Health. Our son Mark was born here on Sept. 1960, also in Bethesda, at suburban Hospital. We were getting ready to move to California early the following year, which in fact we did in late January, right after the Kennedy Inauguration and the blizzard which immediately followed. We headed south to avoid the snow - Mark, (5 months old) was sick so, of course each of the children took turns being sick. It was a miserable trip, but we felt better when we reached California and found the orchards in the Santa Clara Valley, in bloom - the fruit trees were still there then.

Ames Research Center, Moffett Field, Calif.
1961 - 1967

Ames was one of the old NACA (aeronautics) laboratories which had been assembled to create NASA the year before. Historically, it had nothing to do with science, it was one of the countries' original wind tunnel test laboratories, where new

airplane designs could be tested in high and low velocity wind tunnels - there were only two or three in the country. It had been started in 1939 by Smith J. DeFrance one of the country's first Aeronautical Engineers. It was staffed with about 1,000 engineers, all having to do with aeronautics, and "Smitty" knew them all by name. Now he was suddenly taking on something brand new. I knew he must have misgivings - I certainly did. He had been Director for 20 years and continued in that capacity for another 20 or so. Once NASA was created all the old NACA centers had to grow in order to accommodate the new space related activities and maintain leadership in their more traditional areas. Smitty was a "character". He came across as gruff and tough but he was an intelligent and fair minded person when you got to know him. I grew to like him a lot as I got to know him better and he always treated me well. Smitty had been a pilot in World War I, had lost an eye and wore a black eye patch. He had promised his wife he would never fly again and as far as I know, he didn't. The director of a NASA Field Center and he wouldn't use airplanes. When he had to go back to Washington, he took the train. Ames had been operating in exactly the same way for 30 years and now suddenly they had the alien Biologists to cope with. Being an engineering center all those years had led to the establishment of certain work habits and patterns that worked well for them but as I quickly learned, didn't work for us. I had set up a laboratory on the roof of the Instrument Research Building, primarily to prepare for the life science flight program I had started when I was in headquarters, now called "Bios". In addition, I was beginning to outline a program of research in Gravitational Biology for the agency. I had hired a scientist (Jiro Oyama) - who had worked next door to me at the Food and Drug Administration a few years back - as well as several laboratory technicians. We were underway with science at the Ames Research Center. Laboratory researchers doing experiments that require frequent or continuous attention are used to working at odd hours - set by the requirements of the experiments. They had never worked that way at Ames. You started work at 8am, and went home at 5pm with few exceptions. What I didn't know was that the power was shut off at 5pm and back on at 8am. Without power in the laboratory, we couldn't function, especially dealing with live material requiring rigorous environmental control. For example, the refrigerators went off every night often destroying our experiments. I had to go to Smitty, to get this and other disturbing customs changed. At first, Smitty resisted - he didn't understand why we couldn't be like everyone else. It was also required that every publication from the center be published in a government (NASA) publication, and with the center director's name on it. This made no sense at all to me and is totally unacceptable to a scientist. The purpose of such publications is to establish a reputation as a scientist through providing one's data to the scientific community in such publications. Obviously the data can't be signed by an administrator, who knows nothing about it, and published in a government document that no scientist reads or even knows about. To Smitty's credit, he listened and eventually understood. The objectionable rules were changed.

Bios I was now being built and launch time was approaching. The scientific team I had assembled was getting excited about the upcoming opportunity and so was I. This capsule was devoted to science. Once we started to fly astronauts in Mercury,

Gemini and Apollo vehicles, the men became the entire focus of the mission and science was still out in the cold. In addition, most of the early astronauts had no interest in science - they had all been trained as military pilots and all they wanted to do was fly a space craft with their own hands. Unfortunately, when flying in a manned space craft I was told that all my experiments had to be redesigned so that an astronaut was involved in the activation of the experiment. Of course, up to this point I had had to design all hardware to function in the automated mode - so, back to the drawing board. It was now necessary to include astronauts in everything we did whether or not they had any interest or expertise and in spite of the fact that it added a great deal to the expense of the entire mission. I redesigned the hardware so that there was a small lever on the outside of the sperm and egg chamber which required the astronaut to flip the lever at the appropriate time on his activity schedule, which would activate the experiment. Gus Grissom was the astronaut in the Mercury flight responsible for my experiment. For the entire year of preparation and training, I never saw or heard from Gus. It was clear he couldn't care less about this responsibility, even though it was being used by the agency to justify his presence on the spacecraft. During the flight, when it came time for him to flip the lever, he turned it so hard he broke it, destroying the experiment which would have worked very well in the automated mode. I never heard a word of apology from him. This kind of disinterest was prevalent among the early astronauts who were interested only in flying. It was a number of years later before the agency began to include scientist - astronauts in the crews. In the early days, science didn't have a chance. During this period of time I was able to fly experiments on both Gemini and Apollo missions, but without much scientific success. On one Gemini flight, I had some frog eggs on the spacecraft. Things worked pretty well. The recovery ship was the aircraft carrier Wasp, and I had set up a laboratory in the Dental Clinic. The crew had some "fun" with me. They had assigned me a bunk which turned out to be right next to the steam driven catapult used to launch aircraft from the deck above. During the night, they started launching planes, and when the catapult went off, of course, it woke me up in terror. I sat up and bashed my head on the overhead above. The crew, who had been waiting for this, thought it was hilarious - I didn't.

That summer, two Bios spacecraft were launched. I was on board the primary recovery ship, the "Pine Island", which sailed with two destroyers and a tracking ship to the recovery area in the Pacific. I had designed a mobile laboratory, which was on board the recovery ship, to handle the recovered biological specimens after recovery. On the way to the recovery area we also launched two enormous high altitude balloons which were intended to make high altitude cosmic ray measurements. Both balloons were ruined - the first was torn open on one of the ship's gun mounts and the second had an electronic failure and released the entire instrument payload shortly after leaving the deck. It crashed into the deck and was destroyed. The two Bios capsules were launched and both of them were lost from our radar screens, so that nothing was recovered. I had to consider the whole mission a total failure, and so did all the scientists working with me, and the Captain of the ship ("Pine Island"), who was hoping for a promotion to Admiral. That's the way it was in the early days.

Meanwhile, we were hiring scientists at Ames and setting up new laboratories wherever space was available around the center. A few years later, we built a new laboratory entirely for life science research at the center, and Ames became the primary center for life science research in NASA and over the years developed a reputation for excellence in several fields of research in the space life sciences. There were the Space Biology Division, the Exobiology Division and the Biomedical Division, with several Branches in each division. At any given time there were about 250 Civil Service scientists in the life sciences. We had a visiting professorship program where university scientists could come and work in our unique laboratories. We also had a postdoctoral fellowship program administered by the National Academy of Sciences, for us. I gradually evolved from a laboratory researcher into more and more of an administrator. Somehow, this seemed inevitable since I enjoyed both. The government had always treated me well with raises and promotions, so I felt I was progressing satisfactorily, career-wise. I had always been put in positions with sufficient authority and funding to do the job - especially in NASA. The Civil Service, in spite of its many shortcomings, was a system that worked pretty well for me. I had been on the Civil Service rating board, so I knew how the system worked. I had always been promoted as soon as I was eligible for promotion, and the pay, while always lagging behind industry and often university pay, was O.K. The retirement and medical plans were good. Other than the fact that the Civil Service tended to overprotect the inefficient or poorly performing worker, the system worked reasonably well. In addition, I was able to interact freely with scientists anywhere in the world, at scientific meetings, and in my laboratories and theirs.

I was a frequent lecturer to public and scientific audiences (20-40/year) in the U.S. and abroad. I have written two books on space life science research and contributed chapters to many other books, including textbooks and encyclopedias and I have published about 45 papers in scientific journals. I have been and in some cases still am a member of such professional societies as, Sigma Xi, The American Society for the Advancement of Science, Phi Sigma, The American Society of Zoologists, The American Society for Cell Biology (Executive Director), Federation of American Societies for Experimental Biology, and the International Society for the Study of the Origin of Life, which I founded in 1969, and was for many years a member of the Executive Council and for several years, Vice President. The ISSOL meets in a different member country each year, which makes it especially interesting. I have been on the editorial boards of several scientific journals - Origins of Life, The British Interplanetary Journal, Biosystems, and Precambrian Research. Further details of these activities can be found in my curriculum vita, (attached).

Those were very busy days at Ames - hiring personnel, getting laboratories organized and outfitted, getting our funding in order, etc. The first director of the whole Life Science effort at Ames, from 1961 to 1963, was Dr. Webb Haymaker, who came to us from the Walter Reed Hospital and Research Center in Washington, D. C. Webb was a Pathologist with little or no background in administration - a pleasant gentleman, but out of his element. Within a couple of years we had brought in Dr. Harold P. Klein, Chairman of the Biology Dept. of Brandeis Univ. "Chuck", although

not an M. D. was an ideal Director of Life Sciences, and things went smoothly for many years thereafter. I was Chief of the Biochemical Evolution Branch (1961-1963) From (1963 - 1967) I was Chief of the Exobiology Division, which included three Branches (Chemical Evolution, Biological Adaptation and Life Detection). This included about 50 laboratory scientists and support personnel. I have often said that this was the best job I ever had - I was able to do research and to manage the Division and I loved both. For the first couple of years my research had to do with simulating the Mars Environment (as we knew it at that time), and exposing terrestrial life forms to that environment to see if they were able to survive and/or grow. The work was important to our understanding of the possibility of indigenous life on Mars and to the possibility of contaminating Mars with terrestrial life forms and perhaps thereby destroying evidence of indigenous life. There were perhaps 4 or five scientists around the world doing such research at the time, all funded by me. As it turned out, Mars had a much more hostile and extreme environment than we suspected and most of these experiments were essentially irrelevant. Terrestrial life forms (even the hardiest of bacteria) were quickly killed by exposure to the Mars environment - no liquid water, temperatures far below the freezing point of water, virtually no oxygen, the atmospheric pressure equivalent to pressures far above the top of Mount Everest on Earth, and unattenuated ultra violet capable of sterilizing the surface. I terminated this program after a couple of years of very interesting research. This changed our thinking to the possibility that while we no longer believed that life exists today on Mars, further experiments must await the time when we could actually land on Mars, and learn more about this extremely hostile environment. That turned out to be the Viking landers, 10 years later.

During the early '60s we were able to organize and fund two satellites for the sole purpose of flying biological experiments. Compared to my earlier efforts, these satellites (Biosatellites I and II) were pretty sophisticated. We had electrical power, some temperature control, each experiment self contained and some with photographic capability. We had plants, frog eggs, bacteria, amoebae, mice, and on one of the satellites, a monkey. By this time the Soviets had already launched a dog and a number of cellular experiments. While these were still primitive experiments, they were a large step in the right direction. The Biosatellites were launched from Cape Canaveral, Fla. and were to be recovered at sea in the Pacific. Unfortunately, the orbital lifetime of the Biosatellites was limited to no more than 3 days - inadequate for most experiments but still better than ever before.

The switch to Exobiology research, turned out to be an important and productive one. It was a new one initially stimulated by a paper written by Dr. Joshua Lederberg, Nobel Laureate, at the time at Stanford University. His paper, written a couple of years earlier, speculated on the possibility of actually exploring the planets, to search for life, and to search for evidence of the origin of life. These were exciting ideas in exciting times. I got to know Josh well, and was able to fund some laboratory work on his part, in the Life Detection area. He had (and has) one of the best minds I had ever encountered and I had the greatest admiration for his intellect. His paper along with some laboratory work done by Stanley Miller, then a graduate student in the laboratory

of Harold Urey (Chicago Univ.), Nobel Laureate, suggested that ground based research could provide us with solid clues to the chemical pathways by which life arose on Earth. I brought in Cyril Ponnampertuma, a post-doctoral fellow, when he had finished his PhD in the Laboratory of Melvin Calvin, Nobel Laureate at the Univ. of California at Berkeley. He had the training as a chemist and strong interest in the field. I decided the time was ripe for NASA to start a program, both at Universities and in House at Ames, in the field of Exobiology. I obtained the money from NASA Headquarters (from my friend Freeman Quimby), pulled together an advisory committee, solicited proposals for competitive evaluation, reorganized my own Laboratory at Ames, and began. Within a few months I was able to attract a sizeable number of proposals from outstanding scientists from around the country, including 7 Nobel Laureates, for funding. The interest in the field was remarkable and enthusiastic and led to one of the premier research programs in all of NASA, recognized as such to this day. Through publications and lectures we quickly attracted laboratories around the world to start up programs in this exciting field. I established a program in Exobiology (sometimes called Planetary Biology), in COSPAR, so that we had an annual international forum for work in this area. Programs quickly sprang up in many countries, most notably in France, Germany, Great Britain, Holland (where a new Department of Exobiology was created at the Univ. of Nimjegen - the first in the world), Japan, Spain, Sweden, the USSR, and others. There had already been two international symposia on the Origin of Life; one in Moscow in 1957 and one in Florida, (at Waukula Springs, near Tallahassee), in 1963, which I had sponsored through Sidney Fox of Florida State Univ. It was at the Waukula Springs meeting that the two earliest scientific thinkers on the Origin of Life, met for the first time. Both had written on the subject back in the 1920s, and they had never met or communicated. These two were Dr. A. I. Oparin, of the USSR, and Dr. J.B.S. Haldane of Great Britain. Haldane died a few months later of cancer. Oparin lived for a number of years more, and I got to know he and his wife Nina quite well. Nina spoke good English, and in fact taught English in Moscow - she also sometimes translated for Oparin when he lectured to an English speaking audience, although she did not enjoy doing that.

Things had been going well in the laboratory during the 60s, but not so well in Washington. I was under pressure to return to NASA Headquarters in Washington to head up the National program in Exobiology. Freeman Quimby, who had been running it was leaving to go to the Library of Congress, and I was really the only person with the background to do the job. Orr Reynolds who was heading the NASA Office of Life Sciences was quite persistent in asking me to come back and in 1967 we sold our house in Sunnyvale and moved back to Washington. We bought a house in McLean, Va., and stayed there until 1979.

Washington 1967-1979

Living in McLean was pleasant. It was a small town (then, not now), on the Virginia side of the Potomac River, good schools, housing, and about 40 minutes from down town Washington. The children received most of their primary and secondary

schooling there. It was a rather international community, which made it doubly interesting. We enjoyed it a lot. We had a very nice house in a very nice neighborhood, and I enjoyed my job a lot. I was now the Chief of the Exobiology Program at NASA Headquarters, responsible for the national program in Exobiology which included about 100-150 grants and contracts, mostly at Universities. We were involved in basic research on the origin of life on earth and/or elsewhere in the universe, including study of the planets and their evolution. In a couple of years I was also given the responsibility for the Space Biology Program (the same program I had started when I first went to headquarters, years before). In the late 60s I was instrumental in getting the Agency to go to congress with a plan and request to go to Mars with an automated probe to begin to do the necessary analyses to begin to understand the Physics, Chemistry, and to begin the search for life (which many of us thought was an unlikely prospect). In that capacity I was made the Chief Program Scientist for the Viking Program (our first mars lander mission). Jerry Soffen and I were co-chairmen of the Viking Science Steering Committee, responsible for the development of an interdisciplinary team of about 70 scientists from the United States and abroad, working on the instrumentation required to carry out those objectives. The Viking Program was by far the largest unmanned program yet undertaken by NASA - the ultimate cost reaching \$1,000,000,000 spread over 7+ years. Those were exciting days, developing the experiments, assembling the spacecraft, launch from Cape Kennedy, the nearly 1 year wait for the transit to Mars, the successful landing on Mars, the first picture from Mars, the first sample of the Mars surface and then, the three year operation of the 13 major experiments, studying the chemistry, potential biology, weather, temperature, pressure, seismic activity, cameras (2), etc. All the experiments operated perfectly, and since there were two spacecraft, this fact alone was a remarkable achievement, and produced a great deal of data, some of which is still being analyzed. The Viking success led to many scientific meetings held in the U.S. and around the world, in order to communicate with other scientists and the public. While these were preliminary results, there was enormous interest and Jerry Soffen and I spent a great deal of time lecturing. Fortunately, we really enjoyed it. The enormous excitement and sense of success generated by Viking left many of us, including me, wondering how we could ever top this.

During this period of time (the 1970s) our son Mark was having more and more difficulty. His behavior changed drastically, he was in constant trouble both at school and at home, he began running around with a very undesirable group of teenagers and doing very poorly at school. We thought about moving to another community and getting him a fresh start, but before that we decided that counseling might help, especially since they had been indulging in drug and alcohol abuse. We sent him to a Psychologist. After months of "treatment", we saw no improvement and got no feedback from the Psychologist who considered his relationship with Mark confidential. We decided to move to Annapolis, MD, where we were a block from a school for Mark. Also we were able to buy a house on a creek where we could keep a boat for cruising and water skiing, thinking that might help. It did not. Mark began to get more and more paranoid, began hallucinating and in general to deteriorate

mentally. We sent him to a Psychiatrist for help, but after a year we seemed to be getting nowhere, and eventually had to hospitalize him. He is diagnosed with Schizophrenia. He is hospitalized to this day, and may remain so since he does not respond to neuraleptic drugs. We hope for the best but Mark's future is bleak.

New York - Rockefeller Univ. (1979-1982)

Shortly after the Viking Mission, I was approached by my old friend Joshua Lederberg who had recently left Stanford Univ. to assume the presidency of Rockefeller Univ. in New York City. Rockefeller is one of the two top biomedical research institutions in the world. The other is Harvard Univ. Rockefeller is unique in that it offers no courses, it does biomedical research only, and students who are among the best in the country are expected to be able to handle their routine learning on their own. 100 graduate students are accepted each year. It costs them nothing - room and board are subsidized by the University. They can work toward a PhD or M.D. degree, and do so in some of the world's best laboratories under some of the world's best scientists, including a number of Nobel Laureates. It is a remarkable institution, founded by John D. Rockefeller around 1900. Josh invited me to come to Rockefeller as Vice President and help him get started. I was looking for something that might provide the stimulus, missing since the end of the Viking mission. I liked New York and this sounded like a good opportunity. I accepted the position with the intention of staying about 4-5 years and then perhaps returning to Washington. We sold the Annapolis house and bought a house in the Mt. Vernon/Bronxville area of Westchester county, north of New York City. I became a commuter again, and Nancy went into the real estate business. We ultimately moved Mark up to Rockland State Psychiatric Hospital, one of the oldest and best in the state, which is where he is at this time.

My responsibilities at Rockefeller included establishing a career development program for young faculty. Working in the laboratory under a Nobel Laureate, sometimes a young faculty member could be relatively ignored by his mentor. Since the competition for tenure is very acute at Rockefeller, these young people needed a lot of help in preparing to look for permanent jobs. In addition, I was to try to develop new inter-laboratory research programs, where more than one laboratory, working in complementary fields, would join in a research proposal for submission to the National Institutes of Health for funding. Since most of the laboratory heads were very senior scientists and fiercely independent, this was not easy. Lederberg and I were both interested in the area of science and public policy. There has been an increasing lack of understanding on the part of the public, about science, how it works, what it does for people, and why a strong national effort in basic and applied research is crucial to the national welfare. Without solid public support, the leadership of the United States in research is in jeopardy. I set up a series of public lectures to attempt to rectify this problem.

All in all my tenure at Rockefeller was a very positive experience but I was never

quite comfortable with my role and interaction with some of the faculty. Nancy never adapted to life in New York or to New Yorkers, so after 3 years I started to looking to return to Washington, where we were both more comfortable. While at Rockefeller I had remained a NASA advisor, chairing a couple of advisory committees, organizing symposia and playing an active role as a senior advisor to the agency. I enjoyed this and even though I had retired from the government when I went to New York I had remained close to the agency.

Washington, D. C. (1982-1985)
American Society for Cell Biology

In 1982 I was offered a position as the Executive Officer of the American Society for Cell Biology, with my headquarters in the National Headquarters in Bethesda, MD, a suburb of Washington. This was a major scientific society with more than 5,000 members. This appealed to me and my responsibilities were essentially managerial in nature, including building membership, raising money, running the business affairs of the organization, staffing and preparing for the national meeting of the society, which was the most important event of the year for us. I had a staff of four in an office suite near the National Institutes of Health in Bethesda. This also allowed us to move back to our house in McLean which we had rented to Iraquis while we were gone. It also allowed me to pursue my other interests with other government agencies, particularly NASA. While I enjoyed the job for the first couple of years it became quite routine after that. I was able to set up a stable budget for operations and in general put the society on a sound fiscal basis. We had organized two annual meetings, but once you have done that, it gets pretty boring to do it again year after year. One of my assistants turned out to be quite good at it so I turned that responsibility to her. In the meantime NASA was pushing me to do more and more work for them, which I began to do. They wanted me to take on the management of a small General Electric Corp. subsidiary (Management and Technical Services Co.).

Washington D. C. 1985-1987
Management and Technical Services Co.

By 1984 the government was cutting back on its civil service employes and it became obvious that many agencies were going to be understaffed and unable to carry out their responsibilities. The public, unfortunately, seemed to feel that civil servants didn't do any work anyway, so who needed them? This unfortunate attitude is even stronger today, at least among conservatives, so the move to reduce the size of the government continues. The NASA Life Division, along with other federal organizations, were forced to seek help from contractors, and did so by setting up corporate offices, such as MATSCO to supply them with the necessary skilled personnel. I estimate this move ultimately cost the tax payer at least 50% more than it would have had they continued to use civil servants. All it did was to allow the

politicians to brag about reducing the federal payroll. MATSCO was designed to provide expert help to the Life Science Division. This included scientific, computer and administrative services to NASA Life Sciences. To do this I had a staff of about 20 PhDs and MSs, all with expertise in a specific area where NASA needed help. I also set up a computer office and an editorial office, since we did a great deal of report writing and preparation of technical papers for the office. At the same time I was still chairing several advisory committees, I was an official of COSPAR (Chairman of the Life Science Commission), and the liaison person between the International Union of Biological Scientists and COSPAR. Another of my jobs during this period was to try to establish a better working relationship between the NASA field centers working in the Life Sciences.

In the late 1970s, before I retired from NASA I had tried to start up a new program, which involved the study of closed ecosystems. There were two reasons for such a program. First of all, Ecology was becoming of major global importance because of the impact man was having on the Earth on a global scale. The second reason had to do with long term manned exploration of the solar system which most of us felt was inevitable. If indeed man was to make long term (2 or more years) flights, then maintenance of a stable environment either in the spacecraft or on the surface of another planet, would be of paramount importance. This meant creating a stable ecosystem capable of producing food, air and water for the crew for an indefinite period of time. On a long flight it would be impossible to carry sufficient food air and water to sustain a human crew for two or more years, and the distance and cost of resupply would also be prohibitive. We clearly needed to study this problem and devise a solution. I proposed this to NASA at the time, but at that time NASA had no interest in getting into Ecology since they felt that was in the purview of other federal agencies and NASA would help them if asked. As to long term manned flights, they did not appear to be in the cards, in fact, NASA had been directed by congress not to plan on manned planetary mission. I had to give up at the time, but now the situation was different - NASA was interested and working in Ecology, and plans for long term human space flight were being revived. As an official NASA advisor I was in a position to make recommendations to NASA senior management and this time it did not fall on deaf ears. We were able to start a new program - "Controlled Ecological Life Support Systems" - funded by the Life Science Division. The goal was to build a sealed chamber, large enough to hydroponically (without soil), grow enough plants to produce sufficient food and to recycle enough air and water to sustain 2 or 3 humans indefinitely. Plants, of course do exactly that on Earth and thereby make life on Earth possible. We are trying to create an earthlike environment in a chamber - a very difficult job. The Kennedy Space Center in Florida was the first to start on such a program. I decided to move to Kennedy in order to be closer to the work, and help out in an advisory capacity. I had been with NASA since the very beginning and was literally the "memory" of the Life Science Program. I knew what had been done before, where our expertise was, who were the university scientists who could help, etc. So far, we have been able to grow wheat (achieving better yields than in the field), potatoes, tomatoes, lettuce, peanuts, beans, peas, etc. under these conditions. Plants

clean up water metabolically, making it quite potable and plants also automatically take carbon dioxide from the atmosphere and through the process of photosynthesis convert it to carbohydrate, oxygen and water, which is exactly how life on Earth is sustained. This is an extremely ambitious undertaking which will take a lot of time and money, but it is of such fundamental importance to mankind that it seems very important to continue it. Not only will we learn how to proceed with long term human space flight, but we will learn how to cope with some of our environmental problems here on Earth. Unfortunately, our recent frenzy to reduce budgets has already cut programs like this back to almost nothing.

At this point in time I have retired for good. As I said at the beginning, I feel that I have had a career in science at a time when there has been great excitement and progress - at least for me. I hope I have managed to pass on some of this with this autobiography.